Council of the European Union

Brussels, 5 March 2026
(OR. en)

7009/26
ADD 4

Interinstitutional File:
2026/0068 (COD)

COMPET 278
IND 165
MI 215
MAP 74
FDI 7
TRANS 124
CLIMA 113
ENV 200
ENER 108
ECOFIN 291
UD 52
POLCOM 84
CODEC 395
IA 51

COVER NOTE

From:	Secretary-General of the European Commission, signed by Ms Martine DEPREZ, Director
date of receipt:	5 March 2026
To:	Ms Thérèse BLANCHET, Secretary-General of the Council of the European Union
No. Cion doc.:	SWD(2026) 71 final
Subject:	COMMISSION STAFF WORKING DOCUMENT IMPACT ASSESSMENT REPORT Accompanying the document Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing a framework of measures for the acceleration of industrial capacity and decarbonisation in strategic sectors and amending Regulations (EU) 2018/1724, (EU) 2024/1735 and (EU) 2024/3110

Delegations will find attached document SWD(2026) 71 final.

Encl.: SWD(2026) 71 final

EUROPEAN
COMMISSION

Brussels, 4.3.2026
SWD(2026) 71 final

COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT REPORT

Accompanying the document

Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

establishing a framework of measures for the acceleration of industrial capacity and decarbonisation in strategic sectors and amending Regulations (EU) 2018/1724, (EU) 2024/1735 and (EU) 2024/3110

{COM(2026) 100 final} - {SEC(2026) 70 final} - {SWD(2026) 70 final} - {SWD(2026) 72 final}

Table of contents

Glossary

Term or acronym	Meaning or definition
B2B	Business to business
BESS	Battery Energy Storage System
BF-BOF	Blast Furnace – Basic Oxygen Furnace
CBAM	Carbon Border Adjustment Mechanism
CCS	Carbon Capture and Storage
CPR	Construction Products Regulation
CRMA	Critical Raw Materials Act
DSO	Distribution System Operator
EIA	Environmental Impact Assessment
EIIs	Energy Intensive Industries
EPBD	Energy Performance of Buildings Directive
ESPR	Ecodesign for Sustainable Products Regulation
ETS	Emission Trading System
EU	European Union
EVs	Electric Vehicles
FDI	Foreign Direct Investment
FID	Final Investment Decision
FTA	Free Trade Agreement
GHG	Greenhouse Gases
GPA	WTO Government Procurement Agreement
GWP	Global Warming Potential
IAA	Industrial Accelerator Act
IEA	International Energy Agency
IED	Industrial and Livestock Rearing Emissions Directive
LCA	Life-cycle assessment
LCOP	Levelised Cost of Production
MFF	Multiannual Financial Framework
NZIA	Net Zero Industry Act
OEM	Original Equipment Manufacturer
PO	Policy option
PPA	Power Purchase Agreement
PV	Photovoltaic
RRF	Recovery and Resilience Facility
SEA	Strategic Environmental Assessment
SME	Small and Medium-sized Enterprises
SO	Specific Objective
WTO	World Trade Organisation

1 Introduction: Political and legal context

1.1 Political context

The European Union (EU) manufacturing sector employed around 30 million persons and generated EUR 2.5 trillion of value added in 2023, making it the largest sector of the EU's business economy for its contribution to employment (18.7%) and value added (23.6%).[1] However, the EU's share of global industry gross value added declined from 20.8% in 2000 to 14.3% in 2024.[2] Industrial investment in the EU is lower than in other regions.[3] EU energy prices continue to be higher than our trade partners' and are forecasted to remain so in coming years. Europe still faces commercialisation obstacles and regulatory hurdles.[4] Furthermore, a major structural challenge for some EU industries[5] is state-subsidised overcapacity at global level, which distorts global prices and international markets.

Manufacturing industries account for about 26% of the EU's total greenhouse gas (GHG) emissions. Energy intensive industries (EIIs), on their own, represent 22% of the EU's total GHG emissions or more than three quarters of all industrial emissions.[6] For the purpose of this impact assessment, EIIs include the following industrial sectors: chemicals, steel, pulp and paper, plastics, refineries, cement, non-ferrous metals, glass and ceramics, as first identified in the European Commission's Annual Single Market Report 2021 and consistently used in subsequent policy frameworks.[7]

Decarbonisation and industrialisation are two sides of the same coin, as decarbonisation should be delivered with a strong and resilient European industrial base. Achieving the EU's climate neutrality goal without negatively affecting industry's performance depends on a strong business case for decarbonisation. Without a healthy decarbonised industrial base, the EU will not achieve its objectives of economic security, competitiveness and decarbonisation as outlined in the Competitiveness Compass.[8]

The global market for net-zero industry technologies[9] is projected to nearly triple by 2035.[10] While deployment in the EU is progressing, the Union's global market share is declining, and domestic manufacturing capacity remains limited. Production is highly concentrated, with mainland China controlling over 90% of solar photovoltaic (PV) and battery manufacturing capacity, and more than 90% for battery anodes and solar wafers.[11] Strengthening EU clean tech manufacturing is therefore essential.[12]

The Antwerp Declaration[13] calls for a European Industrial Deal to complement the EU Green Deal and safeguard quality jobs in Europe. The Declaration calls for urgent action to restore the business case for investments in Europe.

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[1] Eurostat. Enterprises by detailed NACE Rev. 2 activity and special aggregates.
[2] Eurostat. Gross value added and income by main industry (NACE Rev.2).
[3] ERT (2022). European Competitiveness and Industry – Benchmarking Report 2022.
[4] Draghi, M. (2024). The future of European competitiveness: A competitiveness strategy for Europe (Part A), p.28
[5] Steel, aluminium and chemicals.
[6] Eurostat (2023). Air emissions accounts by NACE Rev. 2 activity.
[7] European Commission (2021). Commission Staff Working Document, Annual Single Market Report 2021, accompanying the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Updating the 2020 New Industrial Strategy: Building a stronger Single Market for Europe's recovery, COM(2021) 350 final, p.120.
[8] European Commission (2025). A Competitiveness Compass for the EU, COM(2025) 30 final, 29 January 2025.
[9] Net-zero technologies include solar technologies, onshore wind and offshore renewable, battery and energy storage, heat pumps, hydrogen technologies, electricity grid, and other technologies listed under Article 4 of the NZIA.
[10] IEA (2024). Energy Technology Perspectives 2024.
[11] IEA (2024). Energy Technology Perspectives 2024.
[12] European Commission (2025). Competitiveness Progress Report on Clean Energy Technologies, COM(2025) 74 final, 26 February 2025.
[13] The Antwerp Declaration for a European Industrial Deal webpage (2024). About the Antwerp Declaration.

Economic security has become a central pillar of the EU's industrial policy since the adoption of a European Economic Security Strategy.[14] In October 2023, the Commission adopted a Recommendation[15] identifying ten critical technology areas that are essential for Europe's security and competitiveness. These technologies underpin the green and digital transitions but also expose the Union to strategic dependencies and supply chain risks.

The European Commission presented in February 2025 the Clean Industrial Deal[16] as Europe's new growth strategy to accelerate decarbonisation, increase competitiveness and ensure productivity growth for European industry. On the financing side, this included the Clean Industrial Deal State aid framework adopted in June 2025, an Industrial Decarbonisation Bank planned for 2026 and the European Competitiveness Fund. The Commission also presented an Action Plan for Affordable Energy to decrease energy costs across the EU.

EU leaders adopted the Budapest declaration[17] highlighting the urgent need and determination to make the EU more competitive through a new European competitiveness deal. In March 2025, the European Council reaffirmed its commitment to strengthening Europe's competitiveness.[18] The European Parliament Resolution on Energy Intensive Industries[19] calls on the Commission to develop solutions for speeding up decarbonisation projects and for the creation of lead markets for clean and circular European products, via non-price criteria in EU public procurement in line with the EU's international commitments.

It is in that context that the Clean Industrial Deal announced a new regulatory initiative to address permitting bottlenecks, introduce resilience and sustainability criteria to create lead markets for the development of European clean and resilient industrial technologies and products and develop a label on the carbon intensity of industrial products, starting with steel. The European Steel and Metals Action Plan[20] and the European Chemicals Industry Action Plan[21] reiterate the commitment to include resilience and sustainability criteria to support the demand for EU-made clean products. The Automotive Action Plan[22] states that to boost the European production of key vehicle components, any public support benefitting the automotive industry will be made conditional on resilience and sustainability criteria to be proposed under this initiative. It also calls on it to address European content requirements on battery cells and components in EVs sold in the EU, in line with the Union's international legal commitments. Based on these previous commitments, the 2025 State of the Union Address announced a proposal of an Industrial Accelerator Act (IAA) to boost demand for clean and Made in EU products in key strategic sectors and technologies.

1.2 Legal and policy context

A range of EU policy and legal instruments govern how the manufacturing industry operates in the EU, covering areas such as GHG emission reductions for manufacturing sites in the EU, energy markets, energy efficiency, conditions to operate in the Single Market and compliance

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[14] European Commission (2023). Joint Communication to the European Parliament, the European Council and the Council on "European Economic Security Strategy".
[15] Commission Recommendation C(2023) 6689 identifies ten critical technology areas for the EU's economic security: 1) Advanced semiconductors technologies; 2) Artificial intelligence technologies; 3) Quantum technologies; 4) Biotechnologies; 5) Advanced connectivity, navigation and digital technologies; 6) Advanced sensing technologies; 7) Space and propulsion technologies; 8) Energy technologies; 9) Robotics and autonomous systems; and 10) Advanced materials, manufacturing and recycling technologies.
[16] European Commission (2025), The Clean Industrial Deal: A joint roadmap for competitiveness and decarbonisation, COM(2025) 85 final, 26 February 2025.
[17] European Council (2024). Budapest Declaration on the New European Competitiveness Deal, adopted 8 November 2024.
[18] European Council Conclusions, March 2025.
[19] European Parliament (2025). Resolution on energy-intensive industries, 3 April 2025.
[20] European Commission (2025). A European Steel and Metals Action Plan, COM(2025) 125 final, 19 March 2025.
[21] European Commission (2025). A European Chemicals Industry Action Plan, COM 2025 530 final, 8 July 2025.
[22] European Commission (2025). Industrial Action Plan for the European automotive sector, COM(2025) 95 final, 5 March 2025.

with environmental and climate legislation. In particular, the EU Emissions Trading System (ETS) Directive[23] is the main climate policy instrument to incentivise GHG emissions reduction. It provides the main price signal for industries to invest in decarbonisation, and the Commission is preparing its proposal for a review to ensure the instrument is adjusted to promote cost-effective emissions reductions in line with the climate neutrality target. The Carbon Border Adjustment Mechanism (CBAM) is the instrument protecting some ETS sectors from the risk of carbon leakage, while ensuring that domestically produced and imported goods face the same carbon costs in the internal market. A comprehensive review of CBAM, accompanied by an anti-circumvention strategy, has been adopted at the end of 2025. The Net Zero Industry Act (NZIA)[24], as well as the Batteries Regulation[25], also provide incentives for clean tech and resilient industrial manufacturing in the EU. Industrial decarbonisation is also supported by policies and legislation on the demand side, aiming at decarbonising downstream end-use sectors. This includes for instance recent legislation on the building and construction sectors, and aviation and waterborne transport or most notably the automotive package, with the revision of CO_2 standards and the introduction of low-carbon steel credits. It also includes products legislation, such as the Ecodesign for Sustainable Products (ESPR), which aims at improving the environmental sustainability and circularity of products placed on the EU market. Permitting and access to energy infrastructure is also covered by other recently adopted Commission's initiatives, namely the grids action plan, the electricity market design, the grid tariff and grid anticipatory investment guidance implementation, the Grids package on infrastructure planning and permitting and the Environmental Omnibus, to simplify administrative burden in environmental legislation. Annex 8 presents the list of relevant initiatives and a detailed explanation of how they relate to IAA.

2 Problem definition

2.1 What is the problem?

The overarching problem this initiative aims to address is to support the EU industry's competitiveness and resilience in a context of increased global pressure, while accelerating the decarbonisation of its processes and products. The business case to invest in innovation and industrial decarbonisation in the EU needs to be improved, with particular focus on EIIs and clean tech manufacturing.

Lengthy and complex permitting procedures slow down projects, while limited access to affordable energy, infrastructure and key materials further constrains investment. These bottlenecks undermine industrial competitiveness and delay the clean transition.

Global pressures

The causes for the industry's reduced competitiveness are multiple, and many depend on external macroeconomic factors beyond the scope of this initiative.[26] Energy inputs account for

[23] Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union and amending Council Directive 96/61/EC.

[24] Regulation (EU) 2024/1735 of the European Parliament and of the Council of 13 June 2024 on establishing a framework of measures for strengthening Europe's net-zero technology manufacturing ecosystem.

[25] Regulation (EU) 2023/1542 of the European Parliament and of the Council of 12 July 2023 concerning batteries and waste batteries, amending Directive 2008/98/EC and Regulation (EU) 2019/1020 and repealing Directive 2006/66/EC.

[26] Such as such as demand slowdown, higher energy and feedstock supply costs in the EU than in certain trading partners, overcapacities and unfair trade policies by some third countries. The Draghi Report identifies several key factors contributing to the declining competitiveness of the EU industry and EIIs: higher energy prices and emissions costs relative to global competitors, substantial investment needs for decarbonisation, regulatory burdens, and an uneven playing field at the international level, exacerbated by limited market demand for greener products and net-zero technologies (Source: Draghi, M. (2024). The future of European competitiveness: In‑depth analysis and

7% to 9% of the production value in EU EIIs, and although gas and electricity prices in the EU have dropped from their 2022 peaks, gas prices are still about five times higher than on other global markets and electricity prices are approximately twice as high. The forecasts for 2030 indicate a continuation of Europe's energy cost disadvantage.[27]

Most manufacturing industries operate in a global market shaped by increasingly distorted competition. These distortions are the result of a combination of state subsidies, global industrial overcapacity, tariff asymmetries, and the strategic deployment of foreign industrial policies that challenge Europe's ability to remain competitive, while decarbonising. In the new world order, competitors like China are moving faster in developing their clean technology industries and supporting their competitiveness. In 2023, China accounted for 55% global steel production[28], and above 60% for aluminium, solar PV, batteries, and electric vehicles (EVs).[29]

Beyond competitiveness pressures, the erosion of EU industrial capacity also creates growing economic security vulnerabilities. Several industrial value chains meet the criteria of high-risk dependencies, including heavy reliance on a single dominant supplier, exposure to non-market overcapacity[30], and the increasing use of export restrictions or coercive economic practices. Such dependencies can be weaponised, creating systemic risks for the Single Market and undermining the Union's ability to secure the inputs needed for clean technologies, critical infrastructure, and defence-related manufacturing. As EU production shrinks and import reliance grows, the likelihood and impact of supply disruptions, price manipulation or arbitrary restrictions increase accordingly.

Energy Intensive Industries in Europe: an industrial fabric at risk

Over the past decade, the EU EIIs have reduced their GHG emissions by 35%[31], while their emissions intensity decreased by 25% since 2000.[32] In parallel, their competitiveness has been declining, more starkly since the energy crisis in 2021, as energy costs in the EU remain above those of many international competitors. Cost gaps with other world regions have widened and imports shares (in particular, for chemicals and metals) have increased.[33]

Figure 1 below illustrates how production volumes in EIIs have substantially declined, compared to production volumes in other manufacturing sectors. The current steel capacity utilisation rate is of approximately 65%, while to be market competitive the sector would need to run at above 85% capacity.[34] For the chemicals industry, production utilisation rates have stagnated at 74-75% range, significantly below the historical averages of 81.5%.[35]

In a decade, the EU trade balance for EIIs has steadily declined, getting close to deficit in 2022.[36] While this is the case for most energy-intensive sectors, the trend was largely driven by

recommendations (Part B), p. 97-100). Similarly, Letta´s report notes that EIIs are particularly vulnerable and transitioning them to clean energy is challenging due to cost uncertainties, capital barriers, and technology scale issues.

[27] European electricity prices are expected to be up to twice as high as prices in the US by 2030. Electricity wholesale prices are forecasted to reach EUR 55-100/MWh and gas prices EUR 20- 40/MWh. Source: ERT (2024). Competitiveness of European Energy-Intensive Industries.

[28] Eurofer (2024). European Steel in Figures.

[29] IEA (2023). Clean energy supply chains vulnerabilities.

[30] European Commission, An enhanced methodology to monitor the EU's strategic dependencies and vulnerabilities, Single Market Economics Paper, 18 April 2023, doi:10.2873/768035.

[31] European Commission, JRC internal calculation, based on EUROSTAT table "Air emissions accounts by NACE Rev. 2 activity" – see figure 6 in Annex 7.

[32] Emission intensity defined as emissions per unit of value added. Source: OECD (2025), A comprehensive overview of the Energy Intensive Industries ecosystem,2025/09.

[33] Draghi, M. (2024). The future of European competitiveness: In‑depth analysis and recommendations (Part B), p. 95.

[34] European Commission (2025). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A European Steel and Metals Action Plan, COM (2025) 125 final, 19 March 2025

[35] CEFIC (2025). The Competitiveness of the European Chemical Industry, January 2025.

[36] See figure 21 in Annex 10.

basic metals with a 36% drop, and chemicals with an 8.1% drop in exports and 15% increase in imports, amongst others.[37]

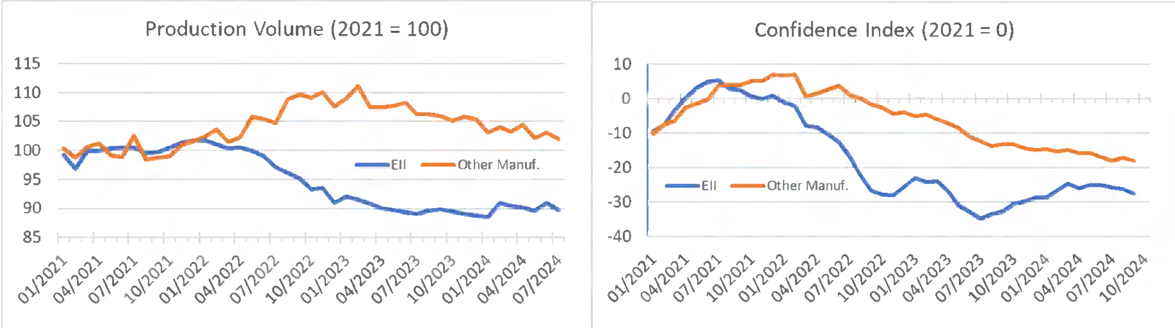

Figure 1: production volume and confidence indicators for EIIs, internal European Commission analysis

The Draghi report highlights that decarbonising industry requires a far-reaching transformation of assets and processes, which calls for substantial investment. The impact assessment for the 2040 Climate Target Plan estimates the investment needs to transform the iron and steel sector at around EUR 80 billion between 2031 and 2040 and EUR 100 billion between 2031 and 2050, while for the four largest EIIs together (chemicals, basic metals, non-metallic minerals, and pulp and paper industry) the investment needs are estimated at around EUR 287 billion over 2031-2040 and EUR 500 billion over 2031-2050.[38,39] While decarbonisation technologies are often more mature and more cost competitive for non EII sectors, manufacturing companies still face significant costs alongside administrative hurdles, regulatory challenges and skills shortages for companies. Today, the cost difference between high carbon and low-carbon technologies remain high, as it is explained under Sub-problem 1 and 3 and in more detail in Annex 7.

Clean technologies also face competitiveness challenges and supply chain vulnerabilities.[40] For instance, for solar PV modules, the EU relies almost entirely on imports from China. Lack of competitiveness is also visible in more downstream value chains. For instance, the European automotive industry has witnessed a significant reduction in profitability, with the average profitability of European automotive suppliers dropping from 7.4% in 2017 to 5.1% in 2023.[41] See Annex 7 for further analysis of all relevant sectors.

2.2 What are the sub-problems and their drivers?

The main problem is the limited business case for EU industry, and EIIs in particular, to invest in decarbonisation in time to reach the EU's climate targets while ensuring the competitiveness of EU energy intensive and clean tech industries in the process.

2.2.1 Sub-problem 1: Limited demand for European low-carbon industrial products at current prices

Limited demand for low-carbon industrial products is mainly due to the currently higher costs of these products against more carbon intensive alternatives. Additionally, business customers often lack sufficient incentives and face difficulties distinguishing between low-

[37] OECD (2025). A comprehensive overview of the Energy Intensive Industries ecosystem, 2025/09.
[38] European Commission (2024). Commission Staff Working Document: Impact Assessment Report (Part 3), accompanying the document Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Securing our future - Europe's 2040 climate target and path to climate neutrality by 2050, building a sustainable, just and prosperous society, COM(2024) 63 final, pp.164-167.
[39] Draghi, M. (2024). The future of European competitiveness: In□depth analysis and recommendations (Part B), p. 99.
[40] European Commission (2025). Competitiveness Progress Report on Clean Energy Technologies, COM(2025) 74 final, 26 February 2025.
[41] McKinsey (2025). European automotive industry: What it takes to regain competitiveness, 10 March 2025.

emission and carbon intensive industrial products, due to the absence of commonly agreed, transparent and harmonised standards, labelling and definitions. These factors restrict market entry and identification of low-carbon industrial products and hamper business to business (B2B) transactions from complying with high climate mitigation ambition.

2.2.1.1 Driver 1 (market failure): Challenges in distinguishing low-carbon industrial products from high-carbon alternatives

Although many industrial production facilities closely monitor their emissions, there is currently no harmonised carbon accounting methodology systematically applied for industrial products.[42] This is due to several reasons. First, current environmental and GHG reporting requirements are typically registered at installation level, as in the context of the EU ETS. Translating these installation-level emissions into emissions per product requires attributing the emissions from various production stages and possibly various installations (in or outside the EU) to a specific industrial product.[43] Second, the complexity is further increased by factors such as the diversity of production technologies, the outsourcing of certain production steps, long and complex supply chains and the varying use of imported heat and electricity in production processes. Finally, different methodological approaches are used on the scope of emissions to be considered. Without sound verification mechanism in place, the level playing field among businesses cannot be guaranteed, greenwashing can proliferate, and the exercise may become an administrative burden, including for public authorities when dealing with green public procurement procedures.

As a result, several initiatives have emerged to define what constitutes a "low-carbon" industrial product. For instance, over 150 sustainability standards and initiatives[44] spanning the entire steel value chain aim to determine what constitutes iron and steel with lower environmental impacts. As explained in the baseline (Section 5.1 and Annex 8), the ESPR and the CPR (Construction Product Regulation) provide a regulatory framework to introduce information and/or performance requirements on the environmental or carbon footprint of products from a life-cycle perspective. This initiative will complement and ensure coherence with these frameworks[45] while enabling more targeted deployment of carbon-intensity information for selected industrial products.

2.2.1.2 Driver 2: Limited willingness to pay a premium for low-carbon industrial products

While in some sectors, such as electricity production, the cost of low-carbon technologies is already lower than that of conventional fossil fuel-based alternatives, industrial sectors often continue to face significantly higher costs for producing low-carbon products, often due to lack of economies of scale.[46] In the steel and cement sectors, estimates suggest that procurement cost for low-carbon steel could range from around 33%% in a low-cost scenario to as much as

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[42] In this context, industrial products are considered intermediate industrial goods that are not used by end-consumers as such but require further transformation.
[43] While this process is relatively straightforward for standardised products such as electricity, it becomes much more complex for industrial goods with long and intricate production chains, such as plastics. As described in Annex 9, similar work is ongoing in the context of the CBAM methodology being developed for the definitive phase.
[44] JRC (2024). Draft preparatory study on iron and steel – ecodesign measures under the ESPR, p. 41.
[45] Some of these frameworks are mentioned in Annex 8: Interplay with other legislation and policies and baseline scenario
[46]Mission Possible Partnership (MPP), E3G and the Industrial Transition Accelerator (ITA) (2025). Building the EU's Clean Industrial Future: Unlocking Investment through Lead Markets.

70% in a high-cost scenario, compared to conventional technologies and considering current CO2 costs.[47]

To create a sound business case, when commercially marketing low-carbon products, manufacturers will likely need to pass on these additional costs in the short to medium term through a "green premium" to potential buyers.[48] However, the percentage of buyers willing to pay a premium for low-carbon products is estimated to range from 14% in the aluminium market to 16% in steel.[49]

In certain segments, the uptake of low-carbon products will likely develop at a faster pace, due to EU requirements. For instance, the revised Energy Performance of Buildings Directive[50] (EPBD) requires Member States to draw up national roadmaps on the introduction of limit values on the life-cycle Global Warming Potential (GWP) of buildings. In addition, the automotive sector appears more willing to accept higher premiums for low-carbon metals, as shown by a growing number of low-carbon steel supply agreements.[51] One key driver is that automakers are subject to life-cycle CO_2 emissions reporting obligations, increasing attention on the overall carbon footprint of a vehicle, including emissions from manufacturing. However, the extent to which these commitments will translate into actual demand remains uncertain.[52]

According to the **Public Consultation**, 81% (253 out of 314) of respondents agree that downstream sectors and consumers lack the willingness to pay a premium for clean industrial products. This is backed by all participating EIIs, including steel (95%), aluminium (80%), cement (77%), ceramics (100%), chemicals (96%), glass (66%), fertilisers (87%), pulp & paper (100%) and metals & mining (100%), as well as by downstream sectors such as automotive (80%), batteries (75%) and construction (75%).

Public procurement is a key driver for low-carbon demand for industrial materials and products. The construction sector dominates EU public procurement involving energy-intensive materials[53], making it a critical lever for stimulating demand for low-carbon industrial products. However, despite this potential, market demand alone is often insufficient to support the scale-up of low-carbon production required to offset higher production costs. Furthermore, public procurement practices aimed to support the uptake of low-carbon materials remain limited at both EU and national levels. Key barriers include a lack of training and capacity, insufficient data availability, fear of litigation and legal complexities.[54] Financial constraints may also be a barrier to support the higher initial costs often associated with low-carbon products. For instance, demand for low-carbon steel under green public procurement accounts for 2.1% of total steel demand.[55]

Finally, the limited willingness to pay for the green premium depends on a range of policy measures to bolster the business case for decarbonisation investments, optimizing net benefits.

[47] VUB Brussels School of Governance (2024).Public procurement of steel and cement for construction, assessing the potential of lead markets for green steel and cement in the EU. Note: Based on 2020 estimates, the cost gap is expected to narrow by 2030 due to technological maturation and higher CO□ prices.
[48] Somers, J. (2022), Technologies to decarbonise the EU steel industry, Publications Office of the European Union, doi:10.2760/069150.
[49] McKinsey (2024). Materials 'green' premia: Trends and outlook to 2030.
[50] Directive (EU) 2024/1275 of the European Parliament and of the Council of 24 April 2024 on the energy performance of buildings
[51] BloombergNEF (2023). Green Steel Demand is Rising Faster Than Production Can Ramp Up.
[52] ICCT (2024). Which automakers are shifting to green steel? An analysis of steel supply chains and future commitments to fossil-free steel.
[53] Based on GROW calculations from WTO GPA publications and statistics on EU public procurement sourced from TED (Tenders Electronic Daily) contract award data and the Public Procurement Data Space (PPDS), filtered for procurement in construction-related CPV codes linked to energy-intensive construction works. This is irrespective to whether procurement was low-carbon or not. In 2023, contracted value for procurements above EU thresholds involving EIIs materials totalled EUR 189B over almost 12k contracts awarded and in 2024, this increased to EUR 214B over more than 13k contracts awarded
[54] Bellona Foundation (2024). Green public procurement of cement and steel in the EU -An overview of the state of play.
[55] EUROFER contribution.

Importantly, the lion's share of demand generated by lead markets measures will continue to originate from private sector uptake and procurement.

2.2.2 Sub-problem 2: Supply chain vulnerabilities in strategic sectors

Security of supply is a precondition for sustainable industrial growth. EU manufacturing is exposed to a risk of dependency for its most strategic industries. The production processes for certain industrial sectors (mainly clean tech and, increasingly, EIIs) rely heavily on third countries for their input materials and/or components, which puts these sectors at risk of supply chain disruptions, limiting Europe's potential to decarbonise. Industrial decarbonisation will also depend on access to energy and raw materials, therefore the risk of disruption in these value chains pose a serious challenge to the EU's strategic autonomy and clean energy transition. Looking ahead, Europe's security and open strategic autonomy will depend increasingly on the ability to increase supply chain resilience, particularly in net-zero and digital technologies.[56]

2.2.2.1 Driver 3: European industry loss of competitiveness due to fierce global competition and value chain dependencies

Energy-intensive industries

A strong industrial base is essential for Europe's economic resilience. However, sectors like steel, chemicals, aluminium, have been losing market shares in Europe due to several factors, including higher operating costs compared to foreign competitors, rising imports because of persistent global overcapacities.[57] While both exports and imports for EIIs have increased by more than 25% compared to 2007, a striking difference appears when compared to 2015, where imports rose by 16.9%, while exports increased by only 1.4%.[58] For instance, the EU dependency on aluminium imports has reached more than 50% of domestic demand in 2023.[59] Furthermore, for chemicals and plastics, the Commission's SCAN monitoring system[60] confirms a clear pattern of loss of competitiveness due to fierce global competition and deepening value-chain dependencies. Out of roughly 780 products analysed, about one-third were identified as distressed, showing a price increase combined with a higher reliance on fewer suppliers between January–September 2025 and the 2022–2024 average.[61]

The weakening of Europe's industrial position is also visible in the investment pipeline, where many announced industrial decarbonisation projects remain stalled before final investment decision. Despite an unprecedented wave of projects announcements in the past five years, the real pace of decarbonisation has slowed sharply since 2023. Analysis from the Commission's Joint Research Centre (JRC) shows that almost half of all announced industrial projects remain unimplemented, and fewer than one in three has entered construction or operation.[62]

[56] COM(2025) 484 final – European Commission 2025 Strategic Foresight Report

[57] Just for steel, in 2024, global overcapacity was estimated to be more than four and a half times the EU's yearly consumption (OECD, 96th Session of the Steel Committee: Statement by the Chair | OECD).

[58] OECD (2025). A comprehensive overview of the Energy Intensive Industries ecosystem.

[59] European Commission (2025). A European Steel and Metals Action Plan, COM(2025) 125 final, 19 March 2025.

[60] SCAN (Supply Chain Alert Notification) is an indicator-based mechanism to monitor the evolution of supply chains in the EU and identify their distress. It aims at contributing to a better risk assessment of supply chains, particularly in strategic areas, with the goal of detecting disruptions as early as possible to avoid potential adverse effects.

[61] A large share of the distressed products also falls within the highest Single-Point-of-Failure (SPOF) risk categories, meaning that global production is heavily concentrated in just a few countries. The top supplier for over 60% of these products is China, followed by the United States (15%) and India (8%). While the dataset captures only trade dynamics, these patterns are consistent with wider evidence of industrial contraction and growing import dependence observed in the sector.

[62] European Commission, JRC internal analysis based on Europe Media Monitor.

Figure 2: Announcements of decarbonised projects in the EII by start date, Commission analysis based on BloombergNEF, Decarbonizing Steel Project Database (1.0.5)

Figure 2 confirms that, in the case of steel, most of the projects announced in 2023-2025, are still in the announced stage. Most concerning is the cancellation of projects announced during the study period (2023-2025), and which were supposed to start between 2024 and 2027 (~10%).

Cement, **chemicals**, and **refining** account for most projects, but implementation lags. Collectively, these projects represent over EUR 1.5 billion of announced investment. Achieving the Union's climate and industrial objectives will require an additional EUR 480 billion in annual investment[63] in energy systems, industrial innovation, scale-up and transport compared to the previous decade. While the EU has mobilised significant resources through instruments such as the Innovation Fund and InvestEU, private investment remains below the level required to meet the 2030 and 2040 climate targets.

When turning to **steel**[64], Europe's clean-steel transformation remains largely on paper. Out of roughly 250 European decarbonisation projects since 2018, about 68% are still at the announcement or concept stage, with no final investment decision yet taken.

Batteries manufacturing

A similar situation is visible in the **batteries** industry. In 2024, the EU imported around EUR 28 billion worth of batteries, with EUR 22 billion coming from China alone[65], while EU exports stood below EUR 11 billion.[66] In 2024, China dominated global battery production, holding around 83% of the world's capacity, well above their end-use demand.[67] China's market share on the upstream battery supply chain is even more significant.[68]

While European battery manufacturers continue to scale up and optimise their production processes, they face intense price competition from third-country producers, particularly China. The EU battery ecosystem remains heavily reliant on critical components and technological know-how sourced from these third countries. These factors have led to the cancellation or delay in the EU of several battery projects, including 233 GWh of battery cells, 100 GWh of

[63] European Commission (2025), Clean Industrial Deal, COM/2025/85 final, 26 February 2025.
[64] BloombergNEF, Decarbonizing Steel Project Database (1.0.5), 2025. Commission analysis. More details in Annex 8.
[65] Bruegel, European Clean Tech Tracker.
[66] Ericher, M. et al. (2024). Les Themas de la DG. Deployment of electromobility: How to develop the European battery supply.
[67] BloombergNEF.
[68] By 2025, it is projected to control 87% of global battery cell production, 88% of Cathode Active Material (CAM), 95% of Anode Active Material (AAM), 89% of separators and over 90% of electrolyte production. Source: BloombergNEF.

anode active materials, 513 GWh cathode active material, and 115 GWh of precursor active materials as considered no longer competitive. Although the EU reached a battery cell installed capacity of around 205 GWh by the end of 2025 and has over 750 GWh in the pipeline[69], these cancelations and delays show the competitiveness gap of the European industry. This gap is further exacerbated by the vulnerability of the existing EU battery industry to supply chain disruptions due to export restrictions on key components and technologies. Additionally, the absence of a robust domestic value chain means EU manufacturers may face a premium for depending on imports to sustain its battery sector, impacting both cost and reliability.

PV manufacturing

The European **solar PV** industry has been losing competitiveness due to several factors, mainly Chinese overcapacity and lower manufacturing costs and prices. Regarding overcapacity[70], at least 80% of global manufacturing across the supply chain components is concentrated in China, which makes them the dominant country in the global PV manufacturing market.[71] [72] This level of concentration creates structural risks for the EU's security of supply of PV systems: overcapacity in China drives prices down globally and exports are redirected to the EU following US import restrictions, discouraging investment in alternative production outside China, and reinforcing dependency on a single source. This dependence heightens exposure to potential supply disruptions, trade tensions or geopolitical shocks, and raises cybersecurity concerns risks in related to system equipment such as inverters.

At present, the EU manufacturing capacity in the solar PV value chain amounts to approximately 12 GW of PV modules, around 2 GW of PV cells, and less than 1 GW of PV ingots and wafers.[73] Inverter manufacturing is still quite strong in the EU (over $82GW_{AC}$[74]) but there is similar worrying pressure and trend as for the rest of the supply chain.

Other clean technologies, or 'net-zero technologies' (e.g. wind, electrolysers), face similar challenges, however the combination of high global overcapacities and high dependencies of the EU's consumption on one single source of supply is particularly acute for solar PV and batteries.[75] Therefore, the assessment report focuses primarily on these two technologies, while Annex 16 provides an in-depth analysis on additional net-zero technologies.

Vehicle components

Over the past years, the European automotive industry has been investing heavily[76] in the development of cleaner vehicles and innovative components. However, based on JRC estimates, the EU content of cars produced in Europe has been slightly decreasing over time.

At the European level, the production index for the European automotive component industry continues to fall at a steady pace (by an average of 11% in 2025 compared to 2021 production volumes), as does vehicle production (compared to 2023). Despite the exceptional customs tariffs introduced in 2024 on Chinese EVs, imports of Chinese vehicles continue to grow (+35% in volume in the first half of 2025 (+380% compared to 2021), compared to a 50% drop in EU exports to China), and they have reached a market share of 9.9% in July 2025 despite efforts to

[69] European Battery Alliance.
[70] SolarPower Europe (2025). Reshoring Solar Manufacturing to Europe, figure 7.
[71] IEA (2024). Energy Technology Perspectives 2024.
[72] European Commission (2025). Competitiveness Progress Report on Clean Energy Technologies, COM(2025) 74 final, 26 February 2025.
[73] European Commission, : Summary - Net-Zero Technologies (NZT) Monitoring Dashboard - Power BI
[74] SolarPower Europe (2024), Inverters Explained 2.0: Strengthening Europe's Inverter Industry .
[75] European Commission (2025). Communication providing updated information under Regulation (EU) 2024/1735. OJ C 2025/3236.
[76] EUR 70 billion a year when considering the whole automotive supply-chain – vehicle manufacturers and suppliers, EUR 30 billion when considering only the automotive suppliers Automotive R&D investment, by world region, ACEA, 11 Sept 2024. Automotive suppliers in the EU – R&I vision on circularity, CLEPA, 11 September 2023.

restore level playing field and to safeguard the European automotive industry against unfair competition. This phenomenon has been squeezing the volumes and margins of European manufacturers and representing huge competition for local manufacturers.[77] Furthermore, as described in the Draghi report, even more than 10% of local EU production may be displaced in the following five years.[78]

Lastly, the automotive industry's vulnerability to external supply chain disruptions was displayed by recent announcements by the largest European automobile manufacturers trade association about the difficulty to secure chips for the automotive supply chain. Despite efforts to diversify supply chains following the semiconductor shortage in the past, automotive companies are still facing vulnerabilities to external shocks when it comes to the supply of essential parts for their vehicles, which decreases the resilience of supply chains.

2.2.2.2 Driver 4: A fragmented EU approach towards foreign investments

The EU's openness to foreign direct investment (FDI) is enshrined in the Treaty on the Functioning of the EU and is essential to ensure the Union's competitiveness and progress towards decarbonisation. Foreign investors can play a significant role in areas where Europe lags on innovative technologies and processes. However, FDIs do not necessarily imply that technology transfer, know-how development, job creation/retention and value chain integration, are realised in Europe or by European companies. Europe's heavy industry is dependent on imported technologies and equipment in emerging low-carbon value chains such as hydrogen electrolysers, batteries, and solar PV.[79] In many cases, investors choose to limit their European footprint to assembly or non-core operations, preserving strategic technologies and innovation activities abroad.[80] while other investors choose to position high value added segments of the production chain, such as R&D, in the EU.[81]

Unlike other countries such as the United States, Korea or Japan[82], the EU does not consistently attach requirements on R&I or skills development. Most importantly, over the past decades, China has applied FDI conditionality by restricting market access in sectors such as automotive, solar, and wind, to joint ventures with Chinese partners, often under majority control by the Chinese partner, while requiring foreign companies to transfer technology, establish local R&I, source components locally and comply with data-localisation and security reviews; these conditions enabled Chinese firms to absorb foreign know-how, scale up domestic capabilities.[83] Foreign companies seemed to have been willing to accept China's demanding FDI conditions because the market itself was too large and too strategic to ignore. In addition, many firms feared that if they stayed out, rivals would step in and gain an advantage, so they chose to comply with technology transfer, joint venture, and localisation requirements. These factors meant that, even though foreign companies may have been at higher risk of intellectual property

[77] For example, the trade balance with China on passenger vehicles became negative in 2025 (EUR 1.2 billion in the first half of the year) and imports of automotive parts from China increased by around EUR 4 billion between 2021 and 2025 (+66%) – compared with a decline in exports to China of around 50%. This is due to a 30-35% price differential between European and Chinese products. See: Made in Europe Local content policy for the European automotive industry. Gerpisa, April 2025.

[78] Draghi, M. (2024). The future of European competitiveness: In□depth analysis and recommendations (Part B), p. 145.

[79] Mission Possible Partnership (MPP), E3G and the Industrial Transition Accelerator (ITA) (2025). Building the EU's Clean Industrial Future: Unlocking Investment through Lead Markets.

[80] Damioli, G., Marin, G., & Zanfei, A. (2024). The effects of foreign entry on local innovation by entry mode. Research Policy, 53(2), 104807. https://doi.org/10.1016/j.respol.2024.104807.

[81] Coveri, A., Paglialunga, E. and Zanfei, A. (2024). Functional specialisation and upgrading in European regions: new insights from FDI data. WP-EMS #2024/01.

[82] SWD(2025) 11 - Key Performance Indicators (KPIs) - Overview of Resilience Measures by Selected Global Players accompanying the 2025 Annual Single Market and Competitiveness Report and Annex 10 of this Impact Assessment.

[83] Jonathan E. Hillman, The Digital Silk Road: China's Quest to Wire the World and Win the Future (New York: Harper Business, 2021).

loss, stringent FDI conditions were tolerated in the context of increasing global integration of production chains, and with China having a strong comparative advantage in the cost of labour.

By contrast, the EU approach remains largely project-by-project, sometimes dependent on EU and national funding programmes.[84] Member States currently compete to attract investors, leading to uncoordinated and uneven requirements. Competition between EU countries for attracting new assembly and material production investments is likely to intensify, as new EV entrants expand into Europe.[85] This fragmented approach does not maximise benefits of foreign investment in the EU, as Member States compete individually to attract foreign investors with varying conditions and incentives, leading to uneven requirements on technology transfer, skills, and R&I commitments. As a result, the Union's overall ability to leverage foreign investment strategically is weakened.

This lack of expertise leads to a strong dependency on imports of such batteries from a dominant foreign supplier, with this supplier (China) having a track-record of weaponizing dependencies. It is important to reduce internal market risks associated to this dependency, ensuring that assembly activities of foreign investors in battery production in the EU lead to knowledge spillovers and gradually reduce the EU dependency on foreign know-how, creating the conditions for maintaining and reinforcing EU capabilities in locating the strategic parts of the battery value chain in Europe, with the economic benefits it brings. In addition, multi-stage production is highly sensitive to fixed-cost thresholds and policy-driven cost differentials, meaning that without coordinated EU-level conditions, firms have strong incentives to keep the high-value stages abroad.[86] Recent evidence confirms that upstream stages do not automatically localise: China retains a strong comparative advantage specifically in cells and modules, while European production remains competitive only in downstream assembly, the part creating least added value.[87] This pattern is not limited to batteries but applies to other industries where China's dominant market position similarly heightens Europe's strategic dependencies.

In the **Public Consultation**, 53% (166 out of 314 respondents) view foreign direct investments as useful to bring in needed capital; 55% (172 out of 314) support applying conditions to align such investments with EU industrial & strategic interests.

2.2.3 Sub-problem 3: Industrial decarbonisation technologies are not deployed at scale

Many projects of the most promising technologies for decarbonising EIIs are not commercially deployed at the necessary scale, nor at the pace needed to meet the climate neutrality target. The long investment cycles for industry from R&I to deployment highlight the importance of policy predictability to reduce regulatory and financing risks.[88] Furthermore, the availability and economic viability of these technologies vary depending on the specific sector and parameters such as the technology readiness level, the energy and raw materials needs, the CO_2 abatement potential and CO_2 abatement costs. Many technologies, such as heat pumps or energy efficiency solutions, are already mature and able to help reducing costs, while improving performance. At the same time, they are not always available at scale. Electrifying industrial production is a viable solution due to the rapid renewable energy deployment but requires process transformation and it is not always affordable nor fully available, because of the need

[84] Many (but not all) Member States screen FDI for possible security risks. This however is done only for some FDI, with conditions differing between Member States (such as regards the extent to which clean tech/EEI are covered), and only as regards risks to security and public order.
[85] CEPII (2024), "Will Chinese Auto Export Boom Transform into Local Production in Europe?", CEPII Policy Brief No. 45, Paris.
[86] Head, K., Mayer, T., Melitz, M., Yang, C. (2025), "Industrial policies for multi-stage production: the battle for battery-powered vehicles", CEPR / HMMY Working Paper.
[87] CEPII (2024), "Will Chinese Auto Export Boom Transform into Local Production in Europe?", CEPII Policy Brief No. 45, Paris.
[88] Draghi, M. (2024). The future of European competitiveness: In‑depth analysis and recommendations (Part B).

to improve connections and increase grid capacity, or to meet the specific EIIs' needs to consume baseload power.

In addition, decarbonising the sectors with so-called 'hard-to-abate emissions' (i.e. chemicals, basic metals, cement, and pulp and paper) requires significant investments. Emission-abatement technologies, including electrification, EAF, clean hydrogen, carbon capture and storage (CCS), carbon capture and use (CCU), and raw material recycling require large capital costs (CAPEX). In addition, the operational costs (OPEX) are uncertain when technologies are not mature and often higher than those of traditional technologies, as long as electricity and low-carbon fuel (e.g. clean hydrogen) prices remain high in Europe. These elements are an important factor determining the slow decarbonisation pace. Estimates suggest that by 2030, producing green steel (H2-DRI-EAF route) in Europe could cost around EUR 100/tonne of steel (17%) more than in the US or Saudi Arabia. This cost gap exceeds that observed today for conventional BF-BOF steel, reflecting Europe's higher (clean) energy and hydrogen prices.[89] Comparing all iron and steel technology pathways, estimates suggest that in 2024 the low-emission solution was 74% more costly than the conventional routes, and 48% more costly than a new build basic oxygen furnaces (BOF) plant. Data suggest that by 2030 the costs will have fallen but will on average remain higher (66%) than for an existing BOF plant, and 42% to a newly built BOF plant.[90] In the case of cement, techno-economic studies for theoretical cement plants estimate CO□ abatement costs at approximately EUR 47.3–60.2/tCO□ for oxy-fuel technologies and EUR 77.4–129/tCO□ for post-combustion capture.[91] A detailed analysis of the availability and economic viability of industrial decarbonisation technologies and their cost evolution is presented in Annex 7.

A large majority of respondents (85% - 266 out of 314) to the **Public Consultation** point to limited access to affordable decarbonised energy and high operational and capital costs (n=260, 83% and n=251, 80%, respectively) as critical barriers.

2.2.3.1 *Driver 5: Lengthy, fragmented and uncertain permitting procedures for decarbonisation projects*

Industrial manufacturing activities can have significant impacts on the environment beyond CO_2 emissions (e.g., SOx, NOx, dust, dioxins, waste generation, water, resource consumption). EU and national legislation have regulatory frameworks to address these impacts. Industrial plants show compliance with the legislation via permits, processed and granted by national, regional or local authorities. While permitting is not an exclusive trait of industries (including EIIs), industrial activities are a considerable source of pressure on the environment. As such, as mentioned below, the permit-granting process can be particularly cumbersome for them - the higher the environmental hazard, the more complex permitting can become. In the context of Europe's decarbonisation transition, where the investments needed are extremely large, the complexity and duration of permitting processes can be an obstacle to investing in Europe and therefore impact its ability to decarbonise. Permitting process has been recognised as a major challenge for project development.[92]

The evidence gathered via stakeholder consultations, as well as internal Commission analysis through the implementation of Union funding for industry showed unnecessarily lengthy and complex industrial permitting. See Annex 2 for more detail. The issues identified are common

[89] Draghi, M. (2024). The future of European competitiveness: In□depth analysis and recommendations (Part B), p. 99.
[90] BloombergNEF (2024). Numbers are averages and may vary due to the abundance of cheaper renewable energy.
[91] Marmier, A. (JRC) (2023). Decarbonisation options for the cement industry.
[92] 2025 annual knowledge sharing report of the Innovation Fund: De-risking innovative low-carbon technologies.

to the different manufacturing sectors, however industrial projects that need to drastically change their processes in EIIs sectors face an extra layer of difficulty due to the innovative and impactful nature of their projects. Almost half of the respondents to the Innovation Fund Sharing Report note that the novel nature of their operation does not fit well in the existing permitting procedures.[93] For Innovation Fund projects, the time required for granting the permits after the applications were filed was on average 16.4 months. Almost 45% of projects estimated that their permit-granting processes would require from 12 to 48 months.[94] More than half of the projects indicated that in the end they required more time than originally foreseen.[95]

The complexities and delays stem from several factors, which are closely related to the administrative setting of each Member State. The most important factors include the numerous authorities involved in the permit-granting process (5 to 10 different authorities can be involved for a single project)[96], unclear or insufficient details on the necessary information to be submitted, lack of administrative capacities in Member States, potential inconsistencies between EU and national regulatory framework implementation, or low levels of investments by Member States in digitising permitting systems.

Results from the **Public Consultation** show that permitting is seen as a major bottleneck (82% - 256 out of 314), with 69% (218 respondents) agreeing that challenges related to permitting are widespread and different (n=222, 71%) across Member States. A fragmented regulatory landscape and complexity of the process (n=187, 60%) and multiple authorities involved in the permitting process (53%, of businesses and business associations) are flagged as main challenges. SMEs in particular (59% - 40 out of 68) point to a lack of administrative capacity. 65% of respondents to the Innovation Fund survey on permitting, ranked the permit-granting process among their top challenges.[97]

2.2.3.2 Driver 6: Difficulty to access resources (e.g. inputs and funding)

For a project developer to proceed with a specific investment project, several elements are needed to make that commitment such as financing, and access to the energy grid.

Industrial decarbonisation requires substantial investments and needs to attract private investors. In the past six years, despite many announcements, less than one-third of industrial decarbonisation projects in large energy-intensive sectors have reached final investment decisions, and almost half remain unimplemented (see Driver 3).

A recurrent issue for decarbonising industrial facilities is **securing a timely connection to the energy grid.**[98] Timely feedback is crucial from a business planning perspective, affecting the business case of each application and hence overall competitiveness. However, at least 15 Member States have experienced queuing problems, which slows down the clean transition and European economic growth.[99] This challenge differs between Member States, connection levels, generation and demand side. In case of not meeting technical requirements or potential

[93] Permitting novel production processes is addressed to some extent at the EU level by the revised Industrial Emissions Directive, which contains specific permitting flexibilities for the implementation of 'deep industrial transformation', where more time is granted for innovative installations to comply with permit conditions.
[94] 27% of respondents indicated 12 to 24 months, 9% from 24 to 36 months and 9% from 36 to 48 months.
[95] Most of them (12 projects) required less than one additional year to have their permits granted. 8 projects used the same amount of time as they had estimated, and only a few projects (5) could save time in the permission process. Within the group of 28 projects, all biofuels and bio-refineries projects (3) and chemicals projects (3) needed more time for the permitting process than anticipated. Fund projects participating in the survey were signed between late 2021 and late 2023 and results may therefore be skewed towards projects with shorter permitting periods.
[96] Innovation Fund survey on permitting showed that 51% of the respondents found the high number of public authorities involved in the permitting procedures as a challenge.
[97] 2025 annual knowledge sharing report of the Innovation Fund.
[98] Almost half (47%) of the Innovation Fund survey respondents highlighted their **energy connections as an issue.**
[99] Study on network development planning, tariff structures and connection requests for electricity distribution grids, 2025,Publications Office of the EU, [forthcoming].

impacts on the security of the electricity grid due to insufficient capacity, grid connection may be refused. For example, in 2024 in Spain, 11 GW of connection requests coming from industry were rejected.

Barriers to finance. Multiple funds are available at the EU level (e.g. the Recovery and Resilience Facility (RRF), InvestEU, the Innovation Fund, Horizon Europe, the Research Fund for Coal and Steel, the Modernisation Fund, the LIFE programme, and the Social Climate Fund). Programmes like InvestEU have played an important role in mobilising private capital and de-risking investments in decarbonisation projects. However, the broader EU funding landscape remains complex to access and fragmented. Under directly EU managed funds, the Innovation Fund reinvests a portion of EU ETS revenues to support the decarbonisation efforts of the EIIs. However, applications meeting the funding criteria tend to exceed the number of projects funded by a considerable margin. At Member State level, only a limited amount of ETS revenues is dedicated to investment in decarbonisation.[100]

Beyond grid access and access to finance, industries also face increasing difficulty in **accessing critical and other raw materials** at competitive prices and/or quantities. The rapid global race for clean-tech manufacturing has intensified demand for both primary and secondary raw materials, many of which are diverted to third countries offering higher prices or fewer export restrictions. This challenge is compounded by third countries increasingly using export controls to secure domestic supply most notably and recently China[101], which has recently added restrictions to exports which now also include rare earth elements and other inputs critical for magnet and clean-tech production. At the same time, Europe faces the paradox of valuable secondary raw materials such as metal scrap being exported to third countries rather than reprocessed domestically, reducing availability for EU clean-tech and industrial producers.[102] These developments heighten input cost volatility and strategic uncertainty for EU industries.

Respondents from the **Public Consultation** also identified permitting times for grid access as around 24 – 120 months, with the process sometimes taking much longer. Timeframes differ however by country and regions. Main issues identified, aside from lengthy timelines, were limited grid capacity, and legal timelines not being enforced or misaligned with reality on the ground.

[100] Draghi, M. (2024). The future of European competitiveness: In‑depth analysis and recommendations (Part B), p. 100. In 2023, 67% of **revenue used** domestically went to domains of energy supply, grids and storage (e.g. renewables, self-consumers), and public transport and active mobility (Use of auctioning revenues generated under the EU Emissions Trading System | European Environment Agency's home page). ETS investment is channelled to priority areas, such as renewable energy production, energy networks and interconnectors, energy efficiency and the just transition.

[101] China's new export controls now require government approval for the export of magnets containing rare earths, and plans to add five more elements (holmium, erbium, thulium, europium, ytterbium) to its control list. Financial Times, 20 October.

[102] The Commission noted declining scrap availability in the EU due to "scrap leakage" to third countries and has activated a customs surveillance system for ferrous, aluminium and copper scrap to ensure sufficient access for EU industries.

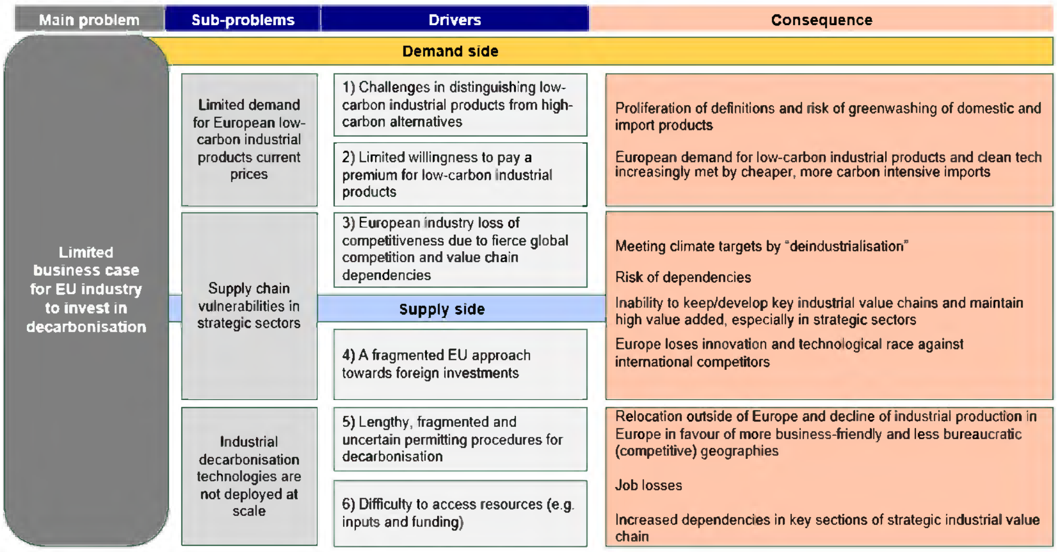

Figure 3: Problem tree

2.3 How likely is the problem to persist?

The need to decarbonise industrial manufacturing and to improve its competitiveness will remain a high priority for the EU and is also highlighted in the 2025 Strategic Foresight Report[103], which stresses that Europe's resilience and prosperity depend on accelerating industrial transformation while safeguarding competitiveness and strategic autonomy.

The EU ETS, including its planned review in 2026, provides incentives to decarbonise, but it will not be sufficient on its own to fully unlock the investments in low-carbon technologies. Investments are slowed down due to an ETS price not sufficiently high, and key barriers such as permitting bottlenecks and too high capital and operational costs. Today, the carbon price ranges between 70-80 EUR/tonne, while studies point at a much higher price to make investments in low-carbon technologies commercially viable.[104]

Over time, decarbonisation technologies like clean hydrogen, electrification of high-temperature processes or CC(U)S are expected to become more cost-effective[105], especially as the EU ETS tightens, strengthening the incentive to decarbonise. However, in the short-to-medium term, the pace of decarbonisation remains too slow, driven by factors such as financing gaps, lack of incentives, permitting delays, infrastructure deficits, slow technology adoption, and a shortage of skilled workers. The price signal alone will not be sufficient to address on its own all the above drivers. At the international level, competitors to EU EIIs are not subject to equivalent carbon pricing measures, making the risk of carbon and investment leakage likelier to materialise. The CBAM and its review should help alleviate some of these impacts, notably by addressing the risk of circumvention. However, until low-carbon technologies and products reach cost parity with conventional alternatives, the problem is likely to remain.

Without additional policy measures to foster a competitive market for decarbonised industrial products now, the EU risks losing strategic manufacturing sectors that are critical for its resilience and economic security. In other words, while emissions abatement might be achieved

[103] European Commission (2025). 2025 Strategic Foresight Report, COM(2025) 484 final.
[104] According to Agora Industry, by 2030, the average CO_2 abatement costs of all steel breakthrough technologies expected to be commercially available will be well above EUR 86/tCO_2. They range from EUR 111/ tCO_2 (NG-DRI-EAF-CCS) to USD 171/tCO_2 (100% H2-DRI-SMELT-BOF). A CO_2 price of EUR 86/tCO_2, in isolation, would likely not be enough to make these technologies competitive. Source: Agora Industry, Wuppertal Institute and Lund University (2024): Low-carbon technologies for the global steel transformation, 2024.
[105] See Annex 7 – Overview of cost evolution of industrial decarbonisation technologies.

and climate targets met, these may result from reduced industrial output, rather than more efficient technologies. This gap can be quantified by looking at the drivers of recent emissions trends. According to the Climate Action Progress Report 2025, the EIIs industrial production installations covered by the ETS reduced their GHG emissions year on year by 6.4% in 2022, 7.5% in 2023 and 0.8% in 2024, due to a combination of a reduced output and efficiency gains.[106] Zooming in on the specific iron and steel case, Figure 4 shows that over the past six years the emissions reduction was mainly driven by changes in the production activity level, rather than in emission intensity.[107]

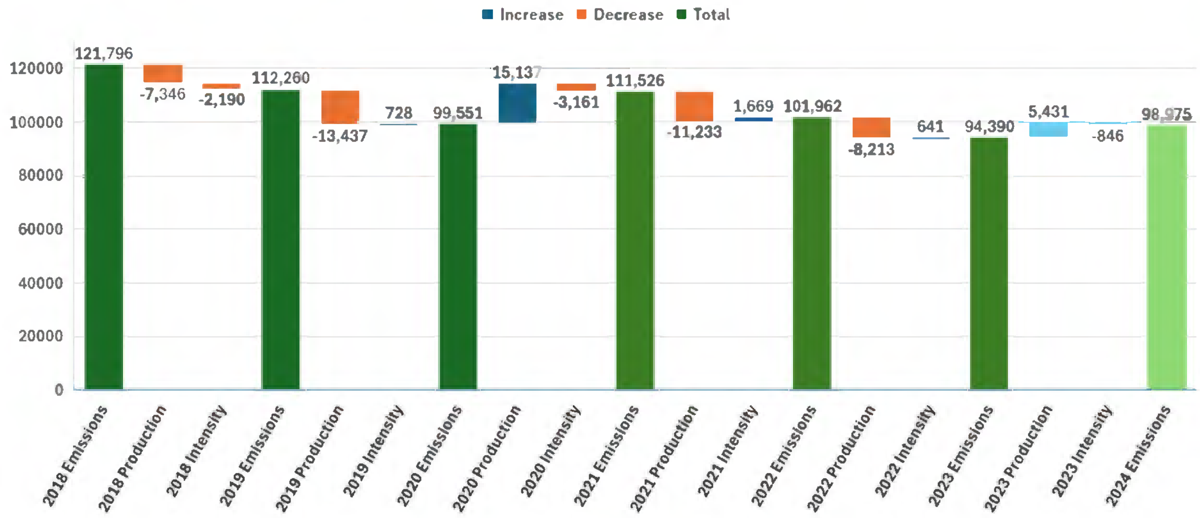

Figure 4: Iron and Steel: EU GHG Emissions drivers 2018-2024 (ktCO₂), European Commission JRC analysis

Past trends combined with recent announcement of projects being stopped, indicate that strategic sectors could face further decline, ultimately undermining the EU's long-term economic growth, technological innovation, and resilience. In strategic sectors, this could also lead to greater dependencies.

On the demand side, only a limited share of industrial buyers is currently willing to pay a 'green premium' for energy-intensive materials. While some recent EU (product) policies address the environmental or energy performance of the product or building in scope, they do not systematically look into the value chain, nor go as far as setting minimum requirements for the use of low-carbon materials in such products/ buildings.[108] The structural disadvantages companies face in Europe (e.g. higher energy prices or reliance of certain raw materials), combined with unfair global practices, will continue to put Europe at a systematic risk of overdependencies.

On public procurement, auctions and public support schemes, the NZIA has recently introduced resilience requirements for a range of clean-tech products. While this will decrease the dependencies from a single third country of supply, it will not be sufficient for these industries to ramp up at sufficient scale to compete with already established foreign markets and global overcapacities. In fact, as regards solar PV systems and batteries, the risk exists that Chinese companies would be able to supply the European market through factories built outside of

[106] European Commission (2025), Climate Action Progress Report, p.94.
[107] Internal calculation based on JRC-IDEES and CETO 2024/ LMDI. The Log-Mean Divisia Index (LMDI) is a method used to decompose changes in an aggregate variable, like CO_2 emissions, into the contributions of its constituent factors over time. Sectoral analysis in Annex 7.
[108] This is the case of the Construction Products Regulation (CPR), or the Ecodesign for Sustainable Products (ESPR), the End-Of-Life Vehicles and the EPBD. See more details in Annex 8.

China, in other Southeast Asian markets, and thereby circumventing the rules put in place by NZIA. According to BloombergNEF, investments in solar PV already appear to be shifting away from China as domestic manufacturers are investing in factories abroad, also in response to the US tariffs and imports restrictions on China.[109] When it comes to batteries, Chinese companies have heavily invested in Indonesia and Morocco[110], while markets such as India, Türkiye and Brazil are leveraging tariffs to attract Chinese investment.[111]

The challenges facing the EU's clean tech sectors are structurally embedded and unlikely to resolve without targeted intervention. Battery and PV manufacturers located in the EU are caught in a strategic squeeze: on one side, they face fierce price competition from third-country producers. On the other side, these same countries control access to critical upstream components and technologies, enabling them to restrict exports or inflate supply costs, further undermining the competitiveness of EU manufacturers.

On vehicle components, data (as described in Annex 7 on sectoral analysis), show an increase of delocalisation of production in the past few years, which is likely to persist over time unless mitigated by policy measures, as EU suppliers continue to face unfair competition.

The expected benefits of foreign investments depend on the business model and governance pursued by the investor for its European affiliates. Without conditions, EU firms may remain locked into high-cost abatement pathways since foreign investors face little obligation or commercial incentive to locate their R&I, engineering, or advanced processes within the EU. A clear illustration is the Tesla–CATL partnership in the United States, where investment incentives were tied to local content, technology transfer and domestic battery supply chains. This has led to the localisation of advanced cell manufacturing and R&I activities in the U.S. In contrast, similar investments in Europe by the same actors have largely focused on assembly and final integration, with limited technology transfer or anchoring of critical value chain segments.

Targeted improvements aimed at streamlining permitting procedures have been implemented for the deployment of specific sectors like energy infrastructure, renewable capacities, critical raw materials projects or net-zero technology manufacturing projects. In addition, the Industrial Emissions Directive (IED) was recently amended to facilitate environmental permitting of industrial installations. However, no current initiative addresses the entire industrial manufacturing sector, nor the entire permit-granting process from start to finish.

Consequences of the problems

Regions that are currently home to EIIs face risks of further economic and social decline, with significant regional disparities in employment and prosperity in the Single Market. This vulnerability echoes the broader megatrends identified in the 2025 Strategic Foresight Report[112], which emphasises the growing regional and social disparities as a key test for Europe's resilience by 2040.

EIIs, batteries, automotive and PV industries risk losing further market share, technological leadership, and becoming locked into deeper strategic dependencies. This would directly undermine the EU's ability to deliver on the "promote" pillar of the European Economic

[109] BloombergNEF.Clean Tech in the Time of Tariffs.
[110] Volta Foundation (2025). 2024 Battery Report.
[111] BloombergNEF. Clean Tech at Heart of Growing Tariff Storm..
[112] European Commission (2025). 2025 Strategic Foresight Repor, COM(2025) 484 final.

Security Strategy.[113] Asymmetries in global investment conditions place EU industry at a structural disadvantage compared to global competitors who benefit from strong conditionalities and incentive frameworks that maximise spillovers.[114]

For the EU, continued clean technologies dependency means that the domestic battery and PV production will remain vulnerable to external shocks, price manipulation, and supply disruptions. China's recent export restrictions on key battery technologies, including lithium-ion battery cells and packs, key production equipment and technologies linked to high-end batteries and graphite anodes, cathode material processes and lithium refining, signal a strategic shift toward consolidating its dominance and limiting foreign access to critical capabilities.[115]

Without additional policy measures, EU PV modules dependency on China could rise to 98% of the value chain. According to the Solar Alliance, which has set the target of achieving 30 GW manufacturing capacity along the value chain, if this goal is not met, Europe would miss out on creating more than 40 000 highly skilled jobs.[116]

When it comes to the automotive industry, the cost disadvantage of manufacturing key automotive components in the EU is combined with increasing pressure from Chinese imports, the impact of tariffs on the US market and increasing tendencies for local content requirements in other jurisdictions[117], and in some cases the technological gap vis-à-vis non-EU manufacturers. Further competitiveness losses in the EU automotive industry may increase the risk of delocalisation of component manufacturing outside the EU, possibly contributing to economic security risks. It is therefore critical to pursue the active reinforcement of cooperation with other countries to strengthen the resilience of EU supply chains. In addition, declining domestic manufacturing capacity increases the risk of "cumulative vulnerability" across interconnected value chains, where disruptions in one critical input can cascade rapidly - from the component to the raw material - and impede the Union's ability to maintain continuity of supply, manage emergencies and safeguard public order. This trend seems to be accelerating, and as a short-term impact 76 000 job losses have already been announced among the automotive suppliers, and up to 50% of the production is at risk in the next five years.[118]

3 Why should the EU act?

3.1 Legal basis

The initiative intends to increase decarbonised and resilient industrial production in the manufacturing industry, with a focus on energy-intensive industrial sectors and clean technologies. It intends to facilitate the harmonisation of the definitions of low-carbon industrial products, support European lead markets for the development, production and diffusion of clean tech in industry, streamline across EU Member States related planning, tendering and permitting processes, as well as address the fragmented approach of EU Member States towards foreign investments. Article 114 (Single Market) of the Treaty of the Functioning of the European Union (TFEU) is the appropriate legal basis. Article 173, on the other hand, is not considered an appropriate legal basis as it does not allow for harmonisation measures on the internal market, which remains the aim of measures included in IAA. Article 207 of the TFEU

[113] European Commission (2023). Joint Communication to the European Parliament, the European Council and the Council on "European Economic Security Strategy".
[114] Draghi, M. (2024). The future of European competitiveness: A competitiveness strategy for Europe (Part A), p.13

[115] China Issues New Rules on Exports of EV Batteries and Materials, Institute for Energy Research, and MOFCOM & GAC Announcement (2025) N. 58: Decision to Impose Export Controls on Items related to Lithium Batteries and Artificial-Graphite Anode Materials
[116] SolarPower Europe (2025). EU Solar Jobs Report 2025.
[117] More details (also related to local content requirements in public procurement procedures) in Annex 10, Subproblem 1, Driver 2: Limited willingness to pay a premium for low-carbon industrial products.
[118] CLEPA – Eurofund, Geripsa (2025).

may be required depending on the specific measures proposed to address the fragmentation of foreign investments in EU Member States.

3.2 Subsidiarity: Necessity of EU action

Industrial decarbonisation, as well as competitiveness, sustainable prosperity, industrial security and resilience are matters where EU action is needed. No single Member State alone is capable of effectively addressing industrial decarbonisation due to the integrated nature of the challenge. A harmonised EU-level approach is therefore necessary to avoid Single Market fragmentation and adequately address the urgency of the problems while protecting the level playing field as well as addressing administrative bottlenecks like permitting. Furthermore, climate change is a trans-boundary issue requiring international and EU action to effectively complement and reinforce regional, national and local action.

3.3 Subsidiarity: Added value of EU action

While national measures may address parts of the challenge, they risk fragmenting the Single Market and undermining collective effectiveness. Given that supply chains are deeply integrated across Member States, a coordinated EU-level approach is essential. It enables economies of scale and solutions that fit the scope of the problem and helps prevent inefficiencies and duplication. In line with this logic, each policy option (PO) focuses on areas where there is a demonstrable value added in acting at Union level due to the scale, speed and scope of the efforts needed.

4 Objectives: What is to be achieved?

4.1 General objective

The general objective is to **increase decarbonised and resilient industrial production in the EU manufacturing industry, with a special attention on EIIs and clean technologies**, considering their contribution to Europe's competitiveness, economic security, and sustainable economic growth, in line with the Clean Industrial Deal's objectives. Progress regarding the general objective will be measured by monitoring the carbon intensity of EII production, as well as production capacities and output for the EU in EIIs, certain clean tech and vehicle components.

4.2 Specific objectives

This overall objective is broken down into five specific objectives (SOs), related to the problems and drivers:

1. Facilitate differentiation for low-carbon industrial products to increase their value and marketability (SO1 addressing problem driver 1); this will be measured by an indicator on the availability of a low-carbon label for relevant industrial products, supported by a robust verification mechanism.
2. Boost demand for European low-carbon products and clean tech, (SO2 linked to problem drivers 2 and 3); measured by the share of EU and low-carbon production in EU consumption for relevant products,
3. Maximise the quality and benefits of *foreign investment in the EU* (SO3 linked to problem driver 4); measured by number of joint ventures for relevant sectors that create European added value, innovation and industrial resilience.
4. Speed-up and simplify permits for industrial decarbonisation (SO4 linked to problem driver 5); measured by the average permitting times

5. Increase investment projects in industrial areas (SO5) measured by the number of industrial Final Investment Decisions (FID) realised in relevant areas

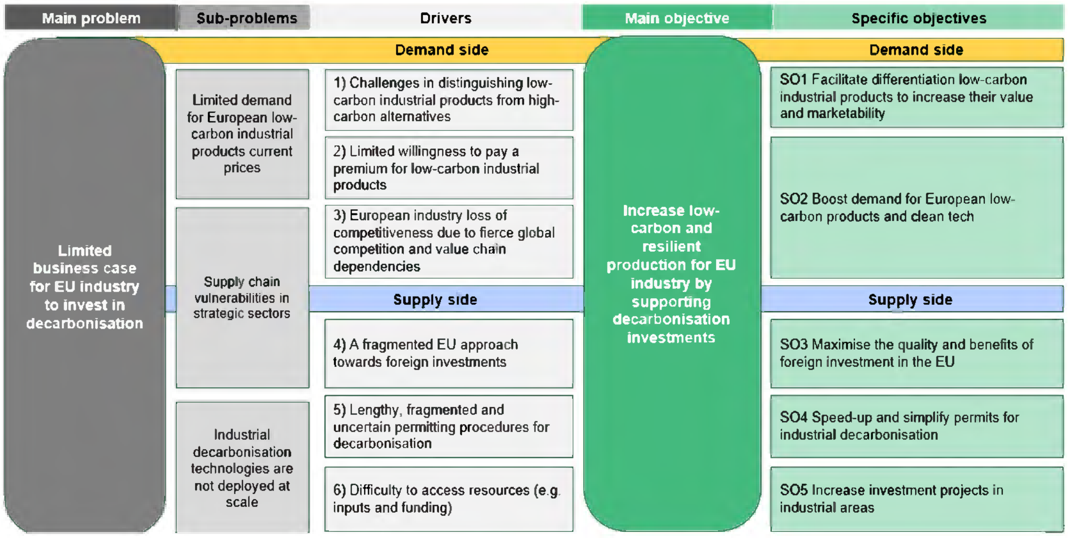

Figure 5: Problem drivers and specific objectives

5 What are the available policy options?

5.1 What is the baseline from which options are assessed?

The current baseline presents a structural imbalance in Europe's industrial transition: emissions are decreasing, but they are largely driven by shrinking production rather than cleaner production methods taking hold. Figure 6 below illustrates past and potential future trends for the EU iron and steel sector, as an example. Between 2005 and 2023, CO□ emissions and production volumes have moved almost in parallel.[119]

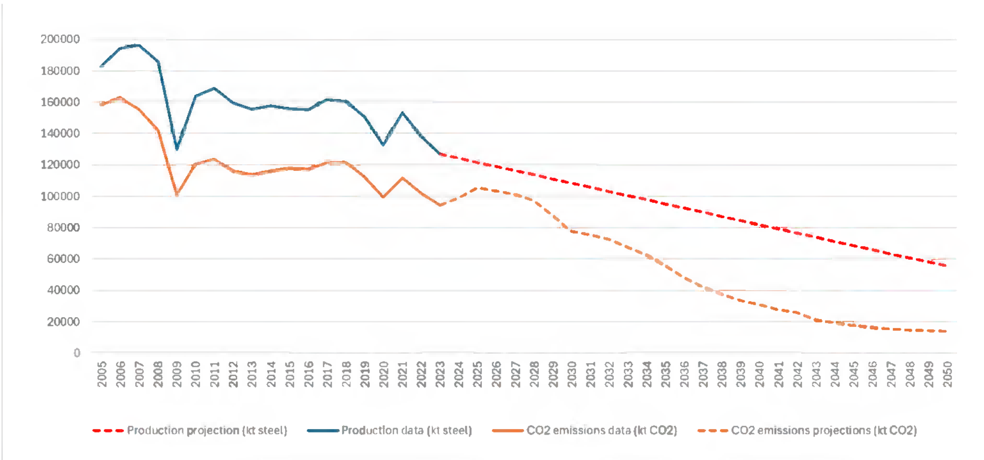

Figure 6: EU Iron and steel: production level and CO_2 emissions (2023-2050)

Looking at the emissions projections extrapolated on the historical trends of production and emissions, although in reach, they will need to decline much faster to meet the EU 2030, 2040 and 2050 climate targets. While CO_2 emissions reductions and production levels remained

[119] Source data 2005-2023: JRC-IDEES, consistent with EUROSTAT data. Source projections 2024-2050: internal calculations and JRC CETO 2025, developed with POTENCIA.

relatively correlated so far, emissions will have to be reduced much faster in the next decade. The EU remains firmly committed to achieving climate neutrality by 2050, including the intermediate target of a 90% reduction in net greenhouse gas emissions by 2040.[120] But if decarbonisation remains at today's pace and is not accelerated, the EU will still be able to achieve its emissions reduction targets, thanks to the EU ETS, but such targets will be met by reducing industrial production, as recent trends have shown. Looking at the iron and steel example, if the trend of industrial production between 2005 and 2023 persist, the production projection shows that the sector is expected to shrink by almost 60% by 2050 compared to the 2023 baseline.

In parallel to the EU ETS, the CBAM will gradually replace free allowances to prevent carbon leakage and ensure that imports reflect an equivalent carbon cost. Its implementation from 2026 is expected to support the competitiveness of EU producers that invest in cleaner technologies. The 2025 CBAM review is also expected to tighten the system, but its impact cannot be quantified at this stage. The baseline therefore assumes continued ETS-driven decarbonisation reinforced by a progressively more stringent CBAM regime, though with residual uncertainty regarding its effectiveness. Annex 8 presents the details of the baseline scenario, and includes the analysis like the above for aluminium, cement, and chemicals.

While industry is willing to invest in decarbonisation, and has taken important initial steps, concrete decisions risk not materialising fast enough to reduce emissions at the pace required to be on track to meet the EU climate targets. This is substantiated by clean projects announcements as reviewed in Driver 3.

Looking at each specific objective, the baseline scenario would result in no common definition, methodologies or minimum threshold for low-carbon industrial products. Furthermore, while existing public procurement rules establish *how* to buy, they fall short of addressing *what* to buy in terms of low-carbon criteria. Current green public procurement practices remain largely voluntary, sectoral, fragmented, and inconsistently applied across Member States. Voluntary resilience criteria are even less considered in the current procurement procedures, as they are a recent concept that will only become mandatory for some products from 30 December 2025 under the NZIA. Additionally, in the NZIA, resilience criteria refer to components, not specifically to the energy-intensive materials used. As such, the viability and competitiveness of European projects across the entire upstream value chain will continue to be undermined by the economic pressures outlined above and the lack of investments in innovation, resulting in a widened technological gap vis-à-vis a non-EU manufacturer.

The International Energy Agency (IEA) indicates that China's predominant role in global solar PV production will remain largely unchanged until 2035, with only a slight decrease as PV manufacturing facilities in other regions begin to materialize.[121] While promoting resilience and diversification, the NZIA does not ensure sufficient support for scaling up EU-based solar manufacturing. Its rules allow PV modules to qualify as "compliant" even if all components are sourced from Southeast Asia, where Chinese Tier 1 firms already operate large hubs. As a result, a product with no European-made content can still meet the NZIA criteria and undercut EU producers in price-sensitive auctions.

In the EU battery ecosystem, manufacturing capacities for battery cells and other key components remain largely dominated by foreign companies. Currently, South Korean firms account for 82% of the installed battery cell production capacity, while European companies

[120] European Commission (2025). The Clean Industrial Deal: A joint roadmap for competitiveness and decarbonisation, COM(2025) 85 final, 26 February 2025.
[121] IEA (2024), Energy Technologies Perspectives 2024.

represent only around 8%. However, ongoing investments are set to significantly boost European production by 2030, with their share expected to rise to approximately 25% based on industry announcements. Despite this growth, Asian players, pushed by Chinese investments in the sector, will continue to lead, holding a combined 54% share of installed capacity. Notably, Chinese companies are projected to become the most dominant, with a 34% share, while joint ventures between European and Chinese firms are expected to contribute a further 7% to the total installed capacity. When it comes to key battery components, Chinese firms are expected to lead cathode active material production by 2030 with 44% of installed capacity, followed by the EU with 32% and South Korea with 19%. For anode active materials the projections are more diversified in terms of ownership with the installed capacity coming from companies from Australia and New Zealand (28%), followed by Europe (23%) and China (20%).[122]

While the efficiency of the permit granting procedures for some decarbonisation projects is expected to improve, most manufacturing industries are not covered under existing frameworks and can continue to face complex and lengthy permitting procedures. The proposal for Simplification of administrative burdens in environmental legislation[123] is expected to streamline environmental assessments, but the overall permitting process from start to finish, beyond environmental permits (such as construction, operational and safety, land use or zoning permits) remains an untargeted field for simplification for the industrial manufacturing. While the grids package will tackle grid planning to remove bottlenecks, the difficulty to de-risk investments and access funding would remain, with Member States struggling to identify relevant projects to focus their efforts on better framework conditions.

Against this baseline, the competitiveness and decarbonisation of Europe's manufacturing industries, notably EIIs and some clean energy technologies, is unlikely to improve in the coming years without further action. The Commission's JRC has estimated that for each 1% loss of final demand in EIIs in the EU, the potential impacts would be the loss of 28 000 jobs, EUR 2 billion in value added and EUR 6.4 billion in turnover.[124] The EU's share in global manufacturing value added has already declined steadily over the past decade, while new investments increasingly flow to regions offering lower energy prices, faster permitting, and stronger industrial incentives. This erosion of industrial capacity risks turning Europe into a net importer of both clean and conventional industrial products, with strategic implications for economic security and the resilience of its value chains.

5.2 Description of the policy measures

Table 1 summarises the main policy measures, which are further explained in Annex 9.

Table 1: Main policy measures

Specific objectives	**Measures considered**	**Policy design elements**
(SO1)	LAB 1 - Development of a low-carbon product label for **all EIIs**	Focussed on principles
	LAB 2 - Development of a low-carbon product label **for steel**	LAB 2.1 - Determination GHG-intensity and system boundaries LAB 2.2 - Classification LAB 2.3 - Ensuring data quality
	LEAD_EII 1 - Low-carbon requirements on EIIs products used in public procurement and	**Scope**: EIIs (i.e. steel, cement and aluminium) outputs used in automotive and construction sectors

[122] European Battery Alliance and industry announcements.

[123] COM(2025) 981 final

[124] CARMEN is a linear model, where a 10% decrease/increase in global final demand would yield a result 10 times worse/better than the baseline. To facilitate understanding, a 1% reduction is used as a reference point, providing a more manageable and comparable outcome. See Annex 4 Section 2.4 for the original values on impact on global final demand.

(SO2)[125]	support schemes in selected downstream sectors	**Low-carbon**: minimum percentage (%) of low-carbon steel in automotive and construction % of low-carbon cement used in vehicles and construction projects **Made in EU**: minimum percentage (%) of materials produced in the EU in vehicles and construction projects should be made in EU **Target**: see table 3 below
	LEAD_EII 2 – Low-carbon and Made in EU requirements on EII products used in public procurement and support schemes in selected downstream sectors	
	LEAD_EII 3 – Low-carbon and made in EU requirements for EII products placed on the market in selected downstream sectors	
	LEAD_BAT 1 – Made in EU requirements in batteries for public procurement, auctions, and public support schemes	**Scope**: Batteries **Made in EU**: minimum number of the main components of the battery end-product manufactured in the EU **Target**: see table 3 below
	LEAD_BAT 2 – Made in EU requirements in batteries placed on the market	
	LEAD_SOL 1 – Made in EU requirements in solar PV systems for public procurement, auctions, and public support schemes	**Scope**: solar PV systems **Made in EU:** minimum number of main specific components of the PV end-product manufactured in the EU **Target**: see table 3 below
	LEAD_SOL 2 – Made in EU requirements in solar PV systems placed on the market	
	LEAD_VC 1 – Made in EU requirements for vehicle components for public procurements[126] and support schemes	**Scope**: Electric vehicle[127] components (excluding batteries) **Made in EU**: minimum share (%) of EU-made components over total components, in value, excluding batteries.[128] **Target**: see table 3 below
	LEAD_VC 2 – Made in EU requirements for vehicle components placed on the market	
(SO3)	INV 1 – Guidance on voluntary FDIs conditionalities	**Scope**: Battery supply chain and other critical supply chains. **Conditionalities**[129]: a. Ownership and structural requirements AND/OR b. Value added production (EU sourced inputs, EU-based staff recruitment) AND/OR c. Technological advancements (e.g. equipment ownership, intellectual property)
	INV 2 – Mandatory FDI conditionalities EU-wide	
(SO4)	PERM 1 – One project-one digital procedure	**Scope**: all industrial manufacturing sectors (NACE code C) • One project-one digital procedure for all permits, including relevant environmental assessments • Fully digitalised process • Standardised data sets[130] • Technical assistance
	PERM 2 – One project –one digital procedure, and special focus on EIIs	**Scope**: PERM 1 and, for EIIs, • Mirroring basic NZIA permitting provisions for all (Single point of contact, time limits) • "Overriding Public Interest" presumption • Regulatory sandboxes for Renewable fuels of non-biological origin (RFNBO)

[125] A detailed overview of all LEAD measures including scope considerations and targets definition for specific objective 2 can be found in Annex 9

[126] The definition of public procurement used here includes procedures that concern 1) contracts for the purchase, lease, rent or hire-purchase of vehicles and 2) the public service contracts having as their subject matter the provision of services that imply the usage of vehicles. To avoid distortions, vehicles first registered on the Union territory before the entry into force of the measure should be deemed to comply with the requirement until a certain date.

[127] In the present document, ICE includes mild hybrids, and EVs include battery electric, plug-in hybrid and fuel-cell electric vehicles. However, the model used to assess the impact of the measures does not include the FCEVs due to the current statistical irrelevance. When referring to vehicles, the definition includes passenger cars, light commercial vehicles, buses and lorries.

[128] Vehicle components are valued at ex-works prices. The methodology used in this Impact Assessment to determine the targets may be subjected to fine-tuning based on further development and additional information that may become available over time.

[129] The list of incomplete but possible conditionalities considered for the legislative initiative is presented in Annex 9, while examples of conditionalities applied by third countries are provided in Annex 13.

[130] Mandating the storage/depository and re-use of data in electronic forms for interoperability purposes.

		• Tacit approval at intermediate stage
	PERM 3 – Dedicated measures for industrial manufacturing clusters	**Scope:** PERM 2 and in addition, for industrial areas: • Tacit approval for all manufacturing industries in areas • Priority assessment by Distribution System Operators of connection requests to energy infrastructure in acceleration areas • Environmental Impact Assessment derogation • Emission exemptions for construction phase for CCS related projects
(SO5)	AREA 1 - Recommend Member States to facilitate public funding for projects in industrial areas	Criteria definition based on: • Economic security potential • Decarbonisation potential, including links with steel label • Deployment potential, including employment and skills considerations
	AREA 2 - Member States to designate industrial areas and facilitate access to public funding	
	AREA 3 - Commission to designate industrial areas according to the selection criteria and giving the projects priority access to funds	

Structure of the policy options

The POs are structured from a low degree of intervention (PO1) to a high degree of intervention on the measures proposed (PO3). Intervention should be understood in the context of each specific objective, e.g.: for permitting or the low-carbon label, each PO becomes increasingly more prescriptive in the requirements imposed on companies or Member States. In the case of FDI, the measures become more stringent due to their being binding, and for lead markets, the measures increasingly cover more and more market segments (from public procurement only to all products put on the market) either for low-carbon or for made in EU requirements.

Table 2: Policy options to be assessed

Specific objectives	**PO1**	**PO2**	**PO3**
SO1- *Low-carbon label*	LAB 1	LAB 2	
SO2 – *Lead markets*			
EIIs	LEAD_EII 1	LEAD_EII 2	LEAD_EII 3
Batteries	LEAD_BAT 1		LEAD_BAT 2
Solar PV	LEAD_SOL 1		LEAD_SOL 2
Vehicle Components	LEAD_VC 1		LEAD_VC 2
SO3 – *Foreign Direct Investment conditionalities*	INV 1	INV 2	
SO4 - *Speed-up and simplify permit-granting procedures*	PERM 1	PERM 2	PERM 3
SO5- *Facilitate investment decisions in decarbonisation projects*	AREA 1	AREA 2	

5.3 Options discarded at an early stage

AREA 3 (SO5) would mandate the Commission to define industrial areas using the selection criteria and providing projects in these areas with preferential access to funding. This measure is discarded at an early stage as this would require amending other pieces of legislation, most notable the ETS Directive for the Innovation Fund, where a revision is already foreseen for 2026. IAA is not the right vehicle to conduct such amendments.

Table 3: Overview of LEAD measures under SO2

Measures	Design elements[131]		
	Requirement	**Market segment**	**Scope & target**
LEAD_EII 1	**Low-carbon:** minimum percentage (%) of low-carbon materials used in construction and automotive	• Public procurement • Public support schemes	• Steel: 25% in 2030 • Cement (concrete[132]): 5% in 2030 • Aluminium: 25% in 2030 • Other EIIs: to be determined at later stage
LEAD_EII 2	**Low-carbon**: minimum percentage (%) of low-carbon materials used in construction and automotive **Made in EU:** a minimum percentage (%) of materials produced in the EU used in construction and automotive	• Public procurement • Public support schemes	• Low-carbon and made in EU Steel: 25% in 2030 • Low-carbon and made in EU Cement (concrete[133]): 5% in 2030 • Low-carbon and made in EU Aluminium: 25% in 2030 • Other EIIs: to be determined at later stage in delegated acts
LEAD_EII 3	**Low-carbon:** minimum percentage (%) of low-carbon materials used in construction and automotive	• All products placed on the market in automotive and construction	• Low-carbon Steel: 25% in 2030 • Low-carbon Cement (concrete[134]): 5% in 2030 • Low-carbon Aluminium: 25% in 2030
	Made in EU: a minimum percentage (%) of materials produced in the EU used in construction and automotive		• Made in EU Steel: 85% from entry into force • Made in EU Aluminium: 70% from entry into force • Made in EU Cement: 95% from entry into force
LEAD_BAT 1	**Made in EU**: minimum four main components in EV batteries and three main components in battery energy storage systems (BESS)	• Public procurement • Public support schemes • Auctions	• EVs: Mandatory Made in EU requirements of at least four components at one year after entry into force, including the battery cell, increasing to 6 components after three years of entry into force, including the BMS and the CAM. • BESS: Mandatory Made in EU requirements of at least three components at one year after entry into force, including the battery pack and the BMS; increasing to 6 components after three years of entry into force, including the battery cell and the CAM.
LEAD_BAT 2		• All batteries placed on the market	
LEAD_SOL 1	**Made in EU:** minimum number of main specific components in solar PV systems	• Public procurement • Public support schemes • Auctions	• PV inverter and at least two additional main specific components one year after entry into force. PV inverter and at least three additional main specific components three years after entry into force.
LEAD_SOL 2		• All solar PV systems placed on the market	

[131] EU content will be designed in line with the Union's international commitments. Requirements will be of a temporary nature, include periodic review clauses, and feature safeguards in case of insufficient competition or supply constraints, ensuring proportionality and policy coherence. These elements are integral to all options considered.

[132] For the objective of lead markets in the construction sector, the requirement may be established at the level of concrete, as the carbon impact of energy intensive materials depends heavily on the specific design and material mix.

[133] Ibid.

[134] Ibid.

LEAD_VC 1	**Made in EU**: minimum share in value (%) of EU-made components over total components, excluding batteries.[135]	• Public procurement[136] • Public support schemes	• EVs[137]: 70% at one year after entry into force (2027) and 75% by 2030
LEAD_VC 2		• All vehicles placed on the market	

[135] Vehicle components are valued at ex-works prices.

[136] The definition of public procurement used here includes: 1) procedures that concerns contracts for the purchase, lease, rent or hire-purchase of vehicles; 2) procedures that concern the public service contracts having as their subject matter the provision of services that imply the usage of vehicles. To avoid distortions, vehicles first registered on the Union territory before the entry into force of the measure should be deemed to comply with the requirement until a certain date.

[137] In the present document, ICE includes mild hybrids, and EVs include battery electric, plug-in hybrid and fuel-cell EVs. However, the model used to assess the impact of the measures does not include the FCEVs due to the current statistical irrelevance. When referring to vehicles, the definition includes passenger cars, light commercial vehicles, buses and lorries.

6 What are the impacts of the policy options?

The impacts of the different POs are assessed below taking into account the results of the public consultation and based on internal analysis and external studies. Overall, the initiative is not expected to have an impact on fundamental rights. All measures that include or imply information sharing or reporting should be implemented in line with the principle of digital by default.

6.1 POLICY OPTION 1

6.1.1 Economic impacts

6.1.1.1 Impact on companies

LAB 1 - Regarding the **differentiation of low-carbon industrial products from conventional ones**, PO1 develops a label on the carbon intensity of all energy intensive industrial products. It would have a demand-pull effect, encouraging energy-intensive companies to invest in low-carbon production processes.

The label allows companies to gain a competitive edge by accessing new markets which require the use of such label, specifically those to be created under SO2 – Lead markets. This means the label can be used as a compliance instrument to meet the environmental requirements foreseen by public procurement rules or public incentives schemes, as analysed under SO2, measures LEAD_EII 1, 2 and 3. An EU wide label would also mean easier access to green finance or Environmental, Social and Governance (ESG)-linked loans.

61% (191 out of 314 respondents) to the **Public Consultation** support the introduction of an EU voluntary carbon intensity label, especially for its potential to boost transparency (n=195, 62%), differentiation (n=187, 60%), and uptake of green products (n=160, 51%).

Companies that wish to certify their products would incur costs related to monitoring, reporting and verifying, and certifying carbon emissions. Therefore, complementary monitoring, reporting and verification is needed. For products where process emissions represent the majority of the carbon footprint, these should be limited as companies are already obliged to do so under the EU ETS. Likewise, if the companies that wish to certify their products are importers, they would have to face similar costs as those faced under the CBAM monitoring, reporting and verification.

At the same time, the administrative costs of setting up specific product-labels covering all EIIs would be substantial and would increase significantly the complexity of implementation for regulators. Given the heterogeneity and complexity of EIIs and their value chains, a very wide range of product labels could be envisaged. For instance, today under the EU ETS there are 54 product benchmarks, used to determine how many emission allowances installations receive for free. At least as many product labels would need to be developed, creating important administrative burden. These costs relate, amongst others, to producing and maintaining a third-party verified carbon footprint certification system.

LEAD_EII 1 introduces **low-carbon requirements for EIIs materials used in construction and automotive in public procurement and public support schemes**. This measure provides increased security for EIIs to commit decarbonisation investments. The potential of low-carbon demand creation depends on the downstream sectors where the requirements would apply, and the role public procurement and public support schemes play in those markets.

In the **cement** industry, public procurement represents approximately 31% of the overall European cement market.[138] This significant share underscores the public sector's leverage in securing the offtake of low-carbon cement in construction and infrastructure, driving broader market transformation within the cement industry. In the **steel** industry, however, public procurement, represents a smaller portion of the overall European steel market, accounting for around 11% of apparent steel consumption in the EU.[139] Aluminium is also used in public procurement and it is a light-weight material whose demand is increasing, primarily driven by automotive, building and construction and packaging. More concretely, considering the high shares of vehicles benefitting from public support schemes in the EU market, and the expected increase in aluminium shares in the future[140], measures targeting public support schemes would be key to unlock low-carbon aluminium demand. Lead markets measure provides a clear and predictable demand signal for low-carbon materials used in publicly funded projects. Steel producers would be able to deliver certified low-carbon steel to industrial consumers that will benefit from more advantageous conditions to public tenders, and therefore an early market advantage during their decarbonisation.

The **automotive** sector is expected to play a significant role in driving demand for low-carbon steel and aluminium, particularly due to lightweighting needs for electrification in vehicles. However, public procurement is not a huge market for the automotive sector, compared to buildings and infrastructure. Of the approximately 15 million passenger cars registered in the EU in 2018, only 0.5% to 3.5% were procured for public sector fleets.[141] Therefore, measures targeting the public sector alone are likely to have a limited impact on driving low-carbon demand for steel and aluminium. The situation is different regarding public incentives and support schemes in the Member States, where according to internal Commission analysis 70% of the automotive market benefits of some sort of support schemes across the EU. Only corporate vehicles registrations make up around 60% of car registrations in the EU.[142]

Introducing targets for the use of low-carbon materials in the construction and automotive sector would allow the steel and aluminium sectors to gain a green premium, which will partially be passed on into the price of final products (see Section 6.1.1.2). As a result, the steel and aluminium sectors could see an improvement of their sector's value added. The benefits could reach **EUR 686 million for the three EIIs** (steel and aluminium EUR 241 million – 0.35%, cement EUR 445 million or 0.65%) combined throughout the EU, in 2030 compared to the baseline year.[143]

This predictability of future demand for low-carbon materials can help absorb part of the investment's costs from the low-carbon technologies and has a high potential to further push investment decisions towards decarbonisation. As a matter of example, in the EU steel sector, there are currently at least 29 announced steel decarbonisation projects, with a combined potential capacity of additional 41 Mtonnes of low-carbon steel per year by 2030, that have not yet reached the final investment stage. To that end, the proposed lead market measures, based

[138] Bellona Foundation (2024). Green Public Procurement of cement and steel in the EU: An overview of the state of play.
[139] VUB Brussels School of Governance (2024). Public procurement of steel and cement for construction, assessing the potential of lead markets for green steel and cement in the EU.
Bellona Foundation (2024). Green Public Procurement of cement and steel in the EU: An overview of the state of play.
[140] European Aluminium (2023). Aluminium Content in Passenger Vehicles (Europe) - Assessment 2022 and Outlook 2026, 2030.
[141] JRC (2022). Revision of the EU Green Public Procurement Criteria for Road Transport.
[142] European Commission (2025). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Decarbonise Corporate Fleets, COM(2025)96 Final, 5 March 2025
[143] Impacts are measured during 2025-2030. These figures result from a simulation of the FIDELIO model, when prices in the automotive and construction sectors are shocked by 0.225% and 0.4499 % respectively, and the resulting general equilibrium effects of higher prices on final demand, incomes and value added are computed.

on the current project pipeline, could unlock up to EUR 15.5 billion in investments[144] covering approximately 15% of the sector's EUR 100 billion total investment need by 2050, as estimated in the impact assessment forthe 2040 Climate Target Impact Assessment. [145, 146]

Results from the **Public Consultation** show that here is widespread support (n=280, 89%) for stimulating demand for clean industrial products, including through public procurement (n=259, 82%) and voluntary EU labelling (n=191, 61%).

As part of the **targeted stakeholder consultation (EIIs)**, out of the 62 total replies, 90% agreed that measures to stimulate demand for low-carbon industrial products are essential to drive decarbonisation. Only 4 respondents (6%) disagreed.[147]

In the **non-ferrous metals** sector, all 5 respondents raised serious concerns about substitution risks. In price-sensitive markets (automotive, packaging, construction), there is potential for users to switch from low-carbon aluminium or copper to cheaper, higher-emission alternatives like steel or plastic. **Steel stakeholders** acknowledged conditional substitution risks. Of 18 responses, 4 state risks are low due to functional superiority of materials in many applications.

LEAD_BAT 1 introduces **made in EU requirements for four main components in EV batteries and three main components in Battery energy storage systems (BESS) for public procurement, auctions, and public support schemes** starting one year after the entry into force of the legislation. These requirements would increase after three years into entry into force. These targets are not limited in time but remain, like all other requirements, subject to a review clause, and will promote the use of EU machinery and equipment when possible.

Made in EU requirements will help ensure that existing manufacturing capacities for key battery components are fully utilized, while supporting the successful implementation of projects under construction and those that have been announced or put on hold. The EU battery ecosystem currently has a project pipeline, including expansions, projects under construction, and announced projects, totalling 775 GWh of battery cells, 874 GWh of CAM, 478 GWh of anode active materials (AAM), 663 GWh of separators, and 205 GWh of electrolytes. These figures exclude projects currently on hold. For battery cells, approximately 134 GWh of announced capacity is on hold, with an additional 100 GWh having been fully cancelled. In the case of CAM, cancellations total 513 GWh, while for AAM, around 100 GWh of capacity has either been paused or cancelled.[148]

By leveraging the size of the European market alongside support schemes, with European EV purchase subsidies totalling between EUR 14 billion and EUR 17 billion annually from 2021 to 2024[149], Made in EU requirements will help strengthen the EU battery industry by ensuring that value creation takes place within the EU and by reducing strategic dependencies across the supply chain. This will level the playing field against heavily subsidised battery industries operating both overseas and in Europe, where some foreign companies maintain key stages of the value chain and the technological know-how in their home countries.

[144] Estimate based on data from BloombergNEF's Steel Decarbonization Project Database 1.0.5. The cumulative figures of 41 Mtpa of low-carbon steel capacity and the associated EUR 15.5. billion in investments represent only projects whose output meets the indicative IAA's carbon intensity label classes of performance (Class A-C).

[145] European Commission (2024)., Commission Staff Working Document: Impact Assessment Report (Part 3), accompanying the document Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Securing our future - Europe's 2040 climate target and path to climate neutrality by 2050, building a sustainable, just and prosperous society, COM(2024) 63 final, pp.164-167.

[146] Draghi, M. (2024). The future of European competitiveness: In□depth analysis and recommendations (Part B), p. 99.

[147] One from the ceramics sector, one from the non-ferrous metals and two from other sectors.

[148] European Battery Alliance and BloombergNEF.

[149] MIT CEEPR. Global Clean Investment Monitor: Government Support for Electric Vehicles and Batteries. Data represents the EU-27 and the United Kingdom. – The value has been exchanged from USD to EUR.

Additionally, Made in EU requirements will protect the European battery industry from the disruptive impact of Chinese export restrictions on critical battery technologies and materials. By anchoring more stages of the battery value chain within Europe, this measure will not only reduce the battery industry's exposure to geopolitical risks but also ensure that public support translates into industrial resilience and long-term competitiveness. The impact of Made in EU requirements also extends to the extraction and processing of critical raw materials, where creating strong and predictable demand is essential to de-risk investments.[150]

In *public procurement and auctions*, EVs are only marginally affected, except for urban buses, thus the impact will be limited to around 3.5% of the total EV demand[151], whereas BESS have a bigger exposure due to its growing reliance on public auctions, which in 2024 accounted for 5% of the total BESS deployment.[152] The proposed phased approach to introducing Made in EU requirements in BESS would help mitigate the impact on prices while enabling the EU to gradually build up its domestic value chain.

Based on the analysis on batteries for EVs in Annex 4, section 2.2, Made in EU requirements in *public support schemes* may raise passenger EV costs between EUR 360-900 in 2030, which could affect affordability and competitiveness in cost-sensitive markets. In 2024, all Member States had some type of tax benefit or purchase incentive for EVs[153], however this will slow down as EV uptake keeps growing. A phased implementation starting with Made in EU requirements for batteries of four components for EVs, including the battery cell, at entry into force, plus the support schemes themselves would help absorb the impact. According to industry announcements and demand estimates[154], battery cell installed capacity in 2025 could meet around 90% of the EV battery demand. While actual production falls short of installed capacity, a significant share of EVs on the EU market are already powered by battery cells manufactured within Europe, indicating that the cost impact of local production is already being absorbed to a large extent by the market.

LEAD_SOL 1 introduces Made in EU requirements for three main specific components in solar PV, starting one year after entry into force, and four main specific components three years after entry into force, in public procurement, auctions, and support schemes.

Made in EU requirements will ensure the retention of existing manufacturing capacities for solar PV modules and inverters, while enabling the scaling-up of further components and supporting the implementation of both the current project pipeline and projects under construction or announced. The component related targets have been set taking into account the assessed project pipeline and thus introducing a Made in the EU requirement one year after the entry into force of the IAA would be feasible (see Annex 9 for detailed assessment).

The impact of this measure would be to reduce the investment risks and improve market access for EU-based solar manufacturers. Companies willing to participate in tenders will have to localise manufacturing or partner with EU suppliers, hence supporting industry growth and job creation. This should therefore facilitate manufacturing projects reach final investment decision.[155] Scaling up the industry here will also ensure investments also in innovation and research in Europe. At least 12 GW of manufacturing capacity is on hold and at least 4 GW is shut down due to insecure and unstable business case for manufacturing PV in the EU at the

[150] The first list of EU strategic raw materials projects is expected to make a significant contribution to the EU's demand for raw materials needed for the batteries supply chain.
[151] European Commission internal calculation
[152] Statista.
[153] ACEA (2024). Electric cars: Tax benefits and incentives (2024).
[154] European Battery Alliance.
[155] See Annex 11 for projected EU supply chain developments as a consequence of NZIA implementation and IAA measures.

moment. Despite the existing challenges, a strong project pipeline exists which, if realised, could increase the manufacturing capacity by 2030 for ingot from less than 1 GW today to 20 GW, for wafers from less than 1 GW to over 30 GW, cells from 2 GW to over 30 GW, modules from 8 GW to over 40 GW, and inverters from around 80 GW to more than 100 GW.[156]

LEAD_VC 1 – The impact of LEAD_VC is assessing based on a model developed by the Commission's JRC (For further information about the methodology and assumptions, see: Annex 4). As vehicle manufacturers will have the incentive to comply with the target to have potential access to public subsidies, the model projects an increase in EU vehicle component suppliers' sales to the manufacturers of EUR 6.5 billion in 2027 and by EUR 6.9 billion in 2030 when aggregating the sales in all three vehicle segments.[157] Following the sensitivity analysis carried out in Annex 15, the cross-region elasticity (i.e. substitution between EU- and non-EU-made EVs) is the parameter that affects mostly the results for EU EV manufacturers, vehicle component suppliers, and the value added generated. However, the values do not significantly affect the outcome of the policy's economic effects.

INV 1 – Voluntary FDI conditions would create only limited and uneven effects: companies in Member States that apply the guidance may face modest requirements, while those investing elsewhere would see no change at all. While such measures could send a positive market signal, they would not prevent a 'race to the bottom' across the Single Market.

However, the voluntary approach does not fix the core problems. Companies can simply avoid any obligations by choosing more permissive Member States, and even implementing Member States may pick and choose individual conditions, creating further fragmentation. This enables regulatory arbitrage and is likely to preserve superficial or assembly-only investment models, and fails to secure technology retention, local value-added or meaningful supply-chain integration—leaving strategic vulnerabilities essentially unchanged.

PERM 1 - Streamlining permitting for decarbonisation projects in manufacturing industries would accelerate the authorisation of such projects and speed up the development of economies of scale for new generation of low-carbon manufacturing. However, these investments also depend on factors beyond the permitting framework, making quantification difficult.

A joint, mandatory, digitally integrated assessment of the entire permit-granting process would reduce the administrative burden compared to fragmented procedures, thus lowering costs (e.g. environmental assessment costs[158]) and saving time and money for companies. The introduction of e-permitting whenever missing could introduce cost-savings from 80 million (for a third of all industrial manufacturing) to EUR 240 million for all manufacturing industries in the EU, through the digitalisation of 5 permit-granting procedures.[159] See Annex 4 Section 2.1 and Annex 15 for more information on the calculations.

Cross-border businesses could further benefit from the Single Digital Gateway (SDG)[160], notably reducing time and money dedicated to gather information or completing administrative procedures. 64% of respondents to the

[156] European Commission – internal analysis. Summary - Net-Zero Technologies (NZT) Monitoring Dashboard - Power BI

[157] In the HDV segment, the impact is difficult to assess due to the unavailability of data and the limitations of the applied model when it comes to estimating the current share of EU content in this vehicle segment. For this reason, the same assumptions are taken as for the passenger cars for the sake of this Impact Assessment. Given that anecdotal evidence suggests a higher market share for EU vehicle component manufacturers, it is expected that the costs estimated for the HDV sector represent the higher bounds of potential impacts.

[158] As a single assessment report would be prepared.

[159] A study on business procedures carried out to underpin the Single Digital Gateway impact assessment concluded that for 9 procedures, the cost savings for all EU businesses - if e-procedures were introduced where missing - would be in the order of of EUR 6.5 billion. For more information on how the estimate of EUR 240 million was derived, see Annex 4.

[160] The Single Digital Gateway is a one-stop-shop for citizens and companies who want to work, study or do business in another EU country that provides (i) access to reliable information, (ii) online procedures and (iii) assistance services. By drastically reducing the administrative burden and improving the European business environment, it is key to the smooth functioning of the Single Market; Regulation (EU)

Public Consultation (114 out of 179) agree that a fully digitalised permitting process is a relevant measure for accelerating permitting for industrial decarbonisation projects. Additionally, 61% (108 out of 178) support improved administrative cooperation through digital tools as a relevant approach. Further identified measures for speeding up permitting for industrial decarbonisation were single points of contact (83%, 136 out of 163), time limits for the permit granting process (88%, 149 out of 170), joint environmental assessment when required under multiple legal acts (76%, 133 out of 176) and tacit approval for certain administrative decisions (83%, 144 out of 138)).

AREA 1 - Regarding the definition of **criteria for industrial areas**, the measures would recommend Member States to make use of the criteria defined in the IAA to focus on which projects to support under their national schemes. As this would be only a recommendation to Member States, it can be assumed that the effect on companies is likely to be limited and potentially fragmented across the EU Single market, with some limited support for projects and industrial sectors with strategic importance for the EU.

6.1.1.2 Impact on downstream sectors

LEAD_EII 1 will have an impact on the cost of procuring low-carbon materials, as well as an impact on the final product pricing across the automotive and construction sectors.

Automotive sector

A 25% low carbon steel target would lead to a price increase for a midsize passenger vehicle of 0.125% increase in the average price of a vehicle[161], resulting in a EUR 46.67 price increase per passenger vehicle and EUR 186.4 for heavy-duty vehicles. The results for low-carbon aluminium present similarly low impacts in the price of a vehicle with only a 0.1% increase[162], or EUR 22.6, bringing the total cost per passenger vehicle **at 0.225% increase for both the low-carbon steel and aluminium**. The overall impact per passenger (light duty) vehicle would total to **EUR 69.27**.

As a result of the modelling exercise, the value added of the automotive sector would be affected in a limited way, with losses of EUR 291 million for the entire sector. These losses are a consequence of the higher final vehicle price driven by the newly imposed green premium and the consequent decrease in the consumption of automotive and construction sectors.

See Annex 4 Section 2.2 for more details on cost calculation. Following the sensitivity analysis for the corporate fleets expected in 2030, the costs could range from EUR 179.6 million up to EUR 417.13 million derived from uncertainties linked to the future cost of low-carbon steel, notably on the technology routes used to decarbonise. See Annex 15 for more information.

Besides the premium linked to the use of low-carbon steel, vehicle manufacturers may need to adjust their supply chains to source the materials, which can lead to additional costs and logistical challenges. The effects of the supply chain adjustments will depend on the verification rules in place to comply with the requirements. In the case of steel, the approach established under the label on the carbon intensity (SO1) is based on third party verified data and on ensuring physical traceability.

Construction sector

2018/1724 of the European Parliament and of the Council of 2 October 2018 establishing a single digital gateway to provide access to information, to procedures and to assistance and problem-solving services and amending Regulation (EU) No 1024/2012.

[161] JRC (2024). Draft preparatory study on iron and steel – ecodesign measures under the ESPR. See Annex 4 for more details.

[162] T&E (2025). Reducing the carbon footprint of aluminium in cars: why and how?,

Different estimates indicate that the premium associated with low-carbon **steel** in the construction sector can account for 0.25% of total building costs, with some variations depending on the type of project.[163] In the case of low-carbon **aluminium**, in the absence of construction sector specific estimates, the 0.1% price increase[164] is also used. Similarly, as far as **cement** is concerned, estimates on the impact of using low-carbon cement or concrete on the final price of a house or construction project range would be of 0.10% for a 5% low-carbon cement target.[165] Setting a 25% target for both low-carbon steel and **aluminium,** as well as a 5% target for low-carbon cement in public procurement is estimated to lead to a combined cost increase of less than **0.45%** for a construction project. The construction sector would face a loss in value added of EUR 691 million by 2030, due to the requirements to source a share of low-carbon steel, aluminium and cement.

Since the value of public support schemes available across Europe in the construction sector is not available, the full impact of the costs for this market segment cannot be provided at this stage. The impact of this proposed measure for the entire construction sector are reflected in Section 6.3.1.2. See Annex 4, Section 2.2, for cost calculation.

It is also important to recall that the cost premium of producing low-carbon materials is expected to decline over time as related technologies mature, are being deployed at large scale and demand for low-carbon materials moves from niche, lead markets to larger scale markets. At the same time, conventional carbon-intensive production methods will become more expensive as CO_2 prices rise, narrowing the cost gap between conventional and low-carbon materials. See Annex 7 for more details on the projected cost evolution of clean technologies.

In the context of the **targeted stakeholder consultation**, industry also reported marginal downstream cost effects from using low-carbon materials. This view was supported by **77% of the steel respondents**.[166] All 7 respondents from the **cement** industry agreed that low-carbon cement can be deployed with minimal or no material impact on the total construction costs.

Administrative costs

For steel, the label on the carbon intensity foreseen under LAB 2 would provide a reliable tool for participants in the tender to demonstrate compliance with low-carbon requirements for the material used in the automotive or construction projects. For cement, the standardisation request under the revised CPR has recently been adopted with a deadline for CEN of June 2027 to deliver the first new harmonised standards.[167] Under these harmonised standards, CE marking will require the declaration of the GHG emissions in the declaration of performance and conformity and in a label on the packaging. This will offer a reliable basis for public authorities to ensure compliance with the relevant policy measure. Accordingly, this would add limited administrative burden compared to the baseline.

LEAD_BAT 1 – Introducing Made in EU requirements for batteries will have a twofold impact on downstream sectors. First, it will lead to higher prices compared to low-cost battery imports with short term risks of delaying the energy transition. However, this must be considered in light of the EU's existing battery production capacity, which reached approximately EUR 24 billion in 2023[168], with exports exceeding EUR 11 billion in both 2023 and 2024[169],

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[163] JRC (2024). Draft preparatory study on iron and steel – ecodesign measures under the ESPR; Global Efficiency Intelligence, TransitionAsia and Solutions for Our Climate (SFOC) (2024). Green Steel Economics.
[164] T&E (2025). Reducing the carbon footprint of aluminium in cars: why and how.
[165] Agora Industry (2024). Creating markets for climate-friendly basic materials. Potentials and policy options, p. 13.
Bellona Foundation (2018). Building with Low Carbon Cement is Affordable, ,.
[166] Respondents include companies from the steel value chain, trade association and think tanks
[167] COMMISSION IMPLEMENTING DECISION of 28.7.2025 on a standardisation request to the European Committee for Standardisation as regards cement, lime and other hydraulic binders in support of Regulation (EU) 2024/3110 of the European Parliament and of the Council.
[168] Ericher, M. et al. (2024). Les Themas de la DG. Deployment of electromobility: How to develop the European battery supply.
[169] Bruegel Clean Tech Tracker and Eurostat.

demonstrating an already strong industrial base. Second, since foreign-made EVs and BESS are unlikely to meet the Made in EU thresholds for batteries, EU-made downstream products will benefit from the access to public support schemes, procurement, and auctions. Even if foreign producers attempt to comply, their costs are likely to be higher due to logistics and limited integration of EU components, further reinforcing the competitiveness of an EU based battery downstream sectors.

In 2024, the price increase for manufacturing the same battery product in the EU using local battery cells, CAM and AAM, compared to importing these components from China, ranged between EUR 16-30 per kWh depending on the maturity of the manufacturing company (see Annex 9). For example, looking at the impact on EVs, for an average passenger EV equipped with a 68-kWh battery pack, the estimated price increase in 2024 would range between EUR 653 and EUR 1 632. This corresponds to approximately 1.4% to 3.5% of the average retail price of an electric vehicle in Europe.[170]

Ongoing cost reductions in battery packs and cells are expected to gradually reduce the battery's share of total EV and BESS costs, thereby diminishing the overall cost impact of Made in EU requirements on the downstream sectors. Global average lithium-ion battery pack prices fell by 20% between 2023 and 2024, and by a total of 86% from 2013 to 2024. The learning rate for batteries is estimated at 18% at the pack level and 24% at the cell level, meaning costs typically decline by 18% and 24% respectively each time cumulative production doubles.[171] This suggests a continued and potentially accelerated decline in battery prices. Pack costs are projected to fall from EUR 98.9/kWh in 2024 to EUR 59.3/kWh by 2030 and EUR 46.4/kWh by 2035 (i.e., a 53% reduction). Similarly, cell prices are expected to drop from EUR 67/kWh in 2024 to EUR 36.9/kWh by 2030 and EUR 27.5/kWh by 2035 (i.e., a 59% reduction) while maintaining a typical cell-to-pack cost ratio of approximately 60:40 *(*see Annex 4 Section 2).[172]

LEAD_SOL 1 - Introducing Made in EU requirements criteria in public procurement, auctions, and public support schemes for solar PV might result in a short-term cost premium[173], as EU-made modules currently have higher production costs than imported ones. European panels with three components manufactured in Europe (which would be NZIA compliant) would cost around 19 €ct/Wp, while minimum sustainable price for production in China is estimated at 15.9 €ct/Wp[174], despite Chinese panels currently being sold at levels of 8.7 €ct/Wp in Europe. Once Chinese products hit a sustainable level again[175] the price difference between the Made in the EU module and an imported one will not be that disproportionate. At current levels of 8.7 €ct/Wp the price difference between Chinese products and NZIA-compliant products would impact the Levelized Cost of Energy (LCOE) by 0.75 €ct/kWh equal to an increase of 14.5%[176] at the level of the specific auction. Please see Annex 4 section 2.2. for further calculations. This means that profit margins of utilities could be negatively impacted, with electricity prices for end consumers potentially increasing only very marginally as (i) Made in EU requirements would be applied only to a share of the auctions; (ii) gas power plants would remain the marginal source to set the electricity price most of the hours. Further, at end-consumer level, slight price increases can be accommodated by other means, such as levies and

[170] European Alternative Fuels Observatory. Electric vehicle model statistics.
[171] BloombergNEF (2024). 2024 Lithium-ion Battery Price Survey.
[172] BloombergNEF (2024). 2024 Lithium-ion Battery Price Survey.
[173] Bruegel (2024), Smarter European Union industrial policy for solar panels, Policy Brief , 08 February 2024.
[174] SolarPower Europe (2025). New study reveals path to reshore solar manufacturing in Europe.
[175] As currently Tier 1 Chinese manufacturers suffer vast annual losses in 2024 and 2025: Chinese PV Industry Brief: Top solar module makers report H1 losses – pv magazine International
[176] SolarPower Europe (2025). Reshoring Solar Manufacturing to Europe.

taxes. According to stakeholder input, the NZIA resilience requirements, applicable as of 30 December 2025 and foreseen to be implemented under the Fer X scheme in Italy, could lead to an increase of approximately 15% in the auction-level LCOE, but only around 1% at the corresponding electricity price level.

Overall, applying Made in EU requirements under LEAD_SOL 1 is estimated to generate the following additional cumulative costs by 2030 compared to the Baseline: approximately EUR 60 million in public procurement, EUR 580 million in auctions, and EUR 240 million in public support schemes. These costs reflect the price difference between PV modules manufactured in the EU using a mix of EU and Chinese components (IAA compliant), and the minimum sustainable PV module price in China[177] for fully Chinese-made modules. If Chinese solar costs would remain closer to today's price, these costs could be higher. The costs for downstream industrial and household consumers resulting from higher electricity prices could not be calculated with the models used for this impact assessment.

Nevertheless, this cost premium would be reduced over time as EU manufacturers ramp up and as the cost of solar PVs, and therefore the share of their cost within a PV installation (household or utility-scale) decreases. Large□scale solar parks may see bid prices rise as EU□content requirements take effect. However, the baseline scenario of NZIA's indicative benchmark of manufacturing capacity across net zero technologies to reach at least 40% of the EU's annual deployment needs by 2030 will improve market predictability. Rooftop and commercial installers who buy panels in small lots could see retail module prices climb and potentially dampening uptake. However, since the module typically accounts for 25-30%[178] of total installation costs, the impact on final consumer prices would remain limited and could be further mitigated through smart auction and procurement design to create different incentives and flexibility.

In relation to cybersecurity, Made in EU requirements for inverters can boost local manufacturing and improve cybersecurity by keeping control of key technologies in Europe. This reduces risks from foreign cyber threats and protects energy infrastructure, making the EU safer and more resilient.

Regarding the energy transition in the EU, the potential impact of Made in EU requirements in solar PV could lead to higher costs in the short term but will be beneficial in the mid to long-term. First, the requirements will significantly reduce Europe's heavy import dependence—especially on China—thereby lowering risks of supply disruptions and enhancing solar PV rollout reliability, critical for achieving renewable targets. Second, they will trigger large investments in new manufacturing capacity, technology, and skills; and 3) it will ensure availability of the main specific components, in particular inverters, with high sustainability and quality standards that enable more resilient deployment, supporting grid stability and climate goals. Over time, this will make Europe a more energy secure space.

In the absence of Made in EU requirements, Europe's heavy reliance on China controlling over 90% of global solar photovoltaic (PV) manufacturing capacity across the whole value chain exposes the EU to significant risks. Negative actions by China—such as export restrictions, tariffs, or supply chain disruptions—could create severe supply shortages, resulting in delayed solar project installations and increased costs due to price spikes. These possible disruptions would likely slow down Europe's renewable energy deployment, delay the achievement of the EU climate targets for 2030 and 2050, and, consequently, increase dependence on fossil fuels or less sustainable alternatives. Moreover, this dependency weakens Europe's strategic

[177] Ibid.

[178] SolarPower Europe (2025). Global Market Outlook for Solar Power 2025-2029.

autonomy in clean energy technologies, making the continent vulnerable to geopolitical tensions. Building a resilient EU manufacturing ecosystem through EU content requirements is therefore essential to safeguard energy security and ensure a stable, affordable, and timely solar PV deployment.

Concerning the impact of the Made in EU requirements on the affordability of energy, this is likely to be limited. In the EU electricity market's marginal pricing model, the price is determined by the most expensive energy source needed to meet demand which typically includes fossil fuels such as coal, oil, and natural gas due to their higher operational and fuel costs. In June 2025, solar energy was the main source of electricity generated in the EU (22%).[179] Since the price formation is dominated by the most expensive energy source, a greater solar share tends to lower average prices when solar is generating because it displaces fossil fuel generation. Buying made in EU solar PV may lead to power producers passing on the cost to consumers but in a modest increase. This impact is expected to be small and much less volatile compared to the larger fluctuating cost related to fossil fuel consumption and CO2 ETS pricing.

An example of how lead markets measures proved successful in the long run can be the feed-in tariffs models used by member States to support renewables deployment. In the past, Europe benefited from spillover effects of feed-in tariff policies like Germanys Renewable Energy Law (EEG). While the policy initially contributed to higher electricity prices for consumers, it ultimately generated net benefits by driving down costs for renewable technologies and accelerated large scale deployment. The guaranteed premium enabled the derisking of future investments, which led to a wide adoption of renewable energy projects as well as rapid expansions.[180]

LEAD_VC 1 - Given the estimated current level of 70% Made in EU in the EVs, the measure would not lead to any further compliance costs for EU EV manufacturers in 2027. As the target is increased to 75% by 2030, the measure would represent a cost increase of EUR 1.9 billion for EU EV manufacturers, which would be offset by the increase of sales. EU EV manufacturers are expected to benefit from a sales increase of EUR 13.9 billion across all vehicle segments in 2027 and EUR 9 billion in 2030. The increase in sales is presumed to offset the cost increase for passenger cars and LCVs, however, not for HDVs. It is important to note that the numbers presented here are aggregated from all vehicle segments, and the measure would impact each of them to a different extent. As previously noted, for the HDV sector, due to the limitations of the model, the same assumptions are applied as for passenger vehicles. However, as the Made in EU in HDV is likely to be higher than the assumed requirements, the measure may result in zero cost implications for EU HDV manufacturers, while preserving the positive effect on sales. Finally, the measure is projected to lead to the generation of EUR 5.5 billion Global Value Added (GVA) in 2027 and EUR 4.5 billion in 2030 when assessing the impact, taking into account only the first tier of the value chain. When considering the entire value chain, the value added generated from the necessary intermediate inputs for EVs the value added can reach EUR 10.5 billion in 2027 and EUR 9.7 billion in 2030. Following a sensitivity analysis (See Annex 15 for more information), the cross-region elasticity is the parameter that most affects the results for EU EV manufacturers, and the value added generated. However, the sensitivity analysis shows the robustness of the results, with values falling within a small range and not significantly affecting the policy's economic effects.

[179] Eurostat (2025). Solar: main source of EU electricity in June with 22%.
[180] The Federal Ministry for Economic Affairs and Energy (Bundesministerium für Wirtschaft und Energie) webpage (2017). Fragen und Antworten zum Erneuerbare-Energien-Gesetz 2017.

INV 1 – The impact of conditions on investment would depend on the extent to which Member States take up the voluntary guidance. In the short term, the effects are likely to be limited, as companies would not be legally required to adapt their sourcing or production models. In Member States that do apply the guidance, some investors may be encouraged to increasing EU sourcing of components, materials or services, potentially creating spillovers through knowledge transfer and collaboration with EU-based firms. However, because the implementation of the guidance is voluntary and Member States may apply the guidance only partially, these positive effects would be uneven across the Union, with benefits concentrated in those countries that actively promote and monitor such conditionalities. In practice, the fragmented uptake would limit the overall capacity of the initiative to strengthen EU-wide industrial ecosystems.

6.1.1.3 Impact on SMEs

LEAD_EII 1 – SMEs may have less capacity than larger firms to absorb temporary increases in material costs or to pass them on to customers, which could put pressure on their margins in the short term. However, these effects are expected to be limited, as the cost increase linked to low-carbon material requirements remain modest and as low-carbon products gradually become more available and price differentials narrow.

LEAD_BAT 1 would directly support SMEs by boosting demand for locally produced battery packs, cells, components, and advanced materials. This would not only strengthen existing suppliers but also create market opportunities for emerging businesses in a nascent and growing strategic industry. As the European battery ecosystem expands, SMEs will be better positioned to scale, innovate, and integrate into regional and global value chains. Since this measure does not target private transactions, the impacts on the SMEs part of the road transport ecosystem using vehicles are expected to be limited.

LEAD_SOL 1 will help channel public demand towards domestically built modules, which are predominantly produced by SMEs in Europe, catalysing the creation of additional manufacturing and installation roles. While a temporary slowdown in solar panel installations by SMEs may occur, the negative impact is expected to be limited and manageable, as Europe's commitment to ambitious PV deployment targets remains firm and unchanged. In the mid to long term, these targets will continue to drive strong demand for installation services, ensuring SMEs can recover quickly and benefit from a sustained, growing market for solar deployment.

INV 1 will have very limited effect on SMEs as the conditionalities would apply primarily to large foreign investors rather than smaller domestic firms and be limited to large investments. Where Member States choose to implement the guidance, SMEs located in those regions may benefit indirectly if inbound investors increase local sourcing or collaboration, but these effects would be uneven and dependent on national uptake. Given the voluntary nature of the measure and the fragmented application across the Union, broader SME participation in strengthened industrial ecosystems would remain uncertain and geographically constrained.

PERM 1 - The digitalisation of the permit-granting process with the Single Digital Gateway would benefit SMEs active on their domestic (national) market by gaining an easier access to other Member States for permit-granting submission.

LEAD_VC 1 is expected to affect those EU based SMEs positively that are Tier 2 and Tier 3 suppliers of the industry due to the increased demand for vehicle components sourced locally. In quantitative terms, the impact on SMEs is covered under the *impact on consumers* section, as they are included in the definition of consumers, alongside private citizens. As Light, Medium, Heavy Commercial Vehicles, and Buses fall within the scope of the measure, the effects described above for consumers in these vehicle segments, have to be assumed as impacting SMEs that typically purchase and operate these vehicles.

6.1.1.4 Impact on citizens and consumers

LAB 1 – As explained under the economic impacts, this option would add complexity to the implementation of the existing framework and might create unnecessary confusion among consumers/businesses with a very wide range of labels on all EIIs.

LEAD_EII 1 - Low-carbon requirements are applied to the steel and aluminium used in end-products (such as passenger cars) supported by public schemes. Therefore, the financial burden would mainly fall on Member States, if they decide to absorb the price increase, rather than on final consumers.

As outlined in Section 6.1.1.2, the minor economic losses observed through the general equilibrium model point at a decrease in the consumption of automotive (EUR 84.4 million) and construction (EUR 59.4 million) goods, driven by the low-carbon cost increase, as one of the reasons for the value-added decrease of these downstream sectors.

For a wider consideration on cost estimates, the sensitivity analysis for the range of potential costs derived from low-carbon steel can present the following for passenger cars: EUR 91.7 million – EUR 212.87 million. See Annex 15 for more information.

However, access to public schemes would be reduced to consumers willing to purchase a product containing low-carbon content. While no assumption can be taken on the level of public funding, public incentives in these products are already widely present in society as explained above. Only for internal combustion engine vehicles, a recent study estimated that subsidies for corporate vehicles alone amounted to EUR 42 billion in 2023.[181] Cost implications on the final products in automotive and construction[182] are outlined in Section 6.1.1.2.

LEAD_BAT 1 - As outlined in Section 6.1.1.2, consumers would be affected by the possible price increases. However, since these are tied to public support schemes, the effect on final prices would be less pronounced and more gradually absorbed. By 2030, the adjustment costs for consumers will range between EUR 292-730 million (average EUR 511 million) for private consumers and EUR 0.9-2.2 billion (average EUR 1.55 billion) for corporate consumers (see Annex 4 Section 2). Given that EV subsidies have exceeded EUR 16 billion annually from 2021 to 2024[183], these subsidies have the potential to financially compensate the income effect of the impact on the final consumers.

LEAD_SOL 1 would likely bring a near□term cost uptick. As mentioned above, even a moderate increase in EU module prices would result in a system cost increase of only around 5-15%, depending on the configuration and market conditions, to be weighed against the broader benefits of resilient, locally based manufacturing and reduced dependency on imports.[184] Directing part of publicly backed demand toward European products would diversify supply and build (economic) security.[185] As the measures target public procurement,

[181] ERM, T&E (2024). Company car fossil fuel subsidies in Europe.
[182] Data on the percentage of the market potentially covered by public subsidies in construction was not available, therefore PO1 only counts with costs on public procurement for Member States.
[183] MIT CEEPR. Global Clean Investment Monitor: Government Support for Electric Vehicles and Batteries. Data covers the EU and the UK.
[184] European Solar Industry Alliance. Net Zero Industry Act: Positions on the Implementation for Photovoltaic Technologies, by Fraunhofer Institute for Solar Energy Systems ISE.
[185] SolarPower Europe (2024). New Report: Growth of EU solar jobs stagnates as rooftop market slows; European Commission webpage (2025). Solar energy.

auctions and public support schemes consumers would not be directly impacted by the price increase and especially under the public support schemes, consumer purchases of EU made PV systems would be financially rewarded.

LEAD_VC 1 is estimated to have two different effects: As EV passenger cars become more expensive from non-EU manufacturers, and ICE vehicles, being not affected by the measure, could benefit from a relative price advantage (prior application of the bonus schemes or subsidies) over EVs, there may be a partial product substitution of EVs with ICEs. However, as EV passenger cars produced by EU manufacturers will benefit from a relative price advantage following the reduction of price originating from the reallocated subsidies, this may lead consumers to prefer EV passenger cars produced by EU manufacturers (which increase their sales) over non-EU EV passenger cars (which reduce their sales). The latter effect crucially depends on the bonus schemes and conditional to the assumptions taken in this impact assessment and Annex 14 presents a counterfactual analysis on the potential price impacts when changing the amount of public subsidy allocated to EU EV manufacturers.

In quantitative terms, when we look at the impacts in 2027, the average price increase (from both the potential reduction of price for EU manufacturers and price disadvantage for non-EU manufacturers), there would be an overall price increase of 0.4% for passenger cars, 0.5% for HDVs and there could be a reduction of 0.7% for LCVs. Looking at the impact in 2030, the price increase for passenger car rises to 1.2%, to 0.4% for LCVs and 1.2% for HDVs. As buyers of LCVs and HDVs are mostly economic operators, the impact qualifies as impact on the downstream. Following the sensitivity analysis carried out in Annex 15, demand elasticity is the parameter that has the strongest impact on the results. However, it shows values falling within a small range and not significantly affecting the policy's economic effects.

INV 1 – For citizens and consumers, the effects would be limited in the short term, as the measure's voluntary nature means it would not immediately alter market prices or consumer costs. Where Member States do implement the guidance and attract additional investment, some localised benefits (such as job creation or opportunities linked to industrial activity) may occur, but these would be uneven and dependent on national uptake. Overall, the voluntary and fragmented application limits the likelihood of consistent or EU-wide improvements for citizens and consumers.

6.1.1.5 Impact on competitiveness

LEAD_EII 1 - EU producers of low-carbon materials would initially benefit from a first-mover advantage. However, many non-EU regions have also rapidly expanded their low-carbon production capacity and are well-positioned to compete on carbon-related requirements. As an example, according to Strategic Perspectives, China is expected to produce 105 Mtonnes of recycled steel by 2030[186], positioning it to supply nearly half of the EU's potential low-carbon steel demand, subject to the limits imposed by the forthcoming Regulation addressing global overcapacity.[187] Any potential disadvantages for firms still relying on high-emission routes are expected to be temporary, as the gradual increase in low-carbon production reduces cost differentials across the sector. At the same time, the measure will create a more stable and predictable domestic market for European producers, allowing them to secure long-term contracts for low-carbon materials in public works and supported sectors. This internal market stimulus is expected to offset any small decline in export volumes, reinforcing industrial utilisation and accelerating investment recovery. In addition, by slightly increasing domestic

[186] Strategic Perspectives (2025). Lead markets: driving net-zero industries made in Europe.
[187] European Commission (2025). Proposal for a Regulation of the European Parliament and of the Council addressing the negative trade-related effects of global overcapacity on the Union steel market. COM(2025) 726 final.

output and reducing exposure to highly concentrated foreign supply chains in the supported segments, the measure provides a modest economic-security gain, lowering vulnerability to sudden price shifts, coercive practices or export restrictions from dominant suppliers.

Compared to the baseline, EU-based EIIs – especially the frontrunners – are expected to benefit from the low-carbon requirement, however their competitive position would still remain at risk, primarily due to higher operational costs in the EU compared to other global regions.[188] Furthermore, as some sectors, such as steel, are significant exporters, their competitiveness on the global market might be affected to some extent, since customers in third countries may not face the same low-carbon requirements and might not be willing to pay for the green premium. However, requirements under this measure only apply to public procurement, and do not require a 100% shift to low-carbon production in 2030, giving producers flexibility to gradually adapt and ramp up the low-carbon production.

Looking at the competitiveness of downstream customers, low-carbon requirements would apply indistinctively to all vehicle manufacturers that operate in the Single Market (both domestic and foreign) that intend to participate in public support schemes or procurement. Therefore, the proposed measures will in principle preserve the level-playing field. However, given the significant share of vehicle registrations supported by public support schemes, it is reasonable to expect that introducing low-carbon steel and aluminium requirements as a condition for accessing such support would strongly incentivise vehicle manufacturers to adopt low-carbon materials across a significant part (if not the entirety) of their product portfolio, particularly for models intended for the EU market. At the same time, there is a risk of losing competitiveness on third countries markets, especially if no similar low-carbon policies apply.

Consequently, the absence of similar requirements in other world regions may put – in the short term – EU vehicle manufacturers in a condition of relative cost disadvantage and possible relocation of EU industry. Moreover, the risk of capacity constraints in the low-carbon steel and aluminium supply-chain should not be neglected: the moderate low-carbon ambition tabled under this measure is therefore based on the existing pipeline of projects, to prevent that risk. Besides, as low-carbon production scales up, premiums are projected to decline, reducing the competitiveness gap. In the medium term, the expansion of EU low-carbon capacity and declining green premiums are expected to strengthen the overall competitiveness of the European industrial base, enabling it to compete globally on both cost and sustainability performance.

LEAD_BAT 1 / LEAD_SOL 1– Such measures would clearly benefit the situation of EU-based batteries and solar industry, creating the conditions to reinforce their competitiveness. In the case of solar PV, introducing Made in EU requirements for only a subset of the main components can limit the production cost difference with fully Chinese PV systems, since some components can be sourced in third countries. For example, producing a PV system with three EU-made components, including the module and cell, while relying on Chinese polysilicon, ingots, and wafers, would reduce the average cost to 19 €c/Watt-peak for a compliant PV system under LEAD_SOL 1. Under LEAD_BAT 1, EU based battery manufacturers would benefit from an increased demand for EU made batteries through public procurement and public auctions, while also reducing the cost gap with battery imports which will cease to receive public subsidies. These competitiveness gains also translate into a modest improvement in economic security, as a larger share of Europe's demand would be met by domestic production rather than from highly concentrated foreign supply chains, reducing vulnerability to external price shocks, export restrictions or other coercive practices affecting strategic

[188] See Section 2. This is partly because EIIs outside the EU generally face less ambitious decarbonisation targets and, therefore, require lower levels of investment.

inputs. When increasing the cost of power generation technologies, this may also have a moderate impact on clean energy deployment in the short term, and indirectly on the cost of electricity. However, electricity prices remain very largely determined by other components, such as the marginal source (usually gas).

LEAD_VC 1 – The measures would create a stable lead market in the EU for European component manufacturers, leading to a stronger business case for manufacturing in the EU and providing European suppliers with greater scale and industrial capacities to compete on the global markets. The EU local requirement for EVs could gradually increase the reshoring of the global value chain and increase the EU production capacity to meet the new requirements. This gradual increase in domestic component production also brings a small but relevant economic security benefit, as reduced dependence on extra-EU suppliers in highly concentrated segments of the EV value chain lowers exposure to supply disruptions, price manipulation and other external shocks.

The competitiveness effects on EU car manufacturers are also positive. On the EU market for EVs, EU car manufacturers could benefit from the policy as it creates a positive price differential vis-à-vis non-EU car manufacturers. The measure also reduces foreign competition, as the Made in EU requirements are likely to be more difficult to meet for non-EU car manufacturers as the initial level of Made in EU in their EVs is lower and they will likely not be eligible for subsidies. The effect will depend on the capacity of non-EU car manufacturers to absorb the non-eligibility of subsidies.

On the non-EU market for EVs, EU car manufacturers would not be impacted as they only need to comply on the domestic market and can differentiate their production based on the destination market of each product. This assessment does not focus on potential action taken by trade partners in response, which are described below.

INV 1 would have limited impact on the competitiveness of EU industries in scope, as any effect depends on whether Member States choose to apply the guidance. Where implemented, voluntary conditions may encourage some investors to embed more activities locally, which could support specific value-chain segments. However, these effects would be uneven, modest in scale, and constrained by the ability of investors to avoid such conditions entirely by locating in more permissive Member States.

PERM 1 - Implementing the SDG will reduce the cost of doing business in the Single Market, administrative frictions, obstacles and therefore improve the overall competitiveness of businesses by facilitating cross-border administrative operations.

6.1.1.1 Impact on competition

LEAD_EII 1 - Low-carbon requirements would apply uniformly to all participants in public procurement procedures and beneficiaries of public support schemes, ensuring that manufacturers of energy-intensive materials and downstream producers compete on equal terms. As such, the measure is not expected to distort competition among market participants that meet the low-carbon requirements, as long as strong and reliable verification mechanisms are in place.

LEAD_BAT 1 / LEAD_SOL 1 Introducing Made in EU requirements is likely to reduce the overall pool of competitors for the segments targeted in this PO. As the number of EU businesses active in PV manufacturing is currently limited (approximately 150)[189], such requirements may initially lead to a concentration of the market among a smaller number of players. However, as investments in the European manufacturing landscape are expected to increase, new players (including through FDI) are likely to enter the market. Competition would, in this scenario, be limited to manufacturers with production located in Europe, who, to be competitive, would be expected to build up GW-scale capacities. This would result in fewer but larger players, rather than many small ones. Nevertheless, competition among these manufacturers is expected to ensure competitive pricing. Another key consequence is that this PO would ensure that Europe can at least partly rely on domestic technologies and jobs, which is essential to achieving climate objectives while reducing the risks associated with external dependencies.

LEAD_VC 1 – The effects of the policy on total sales and consumer welfare depend on the level of market competition on both the supplier and final producer sides. There is a certain risk of captive market for vehicle components, however, it is considered unlikely given the dependence of suppliers from vehicle manufacturers. Regarding the EV producers, the EU EV car manufacturers will have a competitive advantage with respect to non-EU car manufacturers. However, if the EV market is very competitive, non-EU EV car manufacturers will absorb a share of their price increase to not pass through the full price increase to EU final consumers. As there are no market entry barriers, and given the overcapacity of supply in China, non-EU EV manufacturers are likely to compensate with aggressive discounts, hence competition would remain.

INV 1 - Attracting FDI is important to strengthen innovation and competition in the Single Market. Since the measure is voluntary, implementation may remain highly uneven across Member States. Restrictive measures under conditionalities (a) and (b) may limit companies' freedom in supply chain choices. Where applied, certain conditions could marginally influence investors' operational choices, but these effects would be limited and geographically concentrated. The ability of investors to choose Member States applying fewer conditions (or none at all) would encourage regulatory arbitrage and sustain divergent competitive environments across the Union, rather than ensuring a level playing field.

6.1.1.2 Impact on international trade

LEAD_EII 1 is expected to shift trade flows only modestly, increasing trade with producers of low-carbon materials while reducing demand for high-carbon alternatives. Low-carbon steel and low-carbon aluminium or, to a lesser extent, cement produced in non-EU countries would likely be redirected to the EU, to meet such requirements in public procurement and support schemes. While cement trade at the borders of the EU increased since the 2008 crisis, volumes traded remain marginal with the EU cement industry remaining a net exporter.

LEAD_BAT 1 / LEAD_SOL 1 / LEAD_VC 1 would likely reduce the import of solar PV cells and modules, batteries and their key components and vehicle components from non-EU countries, particularly from the single most dominant supplier, China, but also, from other partner countries.

The trade balance for solar products could thus improve for the EU. The requirements could encourage FDI into the EU's manufacturing sector as companies look to set up operations within the region. This reconfiguration could impact the geography and logistics of global solar, battery and vehicle component supply chains, as global suppliers adapt their supply

[189] SolarPower Europe webpage. EU Solar Manufacturing Map.

chains to comply with EU requirements. It would also boost the EU's environmental ambition by reinforcing key supply chains for clean energy and mobility transitions.

LEAD_VC 1, introducing a minimum share of Made in EU requirements for EVs sold in the Union, as a condition to access public procurements and subsidies, presents an opportunity to accelerate localisation, increase EU resilience, and reduce vulnerability to potential export restrictions or geopolitical leverage from dominant suppliers and level playing field, taking into account local content requirements applied on other markets. This could have an indirect effect on international trade, however, given the attractiveness of the single market and the global nature of most vehicles manufacturers, foreign producers would have a strong incentive to adapt, either by reconfiguring supply chains or by investing in local production to meet the requirement (also thanks to FDI conditionalities, if applied by the Member States under INV 1). The measure is tied to legitimate policy objectives such as security of supply, ability to decarbonise, as well as cybersecurity concerns linked to connected vehicle systems.

INV 1 - As the measure remains voluntary, its impact on international trade would be limited, as companies would not be obliged at EU level to localise production or adjust sourcing patterns. In Member States that decide to apply the guidance, some investors may marginally increase EU-based activities, but these effects would remain partial and uneven. Because uptake is optional, any trade effects would be small and geographically concentrated, with no meaningful substitution of imports across the Single Market.

Although the overall impact may remain contained, there is a risk that certain partners could introduce reciprocal or retaliatory conditions affecting EU investors. At the same time, given the non-binding nature of INV 1, significant reactions from trading partners are unlikely, as conditions would only apply where individual Member States choose to implement them. Any external response would therefore be limited and directed at specific national regimes rather than the EU as a whole.

In the specific case of China, some temporary adjustment in investment behaviour could occur. Chinese companies with strong state backing or strategic technology interests may initially hesitate to invest under tighter localisation or value-added conditions. However, analyses[190] show that many Chinese industrial groups have progressively adapted to similar requirements when market access is sufficiently attractive. For instance, Chinese manufacturers in the battery and electric vehicle sectors have already expanded their use of European suppliers and partnerships in order to comply with local content expectations. Therefore, while stricter conditionalities could shift a few planned projects to third countries with lighter rules (e.g. Türkiye or Morocco), well-designed measures are likely to enhance the overall quality of Chinese FDI by anchoring more R&I, jobs and supply-chain activity within the EU rather than deterring investment altogether.

6.1.1.3 Impact on Member States

Financial implications

LEAD_EII 1 – The cost implications of low-carbon requirements in additional public spending would be limited since the cost of steel and cement account for less than 1% of total public procurement expenditures across the EU, according to 2019 data.[191] Setting a 25% target for

[190] MERICS (2025). Chinese investment rebounds despite growing frictions – Chinese FDI in Europe: 2024 Update; Bruegel (2025). A smart European strategy for electric vehicle investment from China.
[191] VUB Brussels School of Governance (2024). Public procurement of steel and cement for construction, assessing the potential of lead markets for green steel and cement in the EU..

low-carbon steel and aluminium used in automotive, building and construction projects, as well as a 5% target for low-carbon cement in public procurement, could generate an additional cost for public authorities, assuming that they are passed on to consumers, and public authorities decide to cover them as the providers of the financial support for the schemes.[192] Furthermore, a portion of public budgets could continue to offset some of the costs for consumers outlined in Sections 6.1.1.2 and 6.1.1.4 by incorporating them into public support schemes. For instance, in 2024, the EU has spent approximately €17 billion in subsidies to promote the purchase of electric vehicles.[193] At the moment, there is public support to buy EVs for corporate purchases in all Member States and for consumers in 19 Member States.[194] In return, this investment could help stimulate job creation and foster the development of clean industries, the scale of the benefits depending on whether low-carbon materials are produced within the EU rather than imported from non-EU countries.

At the same time, the increase in the price of end-goods publicly purchased or supported can result in governments deciding to spend less for such goods. This could result in reduction of consumption from governments of EUR 373 million in the construction sector, and 120 million in the automotive sector.

For a wider consideration on cost estimates, the sensitivity analysis for potential costs derived from low-carbon steel and cement/concrete used in construction show that costs can vary from EUR 339.7 million to EUR 2 billion. For a wider consideration on cost estimates for automotive, notably public fleets, the sensitivity analysis for the low-carbon steel costs can range from EUR 14.04 million – EUR 32.59 million. See Annex 15 for more information.

LEAD_BAT 1 – Made in EU requirements for batteries are anticipated to impact approximately 3.5% of the European EV fleet through private procurement and around 5% of BESS deployment via public auctions. Consequently, the total adjustment costs are estimated to range from EUR 132 million to EUR 331 million for EVs (average EUR 231.5 million) and EUR 26 million to EUR 66 million (average EUR 44 million) for BESS in 2030 (See Annex 4 Section 2).

LEAD_SOL 1 – Due to the public procurement and public support schemes provisions requiring the purchase of EU Made products, the costs faced by public authorities and Member States will increase. However, public procurement is estimated to cover only around 3% of the solar market, auctions around 19% and public support schemes only 12%. In turn, Member States will benefit from several positive consequences in having increased manufacturing capacity in Europe, jobs creation and contributing to the achievement of European climate and energy targets through reduced emissions through transportation costs. It would also mean that the trade balance with Asia (with over EUR 4.5 billion in additional annual import costs) would be reduced and more wealth retained in Europe as well as job creation (more than 40 000 highly qualified jobs in manufacturing, equipment supply, and related industries) and halting foregoing tax revenues of over EUR 1 billion per year. If demand for EU-produced PV systems increases, this could temporarily result in a slight slowing down of deployment in the public-sector for the solar PV segment during the adjustment period. However, it is important to recognise that a significant portion of solar capacity deployment in the EU still depends on public support mechanisms, even when the installations are carried out by private entities.

[192] The estimates are based on the following study: VUB Brussels School of Governance (2024). "Public procurement of steel and cement for construction, assessing the potential of lead markets for green steel and cement in the EU". Low-carbon steel and cement are defined in the referenced study as reducing emissions by at least 80% compared to current production methods.
[193] MIT CEEPR. Global Clean Investment Monitor: Government Support for Electric Vehicles and Batteries, Data represents the EU and the United Kingdom.
[194] ACEA (2025). Electric cars: Tax benefits and incentives (2025).

Consequently, a short-term price increase would likely translate into higher public financial support requirements to meet the EU's renewable energy targets. Made in EU criteria could initially pose procurement challenges for some Member States, requiring potential adjustments to national plans to meet renewable energy targets.

Under **LEAD_VC 1,** as observed above, public support schemes currently used in the automotive industry will mitigate the potential adverse effects of LEAD_VC. (See: Assumptions) To reach this positive objective, as laid down in the assumptions, it is important that Member States re-distribute (at least, partially) the public subsidies that are no longer accessible to non-compliant manufacturers, meaning that the Member States would keep the volumes allocated to finance the strengthening of the EU industrial value chain. Since the assumptions are based on already existing schemes, the cost of public subsidies used for this Impact Assessment will not represent an increase in cost for Member States. Indeed, estimates indicate a saving budget for Member States of EUR 2.7 billion per year from 2027 to 2030, with a net present value of EUR 10.3 billion.[195]

Administrative burden

LEAD_EII 1 - Public authorities can encounter increased administrative burden in ensuring compliance with low-carbon requirements for energy-intensive materials. Effective implementation depends on the availability of reliable and transparent standards, emissions accounting methodologies, and certification systems as well as guidance for Member States.

LEAD_BAT 1 would increase the administrative burden on Member States to ensure compliance with the requirement. Rather than using a detailed value-based approach calculation, fixed component percentages would help lessen the administrative burden.

INV 1 - As the measure is voluntary, Member States would face no obligation to adapt their national frameworks or establish new implementation mechanisms. Administrative impacts arise only where a Member State chooses to apply the guidance, in which case the additional burden would remain limited with respect to additional administrative costs for national authorities. In fact, the Commission's Evaluation of the FDI Screening Regulation found only a 'minimal financial burden' for Member States.[196]

PERM 1 - Digitalising the permitting process would streamline transactions between public administrations and users, resulting in time savings for both parties. Moreover, the economic benefits for public authorities are greatest when digitalisation is implemented swiftly and covers a substantial number of transactions.[197] The biggest beneficiary of these savings would be municipalities, as they normally carry the biggest burden in the permit-granting process.

The type of costs initially incurred by public administrations would be investment costs during the development and implementation phase, which can also include transitional costs from the paper/offline to the digitalised process. In addition, additional operational costs for the management of the tool are also expected. A reorganisation of the administration in some Member States may be required and can be costly in the short term. In turn, this measure can avoid duplication of efforts, notably at the various stages of environmental assessments. Similar digitalisation processes show net benefits for all relevant administrative authorities

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[195] The estimates for the net present value assume a 2% intertemporal discount rate.

[196] European Commission, Commission Staff Working Document – Evaluation of Regulation (EU) 2019/452 establishing a framework for the screening of foreign direct investments into the Union, SWD(2024) 23 final.

[197] See Study on eGovernment and the Reduction of Administrative Burden, estimating that following the Danish Mandatory Digital Self-service approach was expected to produce annual savings for government for around EUR 6.5 billion at EU 28 level by 2017, while the United Kingdom Digital Government Strategy was estimated at around EUR 10 billion of annual savings.

(local, regional and national), even after the upfront cost of implementation for the first year.[198] An upfront cost of EUR 16 000 to EUR 400 000 to digitalise a procedure, depending on whether it's a local or other type of procedures can be considered in this context. Estimates based on digitalisation of procedures can show savings up to EUR 1.3 billion per year for EU governments in efficiency savings.[199] See Annex 4 for more information. However, accurate estimates are hard to quantify precisely, as they depend on the level of digitalisation of the relevant procedures, their complexity or number of relevant procedures.

A small additional administrative cost can be expected when updating the Single Digital Gateway system to streamline the accessibility of information for cross-border users, updating the system to include the permit-granting process for manufacturing industries with a sectoral approach of EUR 20 000 per section for the Commission and up to EUR 40 000 for Member States, per section as well. For more information on aggregate cost calculations for the Single Digital Gateway amendments, see Annex 4 Section 2.1.

The introduction of technical assistance for innovative projects will have positive impacts for the national authorities' staff. Training on the most relevant innovative technologies will facilitate the treatment of permits and reduce the need to contact the project promoter for additional clarifications. In this context, the role of INCITE is particularly relevant.

6.1.2 Social impacts

LEAD_EII 1 – The creation of new demand for low-carbon materials is expected to spur investments in decarbonisation technologies. Analysis by think tank Strategic Perspectives estimates that introducing low-carbon requirements[200] for steel in public procurement could preserve approximately 4 500 additional jobs in the steel sector by 2030 compared to the baseline scenario.[201]

LEAD_BAT 1 - Made in EU requirements can play a critical role in safeguarding and expanding employment across the European battery value chain. By creating stronger demand for locally produced components, Made in EU requirements can help increase investments, secure existing jobs and stimulate further employment across upstream and downstream the battery value chain. The current battery project pipeline is expected to create 170 000 jobs by 2030.[202] In the battery cell sector alone, currently announced gigafactories are expected to create up to 128 000 jobs. However around 85 000 of these jobs are considered to be at high or medium risk.[203] LEAD_BAT 1 would help derisk these jobs, which currently amount to around 66% of the total jobs in the pipeline.

LEAD_SOL 1 could deliver a substantial boost to employment. According to InnoEnergy, manufacturing 30 GW of solar panels annually in Europe alone would require 20 000 trained operators and technicians[204], underscoring the need for dedicated workforce development. In this context, Made in EU requirements would also help secure employment pathways for the

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[198] See Study on eGovernment and the Reduction of Administrative Burden, estimating that following the Danish Mandatory Digital Self-service approach was expected to produce annual savings for government for around EUR 6.5 billion at EU 28 level by 2017, while the United Kingdom Digital Government Strategy was estimated at around EUR 10 billion of annual savings.
[199] Estimates based on digitalisation of procedures in the Netherlands, following a stakeholder consultation on the single digital gateway. These figures could be an overestimation, since costs and savings depend largely on the type of administrative procedure to be digitalised, the number of transactions/uses per procedure, amongst others. EUR-Lex - 52017SC0213 - EN - EUR-Lex
[200] Defined in the referenced study as a maximum carbon intensity of 0.7 tonnes of CO_2e/tonne of steel for flat products and of 0.35 tonnes of CO_2e/tonne of steel for long products in 2030.
[201] Strategic Perspectives (2025). Lead markets: driving net-zero industries made in Europe. Estimate from dataset used in report's underlying analysis.
[202] European Battery Alliance
[203] T&E (2025). Europe's automotive industry at a crossroads.
[204] InnoEnergy, European Solar Academy.

growing number of skilled workers, including the 100 000 individuals the EU Solar Academy aims to upskill in solar PV by 2027, ensuring that training efforts are matched with long-term industrial job opportunities.[205]

LEAD_VC 1 could stop, and possibly reverse, the trend of progressive job losses which has been materialising over the past years in the EU's vehicle components supply chain.[206] From this perspective, the minor vehicle price increases described above in the *impact on consumers* section, should be seen as irrelevant compared to the preservation of hundreds of thousands of high-quality jobs and a strong industrial base in the Union. Furthermore, the measure could create additional financial capacities for suppliers to be reinvested in future technologies.

INV 1 - As the measure is voluntary, social impacts would be limited and depend entirely on whether Member States choose to apply the guidance. Where implemented, some projects may generate additional employment or higher-quality jobs linked to localised activities, but these effects would be uneven and confined to specific regions. In Member States that do not adopt the guidance, no material social impact would occur, resulting in an overall limited and fragmented effect on EU employment and working conditions.

6.1.3 Environmental impacts

Introducing EU-wide labels for low-carbon energy intensive industrial products, as proposed in **LAB 1,** can improve the understanding of what constitute energy intensive products with lower environmental impact. However, the impact of an EU voluntary low-carbon product label depends on its ability to effectively stimulate demand for low-carbon products. This requires the label to provide buyers with credible information about the GHG emissions associated with the product. At the same time, its impact also depends on the ability of low-carbon producers to differentiate their products from conventional alternatives and to strengthen the business case for low-carbon production.

The environmental impact of the different design elements for the low-carbon product label will depend on the scope of GHG emission information provided by the label and on its ability to ensure comparability across products as well as attractiveness and accessibility of such a label for different market players/products (e.g. non-EU manufactured products). These specific aspects are assessed for steel under PO2 and PO3. Regarding other EIIs, it is expected that ongoing efforts to present the environmental performance of construction products would lead to lower environmental impact choices. For other sectors, ongoing initiatives, such as the upcoming ESPR delegated act on aluminium, could ensure a broad coverage of emissions and solid comparability, therefore providing strong incentives for decarbonisation.

LEAD_EII 1 is expected to provide a clear demand signal for low-carbon materials, thereby encouraging investment and accelerating decarbonisation efforts. With a 25% target for low-carbon steel in automotive and construction, emission reductions would amount to approximately 3.37 Mtonnes CO_2 in 2030 alone.[207] Based on the 5% low-carbon target proposed for cement in 2030, the potential savings could reach 0.69 Mtonnes CO_2 for that year. Correspondingly, the 25% low-carbon target for aluminium could save 0.22 Mtonnes

[205] According to Fraunhofer, at full GW-scale production, each GW of solar PV manufacturing capacity is estimated to generate around 1 065 direct full-time jobs, including approximately 70 in polysilicon, 75 in ingot production, 75 in wafering, 200 in cell manufacturing, 85 in solar glass, 200 in module assembly, and 360 in inverter production. This would result in an additional 1 598 of indirect jobs, bringing the total employment impact to roughly 2 663 jobs per GW. In terms of the policy segments assessed in the impact assessment, this corresponds to an estimated 5 193 jobs created by the public procurement provisions, 32 888 jobs by auctions, and 20 771 jobs by public support schemes.

[206] In 2024 alone, automotive suppliers announced that 54 000 jobs will be cut, with most of these in the next two to five years. Source: CLEPA (2025). Job losses escalate as demand stays below expectations.

[207] Calculations explained in Annex 4 Section 2.3.

CO□ in the year 2030. Combined, the potential savings for steel, cement and aluminium could reach 4.28 Mtonnes CO_2 in 2030.[208] These emissions savings amount to EUR 428 million (from EUR 256 million to EUR 809 million depending on the cost of carbon used). See Annex 4 Section 2.3 and Annex 15 for monetisation calculations in ranges following the sensitivity analysis.

LEAD_BAT 1 - Under the Batteries Regulation, batteries manufactured in the EU must meet strict environmental standards throughout their life cycle, covering carbon footprint, responsible sourcing of raw materials, durability, safety, and high rates of collection, reuse, and recycling. Based on the 2023 EU grid, a battery manufactured in the EU would imply on average a 25% CO_2 emissions reduction compared to a Chinese manufactured battery using the average Chinese grid.[209] These CO_2 reductions also apply across the upstream value chain.[210] Localizing the production of battery cells and cathode active materials, including its precursor material, under PO1, rather than relying on imported Chinese products, could reduce CO□ emissions by an estimated 25.6 Mtonnes overall in 2030 alone. These emissions savings amount to EUR 2.56 billion (EUR 1.5 billion- 4.8 billion), see Annex 4 Section 2.3 and Annex 15 for monetisation calculations.[211]

LEAD_SOL 1 - Due to the provisions of the NZIA on environmental sustainability, PV system production in Europe is expected to meet certain environmental standards across the entire value chain. While the NZIA criteria set an important standard for all products, promoting EU PV manufacturing can result in further positive environmental impacts through reduced logistics emissions, stronger regulatory frameworks, and more sustainable production practices overall. This in turn will facilitate meeting Europe' emission reduction targets. According to the JRC, PV modules manufactured in Europe consistently demonstrate lower lifecycle emissions than those produced in more carbon-intensive electricity systems. This is primarily due to Europe's cleaner energy mix during manufacturing, which is the dominant driver of global warming potential (GWP), as well as the use of materials from low-carbon supply chains and more advanced recycling practices.

LEAD_BAT and **LEAD_SOL 1** provisions may also risk having an impact on the pace of deployment of clean energy solutions, and therefore on overall emissions, which could not be quantified in the context of this Impact Assessment . However, the fact that these provisions are limited to publicly supported products attenuates this risk.

PERM 1 - Streamlining provisions for permitting, notably through joint or coordinated environmental assessments, as provided by environmental law, will reduce administrative inefficiencies by identifying potential inconsistencies and in turn increase the quality of the assessments. Moreover, introducing a set of standardised data sets, notably on submissions linked to environmental permits will enable their re-utilisation in other areas like environmental reporting. Being able to re-use the original and most environmentally sound information will benefit the quality of other assessments. Furthermore, the EU manufacturing industry represents 22.5% of the EU total GHG emissions.[212] Streamlining permitting procedures will accelerate the implementation of decarbonisation projects, therefore leading to an accelerated pace of GHG savings.

LEAD_VC 1 - In **Scenario 1**, global greenhouse gas emissions from vehicle manufacturing decrease by 0.5 Mtonnes CO_2e in 2027 and by 0.6 Mtonnes in 2030 due to shifts in production;

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[208] Calculations explained in Annex 4 Section 2.3.
[209] T&E (2024). An Industrial blueprint for batteries in Europe.
[210] EU CAM production achieves a 12% reduction in CO_2 emissions, while battery materials such as lithium hydroxide, nickel sulphate, and manganese sulphate see reductions of up to 71%.
[211] T&E (2024). An Industrial blueprint for batteries in Europe.
[212] Eurostat. Quarterly greenhouse gas emissions in the EU.

they further decline by 0.1 Mtonnes due to reductions in international transport associated with EU imports. These emissions savings amount to EUR 70 million (EUR 42 million -132.30 million), see Annex 4 Section 2.3 for monetisation calculations and Annex 15 for sensitivity analysis on the ranges.

In sum, the environmental effects remain limited and are very similar across LEAD_VC 1 and LEAD_VC 2.

6.2 POLICY OPTION 2

LEAD_BAT 1 / LEAD_SOL 1 / LEAD_VC 1 – the proposed policy measures under PO2 are the same as under PO1, and the impacts have been assessed under PO1.

6.2.1 Economic impacts

6.2.1.1 Impact on companies

LAB 2 would introduce a **label on the carbon intensity of steel only,** covering emissions up to the hot-rolling production step (see more in Annex 12). The impact on steel companies would be overall positive, providing a reliable EU-wide methodology to calculate embedded emissions and support the creation of lead markets. Steel companies would be encouraged to certify their production with the label as it would provide a clear identifier for producers using low-carbon processes and therefore positively impact their ability to monetise their green premium towards potential customers. The classification system combined with the shape of the sliding scale, a clear presentation of the embedded emissions and the share of steel scrap, provides a fair treatment for all producers, acknowledging the decarbonisation effort. See Annex 12 for extended description of the design elements under LAB 2 and their potential impacts. While the use of LAB 2 for steel is voluntary by design and therefore no additional costs are imposed on companies, the administrative costs have been estimated in a yearly approximate cost of EUR 6 700 per steel site[213], which could offset the administrative costs from using several other labels in the market for different products, to just one.

LEAD_EII 2 introduces made in EU requirements in addition to the low-carbon requirements for steel, cement and aluminium used in the automotive and construction projects, purchased through public procurement or public support schemes.

The impacts of **low-carbon requirements for steel, cement and aluminium** in public procurement and incentives have been addressed under PO1, where the benefits in terms of value added could reach EUR 686 million for the three EIIs combined, as a result of the requirements (see Section 6.1.1.1.). Introducing Made in EU requirements will ensure that a share of the demand for low-carbon energy intensive industrial products is met by domestic production, instead of imports from third countries. The Made in EU requirements, however, are unlikely to create further economic benefits for the EII sectors. In the absence of well-established low-carbon supply chains for their materials, and assuming traditional supply chains are maintained, the proposed level of targets is lower than the share of EU's domestic demand for these materials (in automotive and transport) that is currently met by European production.[214] Overall, it will help safeguard security of supply, guaranteeing a share of secure,

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[213] The low-carbon steel label costs for businesses can be estimated using the cost structure from ResponsibleSteel. This estimate took the average between costs for normal and large companies

[214] EU production is still able to cover between 80 and 90% of the EU's domestic demand of steel and about 45% of the EU's domestic demand of aluminium. COM(2025) 125 final

low-carbon demand for domestic producers, and improve the resilience of low-carbon production of steel, aluminium and cement in their transition process where international competition and pressures will remain.

Furthermore, such predictability of demand for low-carbon steel can help absorb part of the investment's costs from the low-carbon technologies, potentially pushing investment decisions towards decarbonisation. In the EU steel sector, there are currently at least 29 announced steel decarbonisation projects, with a combined potential capacity of additional 41 Mtonnes of low-carbon steel per year by 2030, that have not yet reached the final investment stage.[215] To that end, the proposed lead market measures, based on the current project pipeline, could unlock up to EUR 15.5 billion in investments[216] covering approximately 15% of the sector's EUR 100 billion total investment need by 2050, as estimated in the impact assessment for the 2040 climate target. . [217, 218]

In contrast to the baseline scenario, where export-led overcapacity in third countries leads to artificially low prices (notably for steel) and causes EU job losses and plant closures, **introducing Made in EU low-carbon requirements** will help safeguard security, redirect demand towards domestic, cleaner producers, and improve the resilience and transition of sectors like steel or aluminium that have lost market share over the past decade.

According to the **targeted stakeholder consultation,** support for stimulating demand for EU-made industrial products was broadly shared among respondents (86%; 53 out of 62 respondents). Support was widespread among sectors.[219] **SMEs also strongly supported lead markets** for EU-made industrial products, i.e. micro businesses (6 of 7; 86%), small businesses (6 of 7; 86%) and medium-sized businesses (5 of 6; 83%).

INV 2 - FDI conditions would be mandatory and applied consistently across the EU, resulting in more stringent requirements on companies in scope. Conditionalities such as value-added production and staffing requirements could increase costs by limiting options for raw materials, components or labour, while ownership, joint-venture and EU-content requirements would have the strongest operational and strategic impact. The benefits outlined in PO1 would be amplified, as consistent application would close loopholes, preventing investors from bypassing requirements by selecting investment locations with weaker or no conditionalities. For companies investing in or producing "strategic reinforcement" technologies, all core conditions would apply, creating a more rigid obligation set; for companies developing or manufacturing "other emerging key strategic sectors", the requirement to comply with only a minimum subset of conditions would provide greater flexibility when adapting business models. In the short term, this may temporarily deter some investments in the EU for the concerned sectors, particularly those relying on imported intermediate goods or a global staffing model. However, OECD evidence shows that performance-based, transparent obligations (e.g. EU sourcing shares, local R&I, technology commitments) are compatible with sustained inflows.[220] Over the medium to long run, companies adapting to these obligations are

[215] Estimate based on BloombergNEF's Steel Decarbonization Project Database 1.0.5. The cumulative figures of 41 Mtpa of low-carbon steel capacity and the associated EUR 15.5. billion in investments represent only projects whose output meets the indicative IAA's carbon intensity label classes of performance (Class A-C).

[216] Ibid.

[217] European Commission (2024)., Commission Staff Working Document: Impact Assessment Report (Part 3), accompanying the document Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Securing our future - Europe's 2040 climate target and path to climate neutrality by 2050, building a sustainable, just and prosperous society, COM(2024) 63 final, pp.164-167.

[218] Draghi, M. (2024). The future of European competitiveness: In‐depth analysis and recommendations (Part B), p. 99.

[219] All respondents from glass (4), pulp & paper (1) and ceramics (3) agreed. Among respondents from the iron & steel sector, 16 out of 18 agreed, while support was also strong among non-ferrous metals (4 out of 5) and cement (6 out of 7). The chemical showed lower agreement (2 out of 4).

[220] Mistura, F. and C. Roulet (2019). The determinants of Foreign Direct Investment: Do statutory restrictions matter?, OECD Working Papers on International Investment, No. 2019/01, OECD Publishing, Paris, https://doi.org/10.1787/641507ce-en.

expected to embed more R&I and technology in their EU operations, making investments "stickier" and more resilient. International experience suggests that such measures can strengthen strategic value creation without deterring investment, provided they are implemented carefully (see Annex 13).

PERM 2 has the objective to streamline and/or increase business certainty over the permitting process. In this context, energy intensive companies' decarbonisation projects eligible for measures like a One stop shop (Single point of contact) or the permitting timelines could largely benefit from an improved efficiency for their businesses as outlined in the findings of the Innovation Fund knowledge sharing report from 2025.[221] The measures would reduce the number of authorities to contact (which can in some cases reach 10), increase certainty over the timeline for the project from extreme cases lasting more than two years, and be reduced to a maximum of 18 months. Projects could also benefit from tacit approval, subject to conditions, on certain intermediary steps of their permitting process, which could help with the sequencing of permits and further incentivise public authorities to deliver timely feedback.

Moreover, while not speeding up the environmental assessment itself, the presumption of overriding public interest could streamline the final stages of permit approval and increase business certainty. Additionally, enabling the testing of innovative technologies under the regulatory sandboxes for limited periods of time, regarding the production technologies for renewable and low-carbon hydrogen, will facilitate the testing of new generation technologies. Regulatory learning, as one of the main outcomes of regulatory sandboxes would enable authorities to improve the regulatory environment for upcoming technologies, and as a result improve their permitting framework.

AREA 2 - The designation by Member States of industrial areas with investment projects that comply with the criteria presented in this option would allow for selected projects complying with the specified IAA criteria to increase visibility and facilitate their access to finance. This would include easier access to public funding at EU and national level, without prejudice to State aid rules, as well as increased visibility *vis-à-vis* private investors.

6.2.1.2 Impact on downstream sectors

LEAD_EII 2 - The impacts of **low-carbon requirements** for steel, aluminium and cement used for the end user of the materials, namely automotive and construction projects in public procurement and support schemes, have been addressed under PO1 (Section 6.1.1.2 estimates implications for the downstream sectors of about EUR 291 million loss of GVA for automotive and EUR 691 million loss of GVA for construction).

Combining such low-carbon with Made in EU requirements in public procurement and public support schemes is expected to induce no further adjustment costs for the construction sector and automotive manufacturers. In fact, assuming current supply/ demand ratio is maintained, a high share of the steel and aluminium currently used in European vehicles and construction is already sourced from European production.[222] Made in EU requirements will mostly act as a safeguard mechanism, to make sure that domestic producers, when investing in decarbonisation, benefit from a secure and guaranteed demand share.

[221] European Commission (2025). 2025 Annual knowledge sharing report of the Innovation Fund.

[222] EU production is still able to cover between 80 and 90% of the EU's domestic demand of steel and about 45% of the EU's domestic demand of aluminium. COM(2025) 125 final

It should be noted that according to the modelling exercise, the definition of Made in EU assumed that demand is to be met by EU Member States and EEA, and therefore does not consider any imports which can alleviate the impacts to downstream sectors.

Construction: Over 30% of the EU's steel demand comes from the construction sector, while for cement, construction represents 98% of the demand. As noted in the introduction of low-carbon requirements in PO1, the cost increase for final products would be relatively small, since steel, aluminium and cement represent a fraction of the final product costs of, e.g. vehicles or infrastructure projects. Available estimates, as outlined in Section 6.1.1.2 confirm that, even combining the impact of low-carbon material requirements across several energy-intensive materials would have a moderate effect on the final cost of vehicles and construction projects, and therefore moderate impact in the sector's value added.

Administrative costs

Administrative costs for ensuring conformity with the Made in EU measures could entail a higher impact than those observed in PO1, due to the need to enforce the Made in EU. More concretely, applicable measures could have significant impacts on the aggregated administrative costs for the construction sector, due to its size, in the EU to show compliance with the measures. To minimise these impacts, an exemption could be considered for micro and small companies as they are not expected to fundamentally impact lead market provisions due to the size of their projects.

For most firms, these costs represent a minor fraction of total project expenses and are unlikely to affect investment or procurement decisions. Over time, the establishment of harmonised certification procedures and greater supplier familiarity with EU-origin rules should reduce administrative burdens and improve efficiency. The measure thus provides downstream actors with more stable and predictable sourcing conditions, while incentivising closer collaboration with EU-based suppliers.

INV 2 - Regarding the **FDI conditionalities**, the voluntary approach assessed in PO1 would, under PO2, become mandatory EU-wide for the batteries segment and for the other strategic technologies in scope. In the short term, downstream sectors could face moderate cost increases if suppliers pass through compliance costs, particularly in batteries and other market segments where EU production capacity is not yet fully scaled. These transitional costs are expected to be contained if conditionalities are phased in gradually. As under PO1, the conditions with the strongest downstream impact are ownership, joint-venture and EU-content requirements, as these conditions shape suppliers' sourcing strategies, cost structures and localisation decisions. Mandatory application across the Single Market would substantially strengthen EU value chains by encouraging more embedded upstream activities, accelerating technology and know-how transfers and improving the availability of EU-based suppliers - resulting in more tangible competitiveness gains for downstream sectors.

Conditionalities linked to value-added production, supply-chain security or technology retention could raise the price of certain inputs, especially in the short term as local value chains adjust to the new demand created by the new FDI projects. Nevertheless, a more predictable and harmonised investment environment could lead to higher benefits for the industries in scope than the operational costs of mandatory investment conditionalities. For downstream sectors, the uniform EU framework reduces fragmentation, levels the playing field across Member States and enhances long-term supply-chain stability. Above all, they would contribute to harmonise the approach within the Single Market, thereby increasing the benefits across EU Member States. Experience from other regions suggests that comparable FDI measures can reinforce industrial linkages and supply chain resilience without harming investment flows (see Annex 13).

6.2.1.3 Impact on SMEs

LAB 2 - SMEs in the steel value chain are expected to benefit from the low-carbon steel label obtained by large manufacturers, as it will promote and enhance market differentiation of low-carbon products across the supply chain. This, in turn, can provide SMEs a competitive edge by meeting the demand for low-carbon products, and accessing new markets which require the use of such label as a compliance instrument.

LEAD_EII 2 will directly benefit EU SMEs in the steel, aluminium, cement, vehicle component manufacturers, as well as solar and battery manufacturers by creating more predictable demand for their European products. These requirements will not only strengthen existing manufacturers but also open new market opportunities for emerging businesses, especially within the growing battery ecosystem. As these industries expand, SMEs will be better positioned to scale their operations and integrate into global value chains. As under option PO1, SMEs in selected downstream sectors are expected to be less able than larger firms to pass on to consumers or to absorb the extra costs. Even if limited, the cost increase will likely negatively impact their ability to export products.

It may also be costly and time consuming for SMEs to demonstrate compliance with low-carbon and made in EU requirements. This burden could be eased through tailored support measures (such as clear guidelines, digital tools, and dedicated helpdesk) specifically for SMEs as well as by extending the validity periods of relevant certificates. Furthermore, in the case of the construction sector, small and micro companies (99% of construction companies) will be allowed to demonstrate compliance with the requirements via self-declaration, reducing the administrative burden.

INV 2 - Mandatory conditionalities are expected to systematically increase opportunities for SMEs as suppliers to foreign investors. Because conditionalities apply across all key strategic sectors, the resulting localisation of R&I, manufacturing and procurement activities is likely to broaden SME entry points in multiple value chains rather than in isolated segments. This integration may require SMEs to meet higher quality and certification standards, potentially creating compliance costs and working-capital needs. Some SMEs may also need to scale production capacity or upgrade processes to meet the requirements of foreign investors adapting to the mandatory regime. Complementary support (e.g. supplier development programmes, technical assistance) will be critical to ensure SMEs can capture these opportunities. In the medium run, SMEs are expected to benefit from more predictable and stable demand, enhanced technological capabilities, and greater participation in global value chains. The uniform EU-wide application of conditionalities also reduces fragmentation, ensuring that SME opportunities are not limited to specific Member States, as would be the case under a voluntary regime.

6.2.1.4 Impact on citizens and consumers

LAB 2 - The impact on citizens and final consumers of a label on the carbon intensity of steel would be marginal or indirect since steel is a business-to-business traded product between steel manufacturers and other companies, rather than to individual consumers. However, indirectly and through the supply chain, the info on the label could be transferred to consumers to inform about the carbon footprint of the material used in the final good.

LEAD_EII 2 - The impacts are broadly similar to those described under PO1, and driven by the low-carbon measures, rather than Made in EU requirements. As noted in Section 6.2.1.2, the introduction of Made in EU measures would not necessarily add any extra costs for the final consumers, other than the low-carbon premium.

PERM 2's measures related to the presumption of overriding public interest might generate additional resistance by local communities affected by such projects, which can be mitigated by maintaining dialogue with local population. Similarly, strict deadlines for permit granting would need to be achieved while ensuring proper consultation to prevent the risks of litigation.

INV 2 - Consumers may face small, visible price increases in the short term (e.g. for EVs) as firms adapt supply chains to meet EU sourcing or staffing obligations. These transitional effects are expected to be modest and outweighed by longer-term benefits. Citizens will benefit from more secure access to critical products (like batteries and EVs), higher-quality jobs located within the EU, and better protection against supply disruptions. Over time, conditionalities should also contribute to faster decarbonisation, supporting the EU's climate goals and strengthening public trust that the green transition delivers local value and industrial capacity.

6.2.1.5 Impact on competitiveness

LEAD_EII 2 is not expected to have an impact on trade flows compared to PO1, considering that the Made in EU targets introduced fall within existing shares of EU demand met by domestic supply in the automotive and construction sectors. In fact, the made in EU measure would enhance competitiveness by securing a minimum low-carbon domestic demand, which is particularly important in a context where the decarbonisation of these industries can widen the cost gap with third country imports. Temporary administrative and certification costs linked to verifying Made in EU are expected to decline over time as procedures become standardised, strengthening predictability and supply-chain resilience.[223] Additionally, the combination of low-carbon and made in EU requirements will ensure demand is met internally rather than through third country imports. Some of the costs may also be underestimated, as the modelling assumptions do not reflect potential changes in trade flows deriving from the Made in EU requirements while switching to low-carbon alternatives. As such, it is assumed that the supply chain structure and flows for the automotive and construction sectors would remain the same through the transition. It is possible however to consider that supply chain dynamics would result in downstream sectors preferring to source outside of the EU while shifting to low-carbon alternatives.

Automotive: Considerations under PO1 are also valid under PO2. The Made in EU requirement introduced under PO2 is set to generate a positive impact on the competitiveness of domestic vehicle manufacturers that already source most of their steel inputs locally (see Section 6.2.1.3).

INV 2 - Mandatory conditionalities would strengthen EU competitiveness by ensuring that inward FDI systematically contributes to local value creation, innovation, and industrial ecosystems. In the short run, compliance costs could erode margins for some investors. However, consistent EU-wide rules eliminate loopholes, closing opportunities for firms to bypass requirements and helping to level the playing field for both EU and foreign companies. Over time, the resulting knowledge transfer, technology retention and innovation spillovers are expected to reinforce EU technological leadership across the batteries and other key strategic sectors concerned, rather than in isolated value chains.

[223] This assessment is consistent with the modelling framework used in COM(2025) 780 final, applying the same behavioural parameters and elasticity assumptions. More detailed results and the full calculation methodology are presented in Annex 11.

6.2.1.6 *Impact on competition*

LEAD_EII 2 - As the low-carbon and made in EU targets are set in order to accommodate for existing and future EU low-carbon production while also considering the reasonable absorption of price increases in downstream sectors, the measure is not expected to distort competition among market actors that comply with these requirements. However, for products subject to Made in EU requirements for security or environmental reasons, competition would be limited to manufacturers located within the EU, thereby excluding non-EU producers up to the minimum content and narrowing the pool of eligible suppliers.

INV 2 could further safeguard the Single Market from disruptions caused by foreign investments and promote more effective competition, due to its mandatory nature. By introducing harmonised conditions for investments in scope, the level playing field in the Single Market would be enhanced and give investors a single, predictable rulebook. This uniformity ensures fairer competition between investors, regardless of entry location. Practices in other jurisdictions demonstrate that well-designed FDI conditions can enhance fair competition and prevent market distortions linked to state-backed investors (see Annex 13).

6.2.1.7 *Impact on international trade*

LEAD_EII 2 is not expected to have an additional impact on trade flows compared to PO1, considering that the Made in EU targets introduced fall within existing shares of domestic supply in the automotive and construction sectors.

The EU's cement industry is structurally domestic, with exports representing less than 3% of production and imports even smaller. Transport costs and product bulk make long-distance trade uneconomical. Even under a 5% low-carbon requirement, no material effect on trade flows or competitiveness is expected. Intra-EU trade flows of steel, aluminium and cement would increase due to the requirements in other EU countries to buy more Made in the EU steel, aluminium, and cement products.

INV 2 - Compared with PO1, the mandatory nature of INV 2 could generate stronger short-term adjustments in trade and FDI flows, particularly where localisation or EU-content obligations alter sourcing patterns, but these effects would remain concentrated in the sectors covered. Its application must remain consistent with the EU's international commitments on investment liberalisation. In most FTAs, the EU has already granted extensive market access and national treatment in non-services sectors, except for a few sensitive activities. As a result, FDI from these partner countries (representing most EU inflows) would be exempt, limiting overall coverage. The measure would thus primarily apply to strategic investments from non-FTA countries where economic security risks are highest. However, both GATS and TFEU provisions allow restrictions on capital movements only under narrowly interpreted public policy or security exceptions, leaving limited room for measures justified purely on economic or industrial grounds.

6.2.1.8 *Impact on Member States*

LAB 2 would increase the administrative burden for Member States, depending on the additional data requirements, accounting, reporting and verification system. However, as the label on steel will be built on existing EU ETS and CBAM verification rules, the burden on national authorities is expected to be limited, and even more so compared to LAB 1.

LEAD_EII 2 - The financial burden on Member States of introducing low-carbon requirements for steel, aluminium and cement used in automotive and construction projects in public procurement and incentives schemes has been assessed under PO1. Adding a Made in EU requirement will likely not lead to additional adjustment costs. However, it is likely to increase the administrative burden since public administrations would be required to establish systems for monitoring, verification, and enforcement of compliance. This will involve building on existing EU-level verification mechanisms or building new ones in case not in place yet. Effective implementation depends on the availability of reliable and transparent standards, emissions accounting methodologies, and certification systems as well as guidance for Member States.

To support effective implementation, Member States will need to designate a competent authority to oversee the implementation process and ensure monitoring, verification and enforcement. For steel, the introduction of a label on the carbon intensity of steel (LAB 2) will provide a reliable tool for certification. It will also have to ensure that the certification system in place is properly enforced and monitored for fraud risk. Similarly, in the construction sector, for harmonised construction products the compliance with low-carbon requirements will have to be certified by a Declaration of Performance and Conformity, under the procedure established in the context of the Construction Production Regulation.

INV 2 - For Member States, mandatory EU-wide conditionalities would bring higher administrative responsibilities for those Member States that currently do not screen incoming FDI. This will entail capacity-building and generate efficiencies by reducing fragmentation. Uniform conditionalities strengthen the consistency of the Single Market and reduce the administrative burden of divergent national practices, while ensuring that all Member States benefit from spillovers rather than competing against each other. Lessons from other economies show that coordinated frameworks for FDI screening can strengthen national capacities while preserving overall attractiveness to investors (see Annex 13).

PERM 2 - Impacts linked to the "One project, one digital process" have already been outlined for PO1. Measures related to timeframes are expected to shorten procedures and would require additional administrative resources when the reason for delays is the lack of capacity. Still, the proposed time limits for decision-making are based on timeframes that are often already achieved and aim mainly to increase the predictability of the process for the most extreme cases. In addition, time limits can provide incentives to public authorities to consolidate internal processes.

Tacit approval measures for intermediary steps of the permit granting process would not be applicable for Member States in which this option is not allowed by their legal system. No additional impact would be expected in those countries. This measure is in part introduced to facilitate the achievement of the time limits by streamlining sequential characteristics of certain permit-granting processes in other Member States. Some training for relevant authorities could be expected to fully incorporate the tacit approval into the permitting process.

AREA 2 - Member States would need to provide the necessary resources to conduct the process to designate areas with relevant projects. Given that the Commission will provide them with guidance on how to do so, and that each Member State only assigns a limited number of such projects, the additional impacts on Member State administrations should be limited. Additionally, Member States will be able to draw on their experiences with Strategic Projects under the NZIA, where already decarbonisation projects have been designated as strategic.

6.2.2 Social impacts

6.2.2.1 Impact on employment

LEAD_EII 2 would help boost European employment in EIIs. According to research by think tank Strategic Perspectives, implementing a 100% substitution of low-carbon and made in Europe requirements[224] for steel could result in a 21% increase in employment in the steel sector by the year 2030 compared to a baseline scenario without such policies in place.[225]

INV 2 - Impacts described under PO1 remain valid for PO2 and are expected to contribute to an increase in employment and the creation of quality jobs. Mandatory measures would more effectively prevent companies from circumventing staffing requirements by removing the possibility for investors to choose Member States without such obligations, thereby better safeguarding the homogeneity of the Single Market. The implementation of these conditionalities would build on existing FDI screening structures in Member States, with designated authorities ensuring that employment and training commitments are met. This may require some procedural adjustments where Member States currently apply limited or no staffing-related conditions.

6.2.3 Environmental impacts

LAB 2 would support the decarbonisation of the steel industry, which is one of the most emission-intensive industrial sectors, representing almost 20% of the industrial GHG emissions in the EU. In fact, the introduction of an EU-wide label based on reliable and verified data and a uniform methodology can improve the understanding of what constitutes steel with lower carbon footprint impact. The exact impact would depend on three key parameters:

1. The scope of the GHG emission information provided by the label.
2. The label's ability to ensure comparability across products and producers.
3. The attractiveness and use of the voluntary label by companies.

As explained in more detail in Annex 12, up to 78% of GHG emissions (in case of primary steel, up to 60% in case of secondary) can be covered by a label relying on direct industrial GHG emissions covered by EU ETS as well as indirect emissions from electricity, heat and hydrogen use. Besides, the comparability across products and producers can be effectively ensured by integrating classes of performance in the label, based on clear quantitative GHG-intensity thresholds. To maximise the comparability of diverse production pathways, the performance class thresholds could be adjusted in line with the amount of scrap used. Multiple types of information, in addition to indicating a performance class under the classification system, could be added, such as the actual GHG emission intensity or the amount of recycled content used in the product. It must be noted that during stakeholder consultations, the use of a sliding scale for differentiating the performance classes or of an alternative classification method not as a function of scrap was highly debated with no clear preference or compromise solution within industry.

LEAD_EII 2 – could have a bigger environmental impact than PO1, as mandating made in EU requirements could lower transport emissions associated with imports. These are however not quantified in the calculation on reduction of GHG emissions, since they would require a

[224] Defined in the study as a maximum carbon intensity of 0.7 tonnes of CO_2e/tonne of steel for flat products and of 0.35 tonnes of CO_2e/tonne of steel for long products in 2030.

[225] Strategic Perspectives (2025). Lead markets: driving net-zero industries made in Europe. Estimate from dataset used in report's underlying analysis.

comparison between the domestic and imported material under an established low-carbon methodology.

PERM 2 - The designation of a one-stop-shop and streamlining of different assessments could prove to have a positive impact on the environment, as it enables a more comprehensive information base for decision-making. Moreover, by providing a set time limit of 18 months for decarbonisation of energy intensive industrial projects, the EU could gain up to 30 months of decreased emissions from industrial projects on the most extreme cases, thus speeding up GHG emission reductions.[226]

The use of the overriding public interest (OPI) provisions is allowed under the current environmental legislative framework. This provision does not prevent the need for planning and assessing environmental effects under relevant legislation (Water Framework Directive, Habitats Directive,) and therefore does not necessarily accelerate the speed of the assessments. It will provide however the most favourable procedure available in Member States' planning and permit-granting procedures, while requiring that all other conditions are also met. Overriding public interest considerations enable projects to go ahead upon some conditions even in case of a negative assessment for the project, so certain environmental impacts can be expected. However, any authorisation under the overriding public interest considerations must provide adequate compensation measures to offset environmental adverse effects, as provided in relevant legislation. Finally, regulatory sandboxes would be accompanied by a framework setting the necessary limitations to prevent any unintended environmental consequences. Sandboxes would always be limited in time and scope, as well as accompanied by appropriate mitigation measures.

6.3 POLICY OPTION 3

6.3.1 Economic impacts

6.3.1.1 Impact on companies

LEAD_EII 3 - extends low-carbon and Made in EU requirements to the steel, cement and aluminium used in all vehicles and construction products placed on the market.

Extending requirements to all products in the automotive and construction sectors would drive the broader market transformation needed for systemic decarbonisation of EIIs, particularly in steel, where public procurement covers only a limited share of total consumption. By creating large-volume and predictable demand, these measures would send long-term market signals necessary to unlock investment in low-carbon technologies.

This predictability of future demand for low-carbon steel can help absorb part of the investment's costs from the low-carbon technologies and has a high potential to further push investment decisions towards decarbonisation. In the EU steel sector, there are currently at least 29 announced steel decarbonisation projects, with a combined potential capacity of additional 41 Mtonnes of low-carbon steel per year by 2030, that have not yet reached the final investment stage. To that end, the proposed lead market measures, based on the current project pipeline, could unlock up to EUR 15.5 billion in investments[227] covering approximately 15%

[226] EIIs account for approximately 22% of the European Union's total greenhouse gas (GHG) emissions. Time gained through a more efficient permitting process will help to decrease the 22% and achieve wider climate targets earlier.

[227] Estimate based on data from BloombergNEF's Steel Decarbonization Project Database 1.0.5. The cumulative figures of 41 Mtpa of low-carbon steel capacity and the associated EUR 15.5. billion in investments represent only projects whose output meets the indicative IAA's carbon intensity label classes of performance (Class A-C).

of the sector's EUR 100 billion total investment need by 2050, as estimated in the impact assessment for the 2040 climate target. [228, 229]

Furthermore, export-driven overcapacity in third countries today leads to artificially low prices (notably for steel) and causes EU job losses and plant closures. Therefore, this measure introduces higher **Made in EU requirements** (targets of 85% for steel, 95% for cement and 70% for aluminium) to help safeguard security, redirect demand towards domestic producers, and improve the resilience of sectors like steel or aluminium that have lost market share over the past decade.[209] There are two opposing effects of introducing Made in EU requirements. The first is the reduction in the production of cement, steel or aluminium due to the downstream sectors facing higher costs and reducing their demand for domestic production. Secondly, the cement, steel and aluminium industries will experience an increase in demand stemming from the Made in EU requirements as these would lead to replacing imports from non-EU countries by domestic production. Overall, the second effect is greater than the first and translates into higher value added for these sectors.

Energy intensive sectors (cement, aluminium and steel) would benefit from higher targets under LEAD_EII 3, in a similar way as in LEAD_EII 2 but with a higher positive impact. In particular, for the EU cement industry, such benefits would represent 3.09% (EUR 2 079 million) of its total sectoral value added, while for the European steel and aluminium companies, it would account for 4.32% (EUR 2 883 million) of its total sectoral value added. In both cases, the results refer to the period 2025-2030, compared to a baseline scenario without IAA measures.

Similarly to LEAD_EII 2, the benefits stemming from the increase in the demand for steel, cement and aluminium due to the Made in EU requirements overcompensate the reductions in the demand for steel, cement and aluminium from downstream sectors facing higher costs. Moreover, the benefits are greater since the Made in EU requirements are extended to all products in the automotive and construction markets (not only public procurement and support schemes markets).

When comparing LEAD_EII 3 and LEAD_EII 2, the FIDELIO model shows that the public market is an important driver of impacts of the proposed policy measures. This is particularly relevant for the steel and aluminium sectors, where public procurement and public subsidies for automotive causes up to 73.84% of the total estimated positive impacts in both sectors in the period 2025-2030.[230]

In addition to the existing climate policies, introducing low-carbon requirements will help creating demand and accelerating investments, while Made in EU requirements would secure domestic market share for strategic materials, providing greater certainty for investment decisions, compared to the baseline. Redirecting demand to EU-based producers would also improve capacity utilisation - particularly in sectors that have seen notable declines between 2000 and 2021, such as cement, aluminium, and integrated steelmaking.

LEAD_BAT 2 / LEAD _SOL 2 - Expanding Made in EU requirements to all products in scope (i.e. steel, cement and aluminium in automotive and construction; batteries and solar PV)

[228] European Commission (2024)., Commission Staff Working Document: Impact Assessment Report (Part 3), accompanying the document Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Securing our future - Europe's 2040 climate target and path to climate neutrality by 2050, building a sustainable, just and prosperous society, COM(2024) 63 final, pp.164-167.

[229] Draghi, M. (2024). The future of European competitiveness: In□depth analysis and recommendations (Part B), p. 99.

[230] According to European Commission estimates based on FIDELIO model (Rocchi, P. et al. 2025).

placed on the market would increase demand for EU produced energy intensive materials, EU manufactured batteries and solar, with greater certainty for domestic investments.

Looking ahead, Europe is not expected to meet its internal battery demand with domestic production only until 2030.[231] Therefore, the introduction of Made in EU requirements to products placed on the market had to take account of the time needed to reach operational status and reach full-scale production for battery investment.

The current EU solar manufacturing capacity, mainly in critical components (e.g., wafers, cells, inverters), does not yet have sufficient scale to meet overall demand. As the non-public segment of the solar PV market accounts for around 65%[232] of the EU market, introducing mandatory minimum Made in EU requirements had to be carefully designed to avoid creating pressure on the EU supply chain.

In conclusion, extending even partial Made in EU requirements to all products placed on the market at this stage carries some risks for the solar and battery industries, including potential market distortions, implementation challenges, and legal uncertainties. While such requirements could play a role in the future, their near-term application may generate more challenges than benefits unless carefully phased and supported by complementary measures.

PERM 3 contains PERM 2 and therefore the same expected impacts. On top of this, it is expected to further facilitate the deployment of decarbonised projects in specific areas dedicated to industrial activity. The identification of geographical areas of industrial activity will promote industrial symbiosis and offer opportunities for collaboration between industries. Most notably, by being able to settle their projects in key areas of energy demand in the Member States, industry's connection request to future energy infrastructure would become easier through the local synergies between generation and supply of electricity, potentially allowing for more efficient grid use and priority treatment for connection requests.

Considering the electricity grid congestion issues and the lack of a hydrogen or CO_2 infrastructure, favouring a clustering approach is expected to attract industrial investments as it may allow for faster grid connection. Subjecting the entire plan designating the industrial clusters to environmental assessments can contribute to streamlining subsequent permitting steps.

Based on the **Public Consultation**, 67% (210 out of 314 respondents) support industrial clustering as a solution to streamlining and improving the efficiency of the permit granting process.

LEAD_VC 2 – The same assumptions apply as in LEAD_VC 1 (the increasing cost of EVs for EU car manufacturers is projected to be the same). However, in LEAD_VC 2, 100% of EVs put on the EU market will be affected.

As vehicle manufacturers will have the incentive to comply with the target to have access to public subsidies, the model predicts an increase in EU vehicle component suppliers' sales to the manufacturers of EUR 7.83 billion in 2027 and by EUR 8.2 billion in 2030 when aggregating the sales in all three vehicle segments.

6.3.1.2 Impact on downstream sectors

LAB 2 would have same impacts as described under PO2.

[231] Based on industry announcements, the EU is expected to reach an installed battery cell manufacturing capacity of 892 GWh by 2030, matching an estimated internal demand of 890 GWh.
[232] Solar Power Europe input and Commission calculation.

LEAD_EII 3 - extending **low-carbon and made in EU requirements** to all products placed on the market will amplify the impacts described under PO1/PO2 for the construction and automotive sectors.

On the production side of the economy, the construction sector would see losses of their value-added reaching EUR 2.2 billion, while the automotive industry would see more moderate losses, of EUR 396 million. On the expenditure side, this translates into a reduction in consumption amounting to 564 million in the construction sector and 240 million in the automotive industry. These losses are a direct response to higher final good prices driven by the newly imposed green premium, and are partly driven by a decrease in the consumption of products of the automotive and construction sectors.[233] More information on consumption patterns can be found in Section 6.3.1.3 and 6.3.1.7, while further breakdown of cost calculation can be found in Annex 4 Section 2.2.

Expanding Made in EU requirements to higher targets (85% for steel, 95% for cement and 70% for aluminium) and larger scope (i.e. to include all vehicles and construction projects placed on the market) would broadens the impact. The measure would cover a large share of industrial steel use and require a minimum EU-origin content in products placed on the EU market.

However, downstream industries are expected to absorb these costs gradually through process optimisation and local sourcing efficiencies. In addition, greater reliance on EU-based suppliers will reduce exposure to import disruptions and long shipping lead times. For construction and automotive sectors, this stability translates into improved delivery reliability and long-term cost predictability, offsetting short-term compliance expenses.

For the **automotive industry**, LEAD_EII 3 would determine the application of a minimum Made in EU requirement to the steel and aluminium used in the production of all vehicles placed on the EU market. In 2024, 28% of all vehicles registered in the EU market were imported from extra-EU countries.[234] Those imported vehicles would also need to source from EU countries their steel and aluminium up to the minimum share required. While this is expected to translate into higher demand for EU EIIs producers, it would increase costs for automotive manufacturers. In terms of value added, the impacts of introducing the policy measures foreseen under LEAD_EII 3 would have considerably less important effects (in relative terms) on the automotive sector than in construction, even when combining them across several energy-intensive materials. Specifically, this impact would represent an EU27 average of -0.80 % (or EUR 6 651 million for 2030) of the EU automotive sector's value added for 2025-2030, with respect to a baseline scenario without IAA measures.[235]

Introducing a minimum Made in EU requirement for cement used in the **construction sector** would reduce the EU construction sector's value added by an EU27 average of -1.69 % (EUR 13 996 million) for 2025-2030 with respect to a baseline where no IAA measures are applied.[236]

The overall negative impact primarily arises from the fact that downstream sectors—those with a larger economic contribution to the EU GDP than the cement, steel, and aluminium industries—face increased costs due to increased Made in EU requirements.

There are however disparities across the cement-related products and across Member States. The EU has been consistently a net exporter of cement, while it relied on imports to meet its

[233] Figures result from a simulation of the FIDELIO model, when prices in the automotive and construction sectors are shocked by 0.225% and 0.4499 % respectively, and the resulting general equilibrium effects of higher prices on final demand, incomes and value added are computed.
[234] S&P Mobility.
[235] According to European Commission estimates based on FIDELIO model (Rocchi, P. et al. 2025).
[236] Ibid.

demand in clinker before the financial crisis and again in 2021.[237] In addition, Member States where there is a higher cross-border trade with third countries due to geographical proximity would be more affected. This is the case for Southern European regions, exposed to trading with Northern Africa, and Eastern European regions. It should be noted that in the modelling exercise, the relevant demand was only met by EU Member States supply and EEA countries, meaning that it does not consider any potential third country imports which could alleviate the impacts to downstream sectors assessed.

Measures applicable to the construction sector could have significant impacts on the aggregated administrative costs for relevant companies in the EU to show compliance with the measures. To minimise these impacts, an exemption could be considered for micro and small companies as they are not expected to fundamentally impact lead market provisions due to the size of their projects.

LEAD_BAT 2 / LEAD _SOL 2 - Unlike measures limited to public procurement or public support, this approach would affect the whole market. Higher battery prices would impact the affordability and uptake of EVs and BESS, potentially slowing down their deployment. This, in turn, may also affect demand for EU-made batteries, influencing the pace of new investments in battery manufacturing. Ensuring cost competitiveness alongside scaling up production capacity will therefore be key to sustaining demand growth and strengthening the investment case for EU battery manufacturing. Additionally, ensuring adequate supply would be a challenge. Current EU battery production capacity does not match projected demand, as outlined in the previous Section. This measure would require a timely scale-up to prevent the gap from driving up prices and delaying project timelines.

As regards solar, the proposed measure could negatively impact downstream sectors involved in solar deployment. Increased regulatory complexity and increased investment costs in the short-term could slow down the development of utility-scale solar farms, with implications for project developers, engineering firms, equipment suppliers, and grid operators. While this may initially affect project pipelines, it can also encourage more resilient supply chains and greater transparency in the market. Buyers, particularly in offtake agreements or PPAs, may face increased due diligence obligations to certify compliance.

LEAD_VC 2 – Similarly to LEAD_VC 1, given the estimated current level of 70% Made in EU in the EVs, the measure would not lead to any further costs for EU EV manufacturers in 2027 to comply. As the target is increased to 75% by 2030, the measure would represent a cost increase of EUR 2.36 billion for EU EV manufacturers, which on the other hand would be offset by the increase of sales. EU EV manufacturers are expected to benefit from a sales increase of EUR 16.7 billion across all vehicle segments in 2027 and EUR 10.7 billion in 2030. The increase in sales is presumed to offset the cost increase for passenger cars and LCVs, however, not for HDVs. Finally, LEAD_VC 2 is projected to lead to the generation of EUR 6.6 billion Global Value Added (GVA) in 2027 and EUR 5.4 billion in 2030 when assessing the impact, taking into account only the first tier of the value chain. The positive impacts can also be perceived throughout the value chain for intermediate inputs, reaching this time higher benefits, EUR 12.6 billion in 2027, and EUR 11.5 billion in 2030 in value added.

6.3.1.3 Impact on citizens and consumers

LEAD_EII 3 would have a much higher impact on consumers in terms of facing cost increase, as the associated 'green premium' is likely to be passed on to consumers via higher final good prices (until cost parity is reached). However, as outlined before, the low-carbon cost increase

[237] Marmier, A. (JRC) (2023). Decarbonisation options for the cement industry.

per passenger vehicle for including a 25% target for both low-carbon steel and aluminium is considered minimal, EUR 69.27.

However, these cost increases are projected to result in a reduction of consumption from household consumers of EUR 191 million in the construction sector, and 120 million in the automotive sector.

Introducing requirements for low-carbon steel, aluminium and cement in the construction sector at large would have a higher impact on costs, due to the cumulation of the three materials used for construction. Nonetheless these costs remain limited, at 0.45% compared to its traditional alternatives. Similarly, public subsidies for renovations could offset part of these costs.

PO3 raises the Made in EU targets for steel to 85%, aluminium to 70% and cement to 95%, going beyond existing sourcing levels from EU domestic suppliers for automotive and construction. Citizens and consumers will see further cost increases from the obligation to source European energy intensive industrial products, as automakers and construction companies would pass on the higher cost premium in the final selling price.

LEAD_BAT 2 / LEAD_SOL 2 would lead to higher prices for downstream products, as described under PO1. As regards batteries, this could hinder the adoption of EVs and jeopardise the EU's clean mobility objectives. For BESS projects, the increase in prices and the possible lack of supply could stop the momentum of the sector. As regards solar, citizens and consumers may face higher energy costs and reduced access to affordable solar solutions. Stricter obligations on installers or product specifications could drive up the price of residential solar systems, discouraging adoption by households. In turn, it risks slowing down the uptake of clean energy at the local level and limiting the benefits of lower electricity bills and energy independence for citizens.

LEAD_VC 2 - The same assumptions apply as for LEAD_VC 1. In quantitative terms, when we look at the impacts in 2027, the average price increase (from both the potential reduction of price for EU manufacturers and price disadvantage for non-EU manufacturers), there would be an overall price increase of 0.5% for passenger cars, 0.1% for HDVs and there could be a reduction of 0.8% for LCVs. Looking at the impact in 2030, the price increase for passenger car rises to 1.4%, to 0.5% for LCVs and 1.3% for HDVs.

6.3.1.4 Impact on competitiveness

LEAD_EII 3 - Given that a high share of the steel and aluminium used in vehicles produced in the EU is already sourced locally, the introduction of a higher Made in EU requirement in all products placed on the market is not expected to generate a significant impact on the global competitiveness of the EU vehicle manufacturers, at least in the short term. However, in the longer term, the Made in EU requirement could result in a limited capacity by EU vehicle manufacturers to find the required quality steel and aluminium from non-EU countries if domestic EII production is geared towards the specific needs of the EU market. However, a higher share of EU demand served by domestic steel, aluminium and cement producers under PO3 is expected to deliver a notable economic security gain, as reduced reliance on concentrated third-country suppliers lowers exposure to price manipulation, supply interruptions and coercive practices, thereby strengthening the resilience of the entire construction and automotive value chain.

Under LEAD_EII 3, the stronger Made in EU requirement would result in a domestic steel price increase, producing a more visible but still contained effect on downstream industries. The measure would not materially affect investment or competitiveness in construction and automotive sectors but would significantly reinforce the position of EU steel producers by redirecting part of export-oriented output to domestic projects. Total production would increase, improving utilisation of low-carbon capacity and supporting investment in cleaner technologies. As certification systems mature and compliance processes become more efficient, the temporary cost impact should diminish, consolidating a more resilient and competitive EU steel base. Once low-carbon technologies reach maturity and scale, the competitiveness gap is expected to close.

The EU's cement industry is structurally domestic, with exports representing less than 3% of production and imports even smaller. Transport costs and product bulk make long-distance trade uneconomical.

In aggregate terms, JRC estimations show that Made in EU requirements for steel and aluminium in construction, and automotive might trigger negative value-added impacts in the EU economy of -0.13%, over the period 2025-2030 (or EUR 15 202 million), and with respect to a baseline where no IAA measures are applied.

LEAD_VC 2 – would have the same effect as described in PO1.

6.3.1.5 Impact on competition

LEAD_EII 3 introduces Made in EU requirements for EIIs used in products placed on the market (in selected downstream markets), likely reducing eligible supplies for downstream sectors such as automotive, thereby restricting competition and limiting market access.

LEAD_BAT 2 would limit access to the European market for manufacturers and suppliers located outside the EU, strongly reducing competition. Such measures would disadvantage companies located overseas and restrict, proportionally to the level of the Made in EU obligation, supplier diversity for the downstream users of batteries (i.e. automotive OEMs and BESS producers).

Regarding **LEAD_SOL 2,** unlike public procurement, which can be monitored through clear compliance frameworks, private market transactions are highly fragmented and decentralised, making enforcement challenging.

LEAD_VC 2 The reduced competitive pressure for both the suppliers of vehicle components and vehicle manufacturers that was described for LEAD_VC 1 is to be assumed also under LEAD_VC 2, with a higher effect under the latter measure. Overall, minimum Made in EU requirements imposed on all products put on the market (in selected downstream sectors) would distort competition by artificially favouring EU-made products over others, irrespective of market price, quality or existing contractual relationships, depending on the sectors. This potential detrimental effect might be exacerbated in sectors where EU production capacity is more limited, even if for those sectors the level of the content obligations is also lowered.

6.3.1.6 Impact on international trade

LEAD_EII 3 – PO2 impacts remain relevant but are amplified, as the introduction of strengthened Made in EU requirements would have a more pronounced impact on international steel and aluminium trade. This change represents an adjustment of EU trade flows, as part of export-oriented output is likely to be redirected to domestic consumption. However, the measure does not reduce total production capacity; rather, it reallocates supply to the internal market. The EU's cement industry is structurally domestic, with exports representing less than 3% of production and imports even smaller. Transport costs and product bulk make long-distance trade uneconomical. Even under a 5% low-carbon requirement, no material effect on trade flows or competitiveness is expected.

Extra-EU economies would benefit from positive value-added gains in construction and automotive from an Made in EU requirement[238] for steel and aluminium. These downstream sectors would possibly benefit from the increased availability of domestically produced EII inputs that previously were exported to the EU, which would result in lower prices for their inputs.

LEAD_BAT 2 - Making market access conditional on Made in EU in batteries would directly affect imports from major global suppliers, particularly in Asia. The difficulty lies in WTO non-discrimination rules, as imported and EU-produced batteries are "like products" and a content condition would likely be contested. At the same time, Europe's attractiveness as a fast-growing market means suppliers would have strong incentives to comply, either by adapting sourcing or investing in EU production facilities. This creates an opportunity to accelerate localisation and reduce dependency on external supply. To strengthen the case, the measure would need to be tightly framed around essential security and resilience arguments, supported by evidence of risks such as export restrictions. Even if challenged, it could succeed in re-anchoring part of the battery value chain in Europe, though the political costs of trade disputes would need to be managed.

LEAD_SOL 2 - Applying Made in EU conditions would have significant trade consequences, as the EU is highly dependent on imports, especially from Asia. WTO panels have already struck down comparable local content schemes in solar. The risk of legal and political retaliation is therefore high. Nonetheless, the scale of EU demand makes the market too important for global players to ignore. A requirement could trigger investment in EU manufacturing and create new industrial opportunities, provided it is carefully designed and linked to legitimate policy objectives such as climate security and resilience. There is therefore a trade-off: the measure could be transformative for EU industrial capacity but would almost certainly provoke partner pushback. Managing this would require complementary diplomacy and perhaps transitional measures to avoid abrupt disruption of supply.

LEAD_VC 2 - extending the Made in EU requirements to all EVs placed on the market in the Union would have a much more direct and wide-ranging effect on international trade.

6.3.1.7 Impact on Member States

LEAD_EII 3 - introduces low-carbon and made in EU requirements for EIIs for products placed on the market, which will place additional responsibilities on Member States, as they would be required to establish systems for monitoring, verification, and enforcement of compliance. This will involve building on existing EU-level verification mechanisms or building new ones in case not in place yet.

PERM 3 - Relevant impacts on Member States have already been assessed under PO1 and PO2. Increased administrative support needs from relevant national authorities could be expected in the assessment and designation of potential clusters at Member State level including setting up relevant procedures across diverse public sector competencies, in view of the priority assessment to grant the infrastructure connection and the environmental assessments of clusters' plans.

[238] EU content is defined as EU Member States and EEA countries . Moreover, the JRC results are modelled for construction and automotive, two sectors in total, which could have an impact on overall results.

LEAD_VC 2 – Similarly to LEAD_VC 1, as observed above public support schemes currently used in the automotive industry will mitigate the adverse effects of LEAD_VC. Since the assumptions are based on already existing schemes, the cost of public subsidies used for this Impact Assessment will not represent an increase in cost for Member States.

6.3.2 Social impacts

LEAD_EII 3 - Made in EU measures would generate employment in the energy intensive sectors, notably 4 272 jobs in cement, and 3 762 in the steel and aluminium sectors combined, resulting from the increase in value added. In other words, the employment benefits are directly correlated to the increase in value for the covered sectors. At the same time, decreased value added in downstream sectors could lead to negative impacts on employment for those sectors but could not be quantified at this stage.

LEAD_BAT 2 - As discussed under LEAD_BAT 1, Made in EU requirements would help anchor the 170 000 jobs expected to be created by the current battery project pipeline by 2030. However, this measure would not only safeguard those jobs, but it would also stimulate further employment across the value chain as additional production capacity would be needed to meet internal demand.

LEAD_VC 2 – as noted in LEAD_VC 1, the measure could stop the trend of progressive job losses which has been materialising over the past years in the EU's vehicle components supply chain. Furthermore, the measure could create additional financial capacities for suppliers to be reinvested in future technologies.

6.3.3 Environmental impacts

LAB 2 would have same impacts as described under PO2.

LEAD_EII 3 is expected to further contribute to the reduction of CO_2 emissions from steel and cement since the provisions would impact the entire automotive and construction sectors. Low-carbon steel would account for emissions saving of 10.26 Mtonnes CO2, low-carbon cement for 2.22 Mtonnes CO_2 and aluminium 1.1 Mtonnes CO_2. In total, LEAD_EII 3 would contribute to the reduction of 13.58 Mtonnes CO2 emissions. These emissions savings can be valued at EUR 1.358 billion (EUR 814.88 million – 2.566 billion) for 2030, see Annex 4 Section 2.3 for monetisation calculations and Annex 15 for the emission ranges and monetisation.

It also introduces a wider scope for Made in EU requirements, which, on the one hand, would increase environmental performance as EU producers tend to outperform international competitors in terms of emissions performance.[239] On the other hand, it may limit market competition, which could result in lowering the incentive to innovate and hence further decarbonise.

LEAD_BAT 2 - Localizing the production of battery cells and cathode active materials, including its precursor material, under PO3 to meet the whole EU demand rather than relying on imported Chinese products, could reduce CO□ emissions by an estimated 34.17 Mtonnes by 2030. These emissions savings have a value of EUR 3.4 billion (EUR 2 billion -6.4 billion), see Annex 4 Section 2.3 for monetisation calculations and Annex 15 for the sensitivity analysis. This does not account any potential slowdown of EV and BESS uptake, which would in turn have a negative environmental impact.

[239] European EIIs have already decreased their GHG (greenhouse gas) emissions by almost 40% between 1990 and 2017, which is why Europe has a lower emissions intensity than the rest of the world for many sectors. Source: ERT (2024). Competitiveness of European Energy-Intensive Industries, pp. 7 and 38. For a detailed analysis on the GHG intensity of EU steel and its trading partners, see JRC129297.

PERM 3 increases climate benefits by further accelerating the decarbonisation projects through faster deployment, potentially accelerated grid connection as a result of clustering and through easier implementation in clusters areas, notably in their GHG performance. It also introduces a single environmental assessment for the industrial clusters' plans. To mitigate to the maximum any individual impacts by the projects, the plan would accompany the designation of such areas with the relevant mitigation and/or compensatory measures for the industrial activities planned. This would ensure that any potential environmental impact is kept to a minimum. However, a derogation from individual environmental impact assessments will result in a less efficient identification of environmental impacts associated with industrial activities in identified clusters. Hence, mitigation or compensatory measures are expected to be more challenging to implement at an adequate and sufficient level. Permitting under the IED would remain at the installation level within clusters. The possibility to derogate from the temporary emissions occurring during the construction phase of a project with CCS would have negative impacts on the environment, for instance in terms of nitrogen emissions. The initial negative impact on the environment from this derogation should be considered against the climate improvements brought by the projects in the process of the decarbonisation of sectors with hard to abate emissions . The identification of these industrial clusters can contribute to wider decarbonisation efforts as regard to infrastructure planning. Easily identifiable points of considerable energy demand could speed up the deployment of future energy infrastructure, necessary for their decarbonisation efforts.

LEAD_VC 2 - In Scenario 1, global greenhouse gas emissions from vehicle manufacturing decrease by 0.9 Mtonnes CO_2e in 2027 and by 0.7 Mtonnes in 2030 due to shifts in production; they further decline by 0.1 - 0.2 Mtonnes due to reductions in international transport associated with EU imports. These emissions savings represent a benefit of EUR 90 million (EUR 54 million - 170 million), see Annex 4 Section 2.3 for monetisation calculations and Annex 15 for the sensitivity analysis. In sum, the environmental effects remain limited and are very similar across LEAD_VC 1 and LEAD_VC 2.

7 How do the options compare?

7.1 Effectiveness

The assessment of effectiveness looks at the extent to which the general and specific objectives (SO) of the intervention, as described in Section 4, are met.

SO1: Facilitate differentiation for low-carbon industrial products to increase their value and marketability: PO1 would be more effective than PO2 as it would develop low-carbon labels for all outputs of EIIs. This would increase transparency and help manufacturers of low-carbon industrial products in distinguishing their offerings from conventional alternatives, contributing to lead markets creation and, ultimately, the general objective of supporting the decarbonisation of EIIs. However, this would only be the case in the long term once labels have been properly established and the attractiveness and use of such labels confirmed.

SO2: Boost demand for European low-carbon products and clean tech: PO2 is likely to be the most effective in meeting the objective of creating lead markets for European low-carbon industrial products and European clean technologies as well as vehicle components for EVs, as it would introduce low-carbon and Made in EU requirements in those market segments where the benefits would be the highest. By spurring demand, it would also contribute to attracting new investments in EIIs, batteries, solar PV and automotive components. PO3, could also be effective, as long as introducing EU requirements for products placed on the market are sufficiently progressive to address implementation challenges for the sectors considered, especially for 'nascent industries' like batteries and solar PVs, where European manufacturers lack sufficient scale to ramp up production to meet the projected demand increase in the short to medium term. PO3 would also be challenging in terms of enforcement, affecting the effectiveness of the measure.

By creating more predictable demand, PO2 will help absorb some of the investments costs from the low-carbon technologies, unlocking stalled and creating market signal for new investments in the sectors covered. The Made in EU and low-carbon requirements will create a pull effect in the market that will increase the share of domestic demand to be covered by cleaner and European production, establishing certainty for investments decisions. It facilitates the reduction of the green premium through strategic green public procurement, creating a market signal to trigger private capital, which remain the main driver behind investments. As described in the Section 6, under impact on companies, the lead market measures on low-carbon steel could accelerate final investment decisions, unlocking up to EUR 15.5 billion[240] in investments, contributing to reduce the investment gap.

SO3: Maximise the quality and benefits of foreign investment within the Single Market: Compared to PO1, PO2 is expected to deliver significantly greater effectiveness. Under PO2, all Member States would apply uniform, mandatory provisions, while the voluntary approach in PO1 would not ensure convergence, leaving scope for divergent national practices and competition based on lighter conditions. In both cases, the industries in scope are expected to cover batteries and possibly certain EIIs.

SO4: Speed-up and simplify permits for industrial decarbonisation: PO2 and PO3 introduce additional and targeted measures to facilitate and speed up the business case (e.g. planning security and de-risking investments) of decarbonisation projects for EIIs, while PO1 only contains digitalisation and streamlining measures for all manufacturing industries. PO3 would be the most effective option since it includes measures from PO1 and PO2 and combines them with a clustering approach to reap benefits from a geographical concentration of industries, notably in terms of energy infrastructure synergies and rippled down indirect benefits for infrastructure design.

SO5: Increase investment projects in industrial areas: PO2 would be more effective than PO1 in facilitating access to funding and accelerate investment decisions for industrial decarbonisation projects across the EU due to its binding nature.

7.2 Efficiency

Efficiency refers to the 'extent to which objectives can be achieved for a given cost (cost effectiveness). Efficiency also assesses to which extent options contribute to administrative and process efficiency (reaching objectives with the least administrative burden). The analysis below does not quantify the long-term benefits associated with economic security.

[240] Estimated based on data from BloombergNEF's Steel Decarbonization Project Database 1.0.5. The potential investment value of EUR 15.5. billion represents only projects whose output meets the indicative IAA's carbon intensity label classes of performance (Class A-C).

Summary of costs and benefits of policy options for 2030, compared to the baseline (in million EUR)[241]

EUR in millions	Difference to the baseline					
	PO1		PO2		PO3	
	One Off	Recurring	One Off	Recurring	One Off	Recurring
Costs and benefits						
Member States						
Adjustment costs	€0.00	€821.09	€0.00	€821.09	€0.00	€860.78
Administrative costs	€0.00	€5.62	€0.00	€8.92	€0.00	€8.92
Administrative savings	€0.00	€1,300.00	€0.00	€1,300.00	€0.00	€1,300.00
EU Commission						
Administrative costs	€0.80	€0.13	€0.41	€0.18	€0.41	€0.19
Citizens						
Adjustment costs	€0.00	€1,442.47	€0.00	€1,442.47	€0.00	€4,337.96
Administrative costs	€0.00	€0.00	€0.00	€0.00	€0.00	€0.00
Businesses						
Adjustment costs*	€0.00	€3,782.05	€0.00	€3,782.05	€0.00	€27,498.35
Administrative costs	€0.00	€0.70	€0.12	€1.16	€0.12	€5.76
Administrative savings	€240.00	€0.00	€240.00	€0.00	€240.00	€0.00
Increase in GVA/VA	€0.00	€10,386.92	€0.00	€10,386.92	€0.00	€18,299.67
Other benefits						
GHG emission reduction savings	€0.00	€3.058,23	€0.00	€3.058,23	€0.00	€4.865,13
Increase in jobs (not monetised)		143.852		148.352		€270.629
Total costs	€0.80	€6,052.06	€0.53	€6,055.88	€0.53	€32,711.96
Total benefits	€240.00	€14,745.15	€240.00	€14,745.15	€240.00	€24,464.80
Net benefits	**€239.20**	**€8,693.08**	**€239.47**	**€8,689.27**	**€239.47**	**-€8,247.16**

[241] Explanations and the breakdown of the calculations are detailed Annex 4.

[A quantification of benefits derived from Made in EU provisions for solar and batteries sectors was not possible. Moreover, adjustment costs on foreign direct investment conditionalities were not possible either. Therefore, a comparison of costs and benefits is only partially reflected. LEAD_EII costs/benefits are reflected for 2030 compared to baseline year.*

*** PO1 and PO2 only reflect impacts on the shares of the market covered by public procurement in construction (LEAD_EII_1 and 2, in the absence of data of public schemes.]*

SO1: PO2 would be more efficient than PO1 as it would start by developing a label for one EII industry first, steel. Compared to other EIIs, steel is a relatively homogenous product, meaning the administrative costs of establishing an accounting methodology and ensure its implementation would be simpler, meeting the objective of supporting lead market policies faster, via a less burdensome process. Furthermore, by reusing most of the information that are collected through the EU ETS and CBAM, it would alleviate the administrative burden of reporting for both companies and authorities. Key differences between the individual options to design a low-carbon product steel label are presented in Annex 12.

SO2: PO3 has been assessed as more costly to society at large (including Member States and European consumers) than PO1 and PO2 to meet the objectives of creating lead markets for EIIs. Costs under PO3 remain larger than PO1 and PO2 (which are similar) in particular in relation to the ambitious Made in EU provisions for steel, cement and aluminium and their impacts on downstream sectors. Based on policy and regulatory developments, such as the newly proposed trade measure for the EU steel sector, the level of ambition of the Made in EU provisions could be adjusted to fit new market realities. Conversely, it is not possible to fully quantify the positive externalities associated with long-term economic security benefits linked to the promotion of resilient European supply chains in strategic EII industries introduced in PO2 and PO3, notably in relation to external shocks. Overall, PO1 and PO2 result in similar net benefits. Some of the costs may also be underestimated under PO2, as the modelling assumptions do not reflect potential changes in trade flows deriving from the Made in EU requirements, given the assumed constant supply chain structure for the automotive and construction sectors (in absence of low-carbon supply chains). It is possible to consider that supply chain dynamics would result in downstream sectors preferring to source outside of the EU while shifting to low-carbon alternatives. However, PO2 introduces a stronger positive externality of economic security mentioned before. Such benefits include, but are not limited, to job creation/retentions and more economic and social stability overall. Moreover, no quantification was possible on the benefits from Made in EU considerations for solar and battery manufacturing supply chains. Therefore, a full comparison between costs and benefits between the different POs and sectors included is not possible for all measures. In addition, PO2 will reduce the risks of supply chain disruptions and exposure to high-risk dependencies, or of third countries restricting imports of critical materials, leading to a more predictable and stable economic and social environment. While these effects cannot be reliably quantified, they constitute a real and material benefit of policy intervention.

Predictability, access to inputs and strong supply chains are essential for the well-functioning and competitiveness of EU's manufacturing industry. PO3 affects the entirety of the automotive and construction sectors both in terms of low-carbon and Made in EU requirements. The cumulative impacts of these measures will make PO3 more costly, with additional challenges on how to pass on these extra costs for downstream sectors. Similarly, for EIIs, solar, batteries, and vehicle components, PO2 leads to fewer costs for the downstream industry than PO3 and therefore impacts less on final consumers or public authorities. PO1, on the other hand, would have the least adjustment and administrative costs. Benefits increase as the level of ambition increases in the policy options.

SO3: PO1 is expected to cost less than a mandatory approach (PO2), due to lower administrative burden, as some Member States might decide not to adopt the guidance on conditionalities. At the same time, gains (spillovers) are limited and uneven, leading to a low benefit-to-cost ratio overall. However, PO2 will have more impact in addressing the prevailing issues, as Member States will be required to enforce mandatory provisions more strictly, leading to higher market harmonisation. Accordingly, PO2 is expected to be more efficient in the medium- to long-term as systemic spillovers materialise, boosting resilience, innovation, and security of supply.

SO4: PO3 combines the previous permitting provisions introduced under PO1 and PO2, adding benefits for industrial clusters. However, the benefits from industrial clusters can only materialise if a prior mapping and designation of a geographical area by the Member State (with an additional mobilisation of resources) has taken place. All POs will lead to efficiency gains from the one project, one digital process measure, present under each option. Digital improvements paired with data interoperability will increase data re-use for other reporting or permitting activities and potentially reduce unnecessary duplications in the permit granting process. PO2 would capitalise as much as possible on the existing NZIA provisions to meet the objective of facilitating permitting processes to accelerate the decarbonisation of manufacturing industries in Europe with special focus on EIIs.

SO5: PO1 would minimise administrative burden, as it merely recommends using defined criteria for public support, leaving their application to Member States' discretion. PO2 would require Member States to use these criteria to identify synergies with existing and future public funding opportunities, to facilitate access to funding for industrial projects in industrial areas. While this approach may entail higher administrative costs, it offers greater benefits by accelerating decarbonisation in targeted industries.

Impact on various stakeholders depending on the Policy Options:

Downstream sector - Automotive:

Cumulative adjustment costs from LEAD market measures (LEAD_EII 2, LEAD_VC 1, LEAD_BAT 1) increase with each Policy Option, and are estimated at EUR 4.4 billion in PO1, EUR 4.4 billion in PO2, and EUR 14 billion in PO3, with most costs passed on to Member States and citizens as final consumers. The largest cost increases will affect the price of EVs, as per the "Cost increase per type of vehicle" table in Annex 4, Section 2.2 - which are often subsidized. However, subsidies limited to EU-made vehicles and reduced access for non-EU manufacturers to procurement and support schemes can improve EU competitiveness and keep consumer price impacts manageable.

Furthermore, EU-made EVs are expected to increase their market share, generating about EUR 1.9 billion in additional value added in PO1 & 2, and EUR 2.25 in PO3 due to domestic content requirements for vehicle components, aiding the competitiveness of the sector and the green transition. Administrative costs remain low at about EUR 1 176 per company per year, and since most OEMs are large firms, the burden on SMEs is minimal.

Downstream sector - Construction:

Cumulative LEAD_EII costs also increase with each Policy Option and are estimated at EUR 691 million in PO1 and PO2, and EUR 16 billion in PO3. While the exact building price impact cannot be calculated, Member States and citizens are expected to absorb the costs, with building prices projected to rise about 0.45% from low-carbon provisions under PO2. Administrative costs are minimal at about EUR 882 per large and medium company per year.

Downstream sector – Electricity utilities:

The electricity utilities sector is anticipated to experience rising costs for solar PVs and BESS storage due to lead market provisions, as detailed in Annex 4, Section 2.2, on the cumulative costs of the electricity sector. However, these costs are expected to have minimal impacts on electricity prices, as detailed in Section 6.1.1.

Member States:

Public administrations are expected to incur EUR 2.43 billion in additional administrative and adjustment costs in PO1, EUR 2.44 billion in PO2 and EUR 2.48 billion in PO3. However, permitting savings of EUR 1.3 billion reduce net costs to EUR 1.14 billion in PO1, EUR 1.14 billion in PO2 and EUR 1.18 billion in PO3, as per Annex 4, Section 2.2. With subsidy budgets freed up, these increases are considered manageable for national and local authorities.

Citizens:

Citizens will face higher vehicle and construction prices as shown in Annex 4, Section 2.2, though vehicle cost increases may be partly offset as explained in the automotive section.

7.3 Coherence

In terms of overall coherence, the options are all seeking to reinforce the EU's ability to meet the Clean Industrial Deal's objectives. Moreover, in terms of internal coherence, the options are built in a way that actions introduced to meet one specific objective, should not come at the expense of another specific objective.

SO1: PO2 would be the most coherent with existing policies and strategies, such as the Steel and Metals Action Plan, as well as the Clean Industrial Deal which calls for an accelerated procedure to create a voluntary label for low-carbon steel. Coherence with other existing regulatory frameworks, namely ESPR is guaranteed by the complementarity by design of the two initiatives, with a logic of building blocks. Once the steel label under IAA is stabilised, it would be possible to complement it through the ESPR approach and enlarge the scope of products and emissions covered. Both will also benefit from the ongoing streamlining exercise on carbon accounting methodologies.

SO2: All POs would meet the objectives without unduly undermining the EU renewable energy target, even if PO3 could have the greatest impact, as public intervention may not be in a position to smoothen the short-term impacts. Regarding EU requirements for batteries and solar PV, the gap analysis of this assessment demonstrates that the existing EU provisions under NZIA will not likely be sufficient to achieve the objective of creating European lead markets for clean technologies. Additional EU requirements, designed to complement or amend as relevant existing NZIA provisions, can better contribute to creating those European lead markets that in turn support the EU's economic security of battery, solar technologies and automotive components. PO2 is coherent with the objectives set down in the Industrial Action Plan for the European Automotive Sector with respect to batteries and components. Similarly, for EIIs, the lead market measures would complement existing product policies, providing a targeted further demand-side incentive to decarbonise these industries, in line with buildings' legislation notably. For steel in particular however, the new legislative instrument to address global steel overcapacities, points, if adopted by co-legislators, to a possible risk of incoherence, with the blanket measures on Made in EU provisions for public support. Exemptions to WTO principles and FTAs should be invoked to justify the introduction of Made in EU requirements in public procurement and support schemes, which might be more difficult to justify if applied to all products (e.g. batteries, solar PV systems, vehicle components and steel/aluminium/cement in automotive and construction) put on the EU market (PO3) or without considerations for environmental performance.

SO3: On conditionalities for FDI**,** voluntary measures (PO1) have fewer interlinkages with existing frameworks and could be interpreted in addition to prevailing legislation. It would be coherent with historic EU openness to FDI but in current times, but it would undermine coherence of the Single Market, leading to fragmentation: divergent application between Member States can create distortions and unequal benefits. Introducing mandatory conditionalities (PO2) to further harmonise the Single Market would be complementary to the existing FDI legal framework as it would focus on specific strategic industries only (e.g. batteries and possibly certain EIIs) and would be based on thresholds on the investment value, to limit the risk of overlaps. Mandatory requirements would be fully coherent with the European Economic Security Strategy[242]: proactively strengthening Europe's competitiveness, resilience and technological leadership, while protection is strengthened against risks. Finally, conditioning FDI in the manufacturing sector would risk going against the investment liberalisation commitments on market access and national treatment the EU has undertaken under some of its FTAs and relevant FTA partners would thus need to be exempted from investment conditions in these areas to maintain coherence.

SO4: All options would include a measure targeting permitting for all manufacturing industries based on digitalisation of a unified permitting process, while building on sector specific legislation, including the upcoming Environmental permitting initiative (Environmental Omnibus) which will focus on environmental assessment specific items. For instance, PO2 complements the NZIA permitting provisions for EIIs and ensures a consistent approach in this regard by providing a level playing field. Moreover, the overall level of coherence with environmental legislation in PO2 and PO3 will be affected by any possible legislation on environmental simplification (omnibus), currently under preparation, which may require adjustments to the specific measures under the preferred PO presented in this impact assessment. PO3 could also partially overlap with the upcoming grid energy package, which aims at addressing grid infrastructure bottlenecks Finally, coherence will need to be ensured with the permitting reflections under preparation as part of the Environment omnibus, which are however not subject to an impact assessment.

SO5: Projects in industrial areas could tap into existing priority projects or areas under other EU legislation, such as the CRMA and the NZIA. However, care will be required to address the risk of confusion in the multiplication of labelling and in managing expectations by promotors on the benefits of being identified as priority projects.

7.4 Proportionality/Subsidiarity

Regarding the proportionality of the measures to achieve the objectives of the initiative, the three POs follow a logic of increased level of intervention.

PO1 establishes minimum provisions for market intervention (SO2, SO4), often relying on voluntary aspects of the measures for Member States (SO3, SO5).

[242] European Commission (2023). Joint Communication to the European Parliament, the European Council and the Council on "European Economic Security Strategy", JOIN(2023) 20 Final.

PO2 introduces a medium level of intervention, which increases the obligations on Member States and market operators. SO2 introduces made in EU requirements for low-carbon steel, aluminium and cement used in the construction and transport sector in public procurement and public support schemes, which are proportionate to the expected level of low-carbon capacities, based on current investment project pipelines. While the requirements are mandatory, they cover only a partial share of sourcing low-carbon materials and are gradually introduced only for products to be purchased thanks to public financing. This provides member States and business with some flexibility and adjustment time, to allow production ramp up and, ultimately, lowering the green premium. It also ensures that public money is spent to support the objective of EU industrial resilience and decarbonisation. PO2 corresponds to the most proportionate approach, considering market realities and calibrated against the sectors' ability to fully scale up production for low-carbon steel, cement and aluminium, as well as domestic clean tech.

PO3 establishes the highest level of intervention in the market, increasing the obligation not only on the Member States but also more substantially on market operators, especially downstream sectors that will have to comply with the mandatory minimum Made in EU requirements. Regarding SO4, requirements on permitting in PO2 and PO3 increasingly impose further obligations on Member States to streamline processes and time management. At the same time, they would both provide further discretion to Member States regarding permit-granting and the application of environmental legislation, which would make the options overall proportionate to the objectives.

Table 4: Summary comparison of the options

<table>
<tr><th>Impacts</th><th>PO1</th><th>PO2</th><th>PO3</th></tr>
<tr><td>Effectiveness</td><td>+</td><td>++</td><td>++</td></tr>
<tr><td>SO1</td><td>++</td><td colspan="2">+</td></tr>
<tr><td>SO2</td><td>+</td><td>+++</td><td>++</td></tr>
<tr><td>SO3</td><td>+</td><td colspan="2">+++</td></tr>
<tr><td>SO4</td><td>+</td><td>++</td><td>+++</td></tr>
<tr><td>SO5</td><td>+</td><td colspan="2">++</td></tr>
<tr><td>Efficiency</td><td>++</td><td>+++</td><td>+</td></tr>
<tr><td>SO1</td><td>+</td><td colspan="2">++</td></tr>
<tr><td>SO2</td><td>+++</td><td>+++</td><td>-</td></tr>
<tr><td>SO3</td><td>+</td><td colspan="2">++</td></tr>
<tr><td>SO4</td><td>++</td><td>+++</td><td>++</td></tr>
<tr><td>SO5</td><td>+</td><td colspan="2">++</td></tr>
<tr><td>Coherence</td><td>++</td><td>+++</td><td>++</td></tr>
<tr><td>SO1</td><td>++</td><td colspan="2">+++</td></tr>
<tr><td>SO2</td><td>+++</td><td>++</td><td>+</td></tr>
<tr><td>SO3</td><td>+</td><td colspan="2">++</td></tr>
<tr><td>SO4</td><td>+</td><td>++</td><td>++</td></tr>
<tr><td>SO5</td><td>+</td><td colspan="2">+++</td></tr>
<tr><td>Subsidiarity and proportionality</td><td>++</td><td>+++</td><td>++</td></tr>
<tr><td>SO1</td><td>++</td><td colspan="2">+++</td></tr>
<tr><td>SO2</td><td>++</td><td>+++</td><td>+</td></tr>
<tr><td>SO3</td><td>+</td><td colspan="2">++</td></tr>
<tr><td>SO4</td><td>+</td><td>++</td><td>++</td></tr>
<tr><td>SO5</td><td>++</td><td colspan="2">++</td></tr>
<tr><td>Summary comparison of options[243]</td><td>+</td><td>+++</td><td>++</td></tr>
</table>

[243] Increase sustainable and resilient industrial production in the industrial manufacturing with a special attention on EII sectors in the EU by supporting decarbonisation investments.

8 Preferred option

Following the analysis of the impacts of each PO, as well as their ability to meet the general and specific objectives in the most effective and efficient manner while respecting proportionality, coherence and subsidiarity, this impact assessment considers that PO2 would be the preferred option. In that balance, PO2 would facilitate business and trigger investment decisions in the EU by streamlining permit procedures for the entire manufacturing sector, boosting demand for decarbonised materials and clean tech products in strategic value chains, and ensure an investment framework that protects against unfair global competition and support value-added creation in the EU. PO1 and PO3 present a similar impact in terms of proportionality/subsidiarity, however PO2 stands out with a more positive impact in terms of proportionality when introducing Made in EU in policy measures for public procurement and public support only. Regarding coherence, PO2 again presents a bigger positive impact, followed by PO3 and PO1. For SO2 however, coherence with the latest legislative proposals as well as with the EU's international commitments would be better ensured by a combination of PO1 and PO2, potentially associating made in EU requirements for relevant EIIs with low-carbon ones.

PO2 offers a good balance between effectiveness and efficiency. Although it demands resources from Member States and affects downstream sectors, it remains efficient for addressing the problem drivers, in particular when taking account of economic security considerations. PO3 would be more effective in achieving the objectives, but its possible efficiency is hampered by potential impacts on downstream sectors and consumers, and by the challenge in quantifying the positive externalities associated with supply security.

While PO2 results in similar net benefits as PO1, PO2 will provide further long term benefits, increasing the EU economic security and resilience as the Union advances in its transition towards climate neutrality, notably of the energy intensive industries. These benefits are however difficult to quantify and thus are not reflected in the costs and benefits analysis under Section 7.2. Economic security translates, amongst others, into businesses and public authorities operating in a predictable economic environment, with reduced risks of supply chain shortages and disruptions, or of third countries restricting access to input materials for key strategic sectors. This would ultimately result in reduced economic and social instability. For citizens, this means stable access to resources, creation and retention of industry jobs, stable incomes, thereby contributing to social cohesion.

PO3 is assessed as more effective to meet the SO4 (permitting). However, it would require additional resources and support for the mapping and identification of cluster areas. These additional resources could be overshadowed by the positive gains (efficiency offered by the industrial clusters to attract new investments). PO3 also presents some overlaps with other environment or energy initiatives and as such PO2 may offer a slightly more balanced choice, with detailed specific measures to be considered at a later stage pending the environmental omnibus outcome.

8.1 REFIT (simplification and improved efficiency)

The preferred policy option will aim at simplifying conditions for manufacturing industry in general, and EIIs in particular, to decarbonise and operate in Europe whilst maintaining environmental protection through facilitation of permitting processes. This is particularly the case thanks to the proposed measure to speed-up and streamline permitting provisions for businesses investing in decarbonisation delivering a lower regulatory burden.

For the FDI conditionalities, the uniform application of the conditions across the EU would largely prevent forum shopping and race to the bottom in attracting investments, while harmonising and simplifying the business conditions.

The changes to existing legislation that this initiative would provide are limited to the NZIA and the measures are designed to consist in targeted amendments to existing provisions. This will reduce unnecessary regulatory costs and achieve a high degree of simplification in that a legally clear adjustment to reach the underlying policy objectives is made as early as possible, hence avoiding later changes and the related adjustment costs. Moreover, adjustments will be made as much as possible in line with the existing provisions of the NZIA, reducing unnecessary regulatory cost through relying on the existing basic concepts of NZIA.

8.1 Application of the 'one in, one out' approach

The initiative is in the scope of the "one in, one out" approach. The one–off administrative costs for businesses that would result directly with this initiative are limited and relate to:

- The one-off FDI notification cost would amount to EUR 117 600 annualised at EUR 0.01 million per year.

The recurring administrative costs for businesses that would result directly with this initiative are limited and relate to:

- Demonstrating compliance with low-carbon and EU requirements for relevant downstream sectors would amount to EUR 1.16 million recurring administrative costs.

The administrative cost savings for businesses that would result directly with this initiative relate to:

- Cost savings of EUR 240 million for all manufacturing industries in the EU for the digitalisation of 5 permit-granting procedures, annualised at EUR 28.14 million per year.

Overall, the initiative would result in EUR 26.97 million yearly administrative savings for businesses.

The initiative does not foresee any administrative cost applicable to citizens.

The adjustment costs that would result directly with this initiative amount to:

- EUR 3 782 million for businesses.
- EUR 1 442 million for citizens.

A more detailed elaboration (the specific split of FTEs by lead market provision) of all calculations in this Section can be found in Annex 4.

9 How will actual impacts be monitored and evaluated?

The Commission will carry out an evaluation of the effectiveness, efficiency, coherence, proportionality and subsidiarity of this legislative initiative and present a report on the main findings to the European Parliament, the Council, the European Economic and Social Committee, and the Committee of the Regions four to six years after the date of application of the legislative act.

This review mechanism is similar to the review mechanisms included in other Commission initiatives, such as the CRMA or the NZIA. The Commission and Member States will regularly monitor the application of the legal act, in particular the effectiveness of the measures to increase competitiveness and invest in decarbonisation by the European industry.

In addition, the success of the initiative would be measured in terms of increased competitiveness and resilience (which is not easily measurable by a single indicator but relevant aspects, such as the share of EU manufacturing industry in total EU gross value added can be used as proxies), or in terms of the scale (in terms of amount of financial value) and speed (in terms of permitting timelines) of decarbonisation investments by the EU industry. Concretely, the following indicators to determine the initiative's success could be developed as follows:

Table 5: Monitoring table of key performance indicators

Specific Objective	**Indicator measured every second year**	**Unit of measurement**	**Data source**	**Target**
General objective	Manufacturing industry as % of EU total GVA	%	Eurostat	20% by 2030 (Aspirational target)
General objective (decarbonisation)	Carbon emissions/tonnes of EU EII production	Tonnes CO_2eq / tonnes of production	Eurostat	Reduction in line with climate targets
General objective (resilience)	EII Production volumes trends (steel, cement and aluminium)	Output in each sector	JRC	Increase from 2025 values
General objective (resilience)	Value of EU domestic production /value of EU consumption of EII materials (steel, cement and aluminium)	%	Eurostat/ JRC	Increase by 2029
General objective (resilience)	Share of domestic production and/or capacities out of total EU demand in selected clean tech sectors (batteries, solar PV)	% Mtonnes or GW (as relevant)	Data providers for internal Commission analysis	Increased capacities as mentioned in Anne x 9
SO1	Availability of a low-carbon label for relevant products that is supported by a robust verification mechanism	Yes/no	European Commission	Label available by 2029
SO1	Number of companies who applied for the label	Number	Label certifier	11 (large) companies by site by 2030
SO2	Share of low-carbon steel and cement out of total sold on EU markets for automotive and construction	%	Stakeholder reporting	As mentioned in Table 3 in Section 5.2
SO2	Value of EU domestic production for selected vehicle components / value of EU consumption of selected vehicle components	%	JRC's internal methodology	Stable domestic demand while reducing the import from 3rd countries.
SO3	Inward FDI transactions of relevant sectors/businesses	Number	Eurostat and Orbis	Stable transactions as year of entry into force
SO3	Number of joint ventures on batteries	Number	Stakeholder survey	
SO4	Average permitting time	Months	Member States Survey	Total of 18 months
SO4	Share of digitalised permitting procedures out of all permitting procedures for industrial manufacturing	%	Single Digital Gateway	Aspirational target of 75% by 2030
SO5	Industrial FIDs realised in the EU for industrial	Number	Member States	

Specific Objective	Indicator measured every second year	Unit of measurement	Data source	Target
	manufacturing projects in relevant areas			

Annex 1: Procedural information

1. Lead DG, Decide Planning/CWP references

The Industrial Accelerator Act is part of the 2025 Commission Work Programme under the Commission's priority 'Simplifying rules and effective implementation'. The lead DG for this initiative is the DG for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW). The Directorate in charge is Directorate I – Decarbonisation, Mobility, Raw Materials. The initiative is encoded in Decide Planning with the reference PLAN/2024/2611.

2. Organisation and timing

The Secretariat-General set up the Inter-service Steering Group to assist in preparing the initiative in the first quarter of 2025. There have been three interservice steering group (ISSG) meetings (in March, May and August) and four rounds of written consultations. The last ISSG consultation meeting took place on 20 August 2025. Following the Board's negative opinion, a fifth round of written consultation on the revised text was held.

The Call for Evidence and Public Consultation for this initiative were published on 15 April and were open to feedback from all stakeholders for a period of twelve weeks, until 8 July. The timing for adoption of the new act by the Commission is the fourth quarter of 2025.

3. Consultation of the RSB

An upstream meeting with the Regulatory Scrutiny Board took place on 23 May 2025. A meeting with the Regulatory Scrutiny Board to discuss the draft impact assessment took place on 24 September 2025. The Board issued a negative opinion on 26 September 2025. The recommendations of the Board were addressed in the revised impact assessment as follows:

RSB recommendations:	How they were addressed:
(B) Summary of findings The Board notes the additional information provided in advance of the meeting and commitments to make changes to the report. However, the Board gives a negative opinion, because the report contains the following significant shortcomings:	
(1) The report does not sufficiently analyse how the problem would evolve over time and does not demonstrate to what extent this initiative is needed.	See below under C.1
(2) The report lacks an analysis of the market drivers and contribution of various drivers to the identified problems. An assessment of the availability of economically viable industrial decarbonisation technologies is missing.	See below under C.2
(3) The objectives are not defined in a S.M.A.R.T manner.	See below under C.3

RSB recommendations:	How they were addressed:
(4) The report does not provide a sufficient assessment of the impacts of the proposed measures, including on the resilience of the manufacturing industry in the EU and on the foreign direct investments. (5) The report lacks an analysis of the total costs, their pass through, and the impacts on downstream sectors.	See below under C.5 See below under C.6
(C) What to improve	
(1) A dynamic baseline regarding the decarbonisation and resilience of EU manufacturing industry, including energy intensive and clean tech, should be developed to make it clear how the problem would evolve without the proposed policy action.	The dynamic baseline has been improved in Section 5.1 showing that, without further action, EU industry would risk continuing existing trends, i.e. decarbonising more by reducing industrial production than by using more efficient technologies, which would decouple emissions from production. This is illustrated in Section 5.1, Figure 9, which shows past and future trends for iron and steel, while the analysis for other EIIs is presented in Annex 8. The magnitude of the slow decarbonisation problem is described under Driver 3, where the analysis shows that in the past six years many announced decarbonisation projects have been cancelled or remain stalled before final investment decision (See Figure 2, 3 and 4). Similarly, Sub-problem 3 describes to what extent the cost and availability of low-carbon industrial technologies, as well as other barriers (Driver 5 and 6) are important factors determining the slow decarbonisation pace.
As the EU Emissions Trading System is there to provide incentives to decarbonise and CBAM is intended to protect against carbon leakage and establish the level playing the report should better explain the magnitude of the slow decarbonisation problem and to what extent an 'acceleration' is needed to meet the EU's climate goals.	A more comprehensive description of the EU Emissions Trading System as well of the CBAM and its forthcoming review is included in the baseline description.
The report should identify the resulting decarbonisation speed gap as well as gaps related to the resilience of manufacturing industry in the EU that need to be addressed by the additional policy measures.	The decarbonisation speed gap is identified by looking at the causes of recent emissions trends (Figure 7, Section 2.3). They show that over the past six years the emissions reduction was mainly driven by changes in the production activity level, rather than in emission intensity. This is further elaborated in Annex 7. The resilience gap is described by the re-drafted Sub-problem 2, showing supply chain vulnerabilities (see number of cancellation or delay in

RSB recommendations:	How they were addressed:
	the EU of several battery and solar PV projects), as well as in the Section 2.3.
(2) The report needs to identify all the problem drivers and to further investigate the causal links and contribution to the identified problem. The report should analyse more in-depth the availability and economic viability of industrial decarbonisation technologies. A more detailed analysis is also needed regarding the demand for low-carbon alternatives including related price elasticities and substitutability. The problem driver related to permitting should be clarified regarding the specificities and differences compared with other sectors. The analysis of drivers related to foreign investments and difficulty to de-risk investments should be deepened and go beyond the regulatory and public funding aspects.	The correlation between the problems identified and their corresponding drivers have been modified to better reflect their connection to the limited business case for EU industry. Notably, how resilience plays a role in the competitiveness of European companies, with the introduction of a new Sub-problem 2 about 'Supply chain vulnerabilities in strategic sectors and the related causes explained in Drivers 3 and 4. Regarding the availability of industrial decarbonisation technologies and demand for low-carbon alternatives, the analysis has been deepened by showing the heterogeneity of these technologies and their economic viability depending on factors such as the technology readiness level, the energy and raw materials needs, the CO_2 abatement costs. This is illustrated under Sub-problem 3, as well as further in details in Annex 7, where an overview of the cost evolution of the main industrial decarbonisation pathways, as well as total investments needs, for aluminium, cement, chemicals, steel and pulp and paper is provided. Regarding the demand for low-carbon alternatives, Annex 10 (Sub-problem 1, Driver 2) now contains an overview of existing green public procurement practices to illustrate similar initiatives. No information regarding the price elasticity of demand for the relevant low-carbon products could be determined. Therefore, we have assumed full cost pass-on when analysing the impacts of the policy options to final consumers. The analysis for the problem drivers has been revised to reflect the Board's comments as follows: - Driver 4 on foreign investments has been improved by bringing in concrete evidence from current practices in Europe vis-à-vis other regions in the world, and data that reflects the technological knowledge gap for batteries, and the impacts this has on wider socioeconomic benefits. Further information has been added in the Annex 13.

RSB recommendations:	How they were addressed:
	- Driver 5 linked to permitting procedures has been improved by clarifying the complexities of permitting for industrial manufacturing vis-à-vis other sectors, especially with regards to their environmental impacts. - Driver 6 linked to investments has been widened to reflect larger struggles beyond public funding, to highlight other bottlenecks for projects to invest and take final investment decisions, such as access to energy infrastructure or other essential inputs, while taking account of other ongoing initiatives
(3) The report should establish how the success regarding the general objective will look like and how it will be assessed including the timeframe. Based on the improved analysis of problem drivers, the specific objectives should be revised to better reflect how they contribute to the general objective. The specific objectives should be formulated in S.M.A.R.T. terms to allow for an improved analysis of the impact of options and for monitoring the progress on attaining the objectives.	The general objective has been revised to ensure it can be measured. Specifically, it will be measured by monitoring the carbon intensity of EII production, as well as production capacities and output for the EU in EIIs, certain clean tech and vehicle components. The general objective will also be assessed in combination with indicators for the specific objectives. Specific objectives in Section 4 have been aligned to individual problem drivers, and reformulated and clearly linked to indicators that measure the extent to which success has been achieved. Those indicators are included in Section 9 as well. The specific objectives are now formulated in a more S.M.A.R.T manner, notably improved on the measurability.
(4) The measures considered should reflect the improved analysis of the problem and problem drivers. The selection of measures should be based on available evidence regarding the short and medium to long-term benefits of public intervention, in particular evidence how such interventions can cause the development of lead markets, including how CO_2 content requirements could affect demand patterns as well as innovation in the industry. The selection of measures should also better reflect related costs.	The policy measures are now better aligned to the revised analysis of sub-problem and drivers. The vulnerability of certain strategic sectors and their supply chains is now explained by two specific drivers: the fragmented EU approach to foreign investments, and the loss of competitiveness due to fierce global competition. While the intervention logic and structure of the different policy options have remained the same, the impact of the measures, including the level and duration of the targets for the lead markets provisions, has been revised reflecting additional evidence and improved quantification of impacts for each measure. The intention of a review clause has also been added, making it clear that such measures on lead markets could be of a temporary nature. The link between each measure and the estimated cost has been better presented and clarified throughout the text, as well as substantiated further with aggregated

RSB recommendations:	**How they were addressed:**
	costs for the policy measures at hand. Impacts are also aligned to their targets when relevant, notably the lead market measures.
(5) The analysis of the impacts of the proposed measures and combined impacts of options should be strengthened including by quantifying overall costs and benefits to the extent possible. The report should establish a single appraisal period on which basis all costs and benefits are calculated. When it comes to the benefits, the analysis should be reinforced based on quantitative modelling to demonstrate to what extent it can be expected that the initiative will address any identified gaps in terms of speed of decarbonisation and contribute to EU economic security. The results of modelling including the impact on capital costs (CAPEX), operational costs (OPEX) and international competitiveness should be subject to sensitivity analysis and robustness of the projection should be clearly acknowledged. The analysis of the expected impact on FDI should be improved based on quantitative modelling distinguishing more clearly between the expected impacts in the short versus the medium to long run, taking into account the interplay of various measures.	Individual costs and benefits for measures linked to every specific objective have been included under Annex 4, to reflect all calculations relevant for the final table on costs and benefits reflected in Section 7.2. The chosen appraisal period is the year 2030 for the quantitative aspects, even if impacts could be of a longer nature. When relevant, qualitative elements are added regarding the long-term perspective. The analysis of the impacts for the Made in EU provisions for Energy intensive industries has been strengthened with a revised modelling exercise, adjusted to the Made in EU targets described in the impact assessment. A more accurate representation of the impacts can be found in Sections 6.2 and 6.3, including comparison of impacts for the year 2030. On this last point, to facilitate comparisons, quantitative impacts (costs and benefits) have been presented for the year 2030, while adding qualitative impacts for the longer-term perspective. The limitations inherent to the modelling have been better outlined in Annex 4, which also includes a more thorough description of the broader analytical approach followed in the different parts of the impact assessment. Some expected benefits, notably in terms of greater EU economic security, cannot be quantified with the modelling tools available for this impact assessment. The foreign direct investment measures' analysis has been strengthened by a comparison with existing similar practices in other regions of the world, notably to address the possible impacts in terms of similar approaches that have been successfully implemented in major economies, demonstrating that such measures can enhance strategic value without deterring investment. See Annex 13.
(6) The calculations of costs and their pass through to downstream sectors including to businesses, consumers and public administration for each policy option needs to be strengthened based on the clarification of the scope of the envisaged measures (i.e. public support/procurement and specific downstream sectors rather than all products put on the European market) and transparent assumptions used for the calculations.	The calculations of costs for each policy option have been improved based upon available data, and the assumptions are more clearly and transparently reflected in Annex 4. The pass-through effects have been emphasized, following the assumption of full pass through to customers and public administrations, wherever relevant.

RSB recommendations:	How they were addressed:
In addition, it should be better explained how the possible inflationary effects were taken into account when considering the scope and parameters of the policy measures. The assessment of cost and benefits should allow to analyse and compare the effectiveness and efficiency of the options.	The inflationary effects were also briefly explained, notably when presenting where relevant impacts on final products' prices. The assessment of costs and benefits for each policy option was conducted for the year 2030, while the Efficiency Section 7.1 now has a summary of all costs and benefits of the longer-term perspective for the different policy options. Annex 4 has individual tables per type of cost or benefit, for all relevant SOs, with the calculations used to reach the final summary Table of Section 7.1.
(7) The simplification and burden reduction dimension of this initiative needs to be better analysed. The tables in annex 3 need to be revised to provide a clearer representation of the overall costs and benefits. The estimates of the administrative costs need to be revised to ensure a credible calculation of the net administrative burdens.	The administrative burden reduction was emphasised in the one-in one-out table in Annex 3, showing overall administrative savings for businesses, in particular from the permitting provisions. Overall administrative benefits derived from the digitalisation of permitting provisions has been adjusted, after reconsideration of the expected benefits from the Once Only Technical System for the permitting processes. Table I on the overview of benefits in Annex 3 was updated to reflect the appraisal period for 2030, where possible. Table II on the overview of costs was broken down by policy measure, and the quantification of costs was further expanded upon. The methodology Section of Annex 4 has been further developed, to transparently reflect the cost and benefit analysis of the different policy measures assessed. Annex 4 now includes all relevant assumptions and calculations necessary to understand the cost and benefit analysis. The one-in one-out table was significantly revamped, including the calculation on the net administrative burdens, by focusing more specifically on the expected impacts for the targeted stakeholder groups.

The revised impact assessment was resubmitted, and the Board issued a second opinion (positive with recommendations) on 20 November 2025. In its opinion, the Board made further recommendations for improvement that were addressed as follows:

RSB recommendations:	How they were addressed:
(B) Summary of findings The Board notes the improvements to the revised report responding to the Board's previous opinion.	

RSB recommendations:	How they were addressed:
However, the report still contains significant shortcomings. The Board gives a positive opinion with reservations because it expects the lead Service to rectify the following aspects: (1) The report does not sufficiently assess the expected impacts regarding the general objective to increase decarbonised and resilient industrial production in EIIs. The interplay with economic security implications is not sufficiently analysed. (2) The report is not clear to what extent the demand side measures are expected to address the consequences of identified problems. (3) The limitations related to the modelling are not sufficiently reflected; cost benefit calculations as well as impacts on consumers and the downstream sectors are not sufficiently robust.	 See below under C.1 and C.2 See below under C.1 See below under C.3 and C.6
(C) What to improve (1) The report should model how the demand for EU low-carbon products and clean tech industries is expected to increase thanks to the initiative and how the increased demand will enable investments in the sectors covered by the scope of the initiative. In addition, the expected investment increase should be put into perspective with the investments needed to reach the decarbonisation goals.	 The analysis has been strengthened by better explaining in Section 7, under the comparison of options, that made in EU and low-carbon requirements will create a pull effect in the market by guaranteeing that a larger share of European demand is met by EU and low-carbon industrial products and technologies. While a new quantitative analysis was not possible due to the modelling limitation, additional explanations on how the increased demand will help absorb some of the investments costs from the low-carbon technologies has been added under Section 7.1 on Effectiveness. Concerning the link between the expected investment increase and the overall investments needs to reach the decarbonisation goals, a new quantitative analysis has been conducted in the impacts Section (under PO1 and PO2, 'Impact on companies'), which outlines the potential impact of the initiative on reducing the decarbonisation investment gap in the steel sector. The lead market measures on low-carbon steel could accelerate final investment decisions, unlocking up to EUR 15.5 billion in investments (or about 15% of the sector's estimated investment need by 2040)
(2) The report should demonstrate how the industries in the scope of the initiative are expected to evolve when the initiative will be implemented, in particular in terms of the size of the sector (production capacities and output) and the share of the EU demand covered by EU production. The report should provide a more detailed analysis of economic security implications.	The evolution of the industries in scope has been further described in Section 2.1, 2.3, and Sections 6 and 7. Specifically for batteries and solar PV, new data have been highlighted on how EU production capacities are expected to ramp up, based on existing projects pipelines. This can be found in Section 6, under impact on companies. Regarding economic security, for each policy option, the competitiveness analysis now includes explicit economic security effects. However, the quantified cost–benefit analysis

RSB recommendations:	How they were addressed:
	does not capture a central dimension of the problem, namely the reduction in the risk of supply disruptions and exposure to high-risk dependencies. These effects constitute a real and material benefit of policy intervention but cannot be reliably quantified for any of the policy options. As a result, interpreting the numerical comparison of costs and benefits in isolation could be misleading. Section 7 therefore clarifies that, while PO1 appears less costly in purely quantified terms, this assessment excludes long-term economic-security benefits that are intrinsic to the policy objective. By contrast, PO2 delivers a clear increase in economic security by strengthening EU industrial capacity and reduce strategic dependencies.
(3) The costs and benefits should be, to the extent possible, monetised, discounted and aggregated for each of the options for the whole appraisal period, which should be clearly established. In case a phased approach is envisaged, it should be captured by the modelling. The assessment of costs and benefits should allow to analyse and compare the effectiveness and efficiency of the options. The report should provide a clear distributional analysis, i.e. a distribution of the aggregated costs and benefits to the main groups of stakeholders.	The costs and benefits have been updated and aggregated in the overview table present at the end of Annex 4, as well as in Section 7.2. A new zoom-in box has been added to Section 7.2, showing the aggregated costs and benefits for the main stakeholders' groups (including downstream sectors, citizens and Member States). This can also be found in detail in Annex 4. It was not possible to calculate the yearly costs for each policy option, therefore the analysis for the year 2030 was maintained.
(4) The newly added summary of estimated costs and benefits in 2030 (Table 4) provides for an important difference in net benefits of the preferred policy option 2 (negative net benefit) and policy option 1 (positive net benefit). The report should justify why a less efficient option has been selected as the preferred one; this should be reflected also in the executive summary. The analysis should also build on an improved analysis of proportionality, in particular related to the scope of low-carbon content (all products placed on the market vs. products purchased thanks to public financing).	Following an adjustment to the policy option design, the overall costs and benefits result in similar net benefits between PO1 and PO2. These result from lowering the Made in EU targets, to align them with the low-carbon targets. In the absence of established low-carbon supply chains for cement, steel and aluminium, the analysis is based on the traditional supply chains for these materials, where today domestic EU materials producers are able to meet high shares of the demand for materials by the European automotive and construction sector. As a result, no increase in costs from Made in EU can be incorporated to PO2. The justification for selecting an equally efficient option has been added in Section 8, where the reasons for the preferred Policy Option have been further expanded upon, showing how the long-term economic security benefits will mitigate the initial negative net benefit for 2030. This is also further reflected in Section 7.2, under Efficiency considerations. This is now reflected in the executive summary as well. Additionally, the breakdown of costs associated with low-carbon content requirements, divided by public procurement, support schemes, and products placed on the market, is detailed in Annex 4, Section 2.2. This provides a better reflection of the impacts of each

RSB recommendations:	How they were addressed:
	policy option as the requirements extend to a larger share of the market. The proportionality analysis has been improved under Section 7.4 explaining that starting with low-carbon requirements for all products placed on the market could have substantial impact on downstream sectors, with risks of imposing high costs or incentivising material substitution. Therefore, a more gradual option could be considered for the legal drafting, where the low-carbon requirements could initially be introduced on a reduced application scope.
(5) The incoherence of the adjustment costs for business, as reported in the new summary Table 4 on the one hand, and in the one-in one-out section of the main report and in annex 4 on the other hand needs to be resolved.	This incoherence has been addressed in the main text, as well as in Annex 3 and 4, where the data was aligned.
(6) Both in the main text and the annexes, the limitations related to the modelling and the calculations as well as their robustness should be better reflected including in the comparison of options. Where significant uncertainties regarding key estimates are identified the report should provide a corresponding sensitivity analysis. In case a quantification and monetisation of benefits is not possible the report should provide a substantiated estimate to present the order of magnitude of expected benefits.	The main text in the relevant impact sections and Annex 4 is now nuanced with the characteristics of the modelling exercises, and how the results should be framed. Further limitations on the calculations are outlined as well in the relevant impact sections and Annex 4, such is the case for digitalisation of permitting, where in the absence of permitting-specific analysis, certain assumptions need to be drawn to provide estimations for the benefits. A new Annex 15 has been developed. It introduces potential ranges of cost impacts, where uncertainties over the price differentials could influence the choice of Policy Options. It presents a sensitivity analysis for some key parameters in the lead market measures: • Low-carbon measures for EIIs provide cost ranges, considering the uncertainty related to definitions of low-carbon, prices for decarbonised energy, decarbonisation costs and other variables. Due to these uncertainties, the low-carbon steel target would trigger a price increase ranging from 0.075% to 0.175% in the final price of the vehicle. The combination of low-carbon steel and cement would be projected to increase between 0.08% to 0.45% the final prices of construction projects. • Batteries provides variables when manufactured in the EU with a cost differential ranging from a 26% to 50% increase. • Solar presents a more conservative estimate of a low deployment scenario in 2030. • Vehicle components present a sensitivity analysis on the set of elasticity parameters governing consumer behaviour.

RSB recommendations:	How they were addressed:
	Additionally, some of the benefits present a wider range of potential scenarios: Environmental benefits also present the low (60 EUR tCO_2eq) to high (EUR 189 per tCO_2eq) value used for 2030 to give an estimation of the monetisation range. Administrative savings also present a more conservative estimate, with the assumption that only a third of the manufacturing industries can carry out their transformation process by 2030 (and therefore undergo a new permitting process). Elements of the sensitivity analysis have been cross-referenced in the main report under Section 6.
(7) The report should provide an analysis of the cumulative effects of costs increases (low-carbon, EU-made, energy, etc.) on consumers and downstream sectors and their competitiveness. It should also better analyse the potential impact that this can have for the energy transition in the EU as well as the impacts on the affordability of energy.	The cumulative effects of the cost increases were further shown in Annex 4 and Section 7.2, where the competitiveness of the downstream sectors was addressed. Furthermore, the potential implications of the proposed policy instruments on the energy transition, as well as the affordability of energy, have been addressed in Section 6.1.1.
(8) Regarding permitting for EIIs coherence shall be assured with other measures and initiatives on permitting. The impact on costs for administrations through the digitalisation of permitting should be better substantiated.	Coherence with the Environmental Omnibus initiative on permitting is highlighted in the baseline, as well as in Section 7 for coherence. Moreover, estimates on the costs of digitalisation, even if outweighed by the benefits, are outlined in Section 6.1. Substantiated ranges are presented per procedure, depending on the type of processes at hand. A revised estimate of cost savings for administrations is presented, with the limitations that these figures entail, notably that they are extracted from assessments on different types of business processes, not necessarily linked to permitting.
(9) Regarding the FDI conditionalities (measure INV 2) the report should specify what methodology, and criteria will be used for including strategic technologies or EIIs into the scope of mandatory FDI conditionalities. In addition, the report should provide more detail on the related safeguards, including how proportionality of the conditionalities will be ensured and how the speed of phasing in the conditionalities will be determined.	This has been addressed in Annex 9 'Overview of policy measures', under SO3, INV 2 measure, by explaining that the Commission's critical technology assessment methodology will be applied to identify the sectors in scope, that a coherent, uniform and proportionate set of conditions will apply to inbound investors in these designated sectors, and that the degree of obligation differs between strategic reinforcement technologies on the one hand and other emerging key strategic technologies on the other hand.
(10) The report (as well as SME Check) should further clarify mitigation measures, in particular on micro and small enterprises in the construction sector.	The mitigation measures for SMEs, in particular the reduction of the administrative burden for those operating in the construction sector, have been addressed in Annex 6, the SME Check, as well as cross-referenced in Section 6 of the report.

4. Evidence, sources and quality

Evidence and data that were used in this Impact Assessment included:

a. Academic studies and literature on challenges faced by EIIs and clean technologies and possible policy measures, as well as existing position papers and other documents drawn up by relevant stakeholders.
b. Newspaper articles and press materials. The references are cited in the main text of the report as appropriate.
c. Internal studies and modelling exercises of Commission services, and notably of the JRC.

The Impact Assessment further relies on the information received from consultation activities as detailed in the synopsis report contained in Annex 2 of this Impact Assessment.

Annex 2: Stakeholder consultation (Synopsis report)

In the context of the Impact Assessment on the Industrial Accelerator Act, several consultation activities were conducted between April and July 2025. The purpose of the consultations was to collect evidence and views from a broad range of stakeholders, giving them an opportunity to provide relevant data and information on the problems and potential solutions in support of the decarbonation and competitiveness of industry, with a clear focus on energy intensive and clean tech industries. This Annex presents the results of the consultation activities carried out. The consultation activities included:

- A Call for Evidence, published for feedback from 15 April 2025 to 08 July 2025
- A public consultation published in the "Have your say" portal, open to the public, containing multiple choice and open questions, running in parallel with the Call for Evidence.
- A targeted consultation published in the "Have your say" portal, open for associations and companies from the energy intensive sectors
- A reality check workshop, open only to companies from energy intensive sectors, including the possibility to submit position papers afterwards
- A reality check workshop, open only to steel companies, on EU low-carbon product label for steel, including a survey and the possibility to submit position papers afterwards
- A reality check workshop, open only to Member States, including the possibility to submit position papers afterwards.
- A targeted consultation following the Automotive Action Plan to gather insights from the battery ecosystem and downstream sectors on the potential impact of EU content requirements for batteries.

1. Overview of the participants

For all stakeholder activities, the main stakeholder groups addressed were:

- National authorities of the Member States responsible for industrial policy, permitting procedures and public procurement
- Non-Governmental Organisations representing civil society
- Associations representing industry, businesses and professionals
- Businesses, including SMEs
- EU citizens
- Think-tanks
- Other

The public consultation received 314 answers. The responses came mainly from business associations (n=129, 41%), followed by companies (n=120, 38%), non-governmental organisations, EU citizens, public authorities (n=11, 3%), trade unions, academic institutions, environmental organisations and other stakeholders (n=15, 5%). 133 stakeholders attached a policy paper to their answers. Most respondents came from Belgium (29%, n=91), followed by Germany (13%, n=42), France (10%, n=32), Spain (6%, n=20), Netherlands (6%, n=18), Italy (5%, n=17), and Finland (4%, n=13), with responses from other Member States as well as non-Member States.

Significant participation came from industrial respondents (n=249, 79%), broken down into the following sectors: chemicals (n=24, 7.6%), steel (n=21, 6.7%), fuels (n=16, 5.1%), metals and mining (n=11, 3.5%) , cement (n=8, 2.5%), fertilizers and agriculture (n=8, 2.5%), aluminium (n=5, 1.6%), pulp & paper (n=5, 1.6%), ceramics (n=4, 1.3%), glass (n=6, 1.9%)

and lime sector (n=1, 0.3%), as well as downstream sectors such as energy (n=57, 18.1%) - including electricity (21 answers), clean tech (n=15), gas & oil (n=7), hydrogen (n=5), heat (n=4), solar (n=2), wind (n=2) and geothermal (n=1) -, waste management and recycling (n=11, 3.5%), construction (n=8, 2.5%), automotive (n=5, 1.6%), batteries and storage (n=4, 1.3%), and other (n=55, 17.5%).

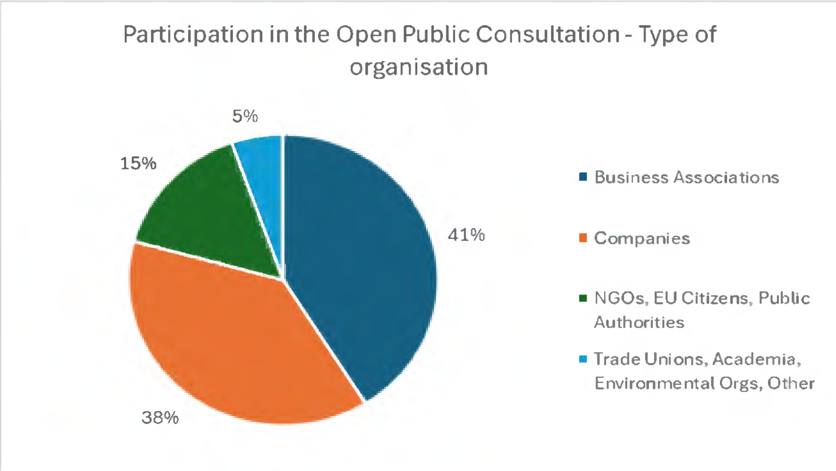

Figure 7: participation in the open public consultation by type of organisation

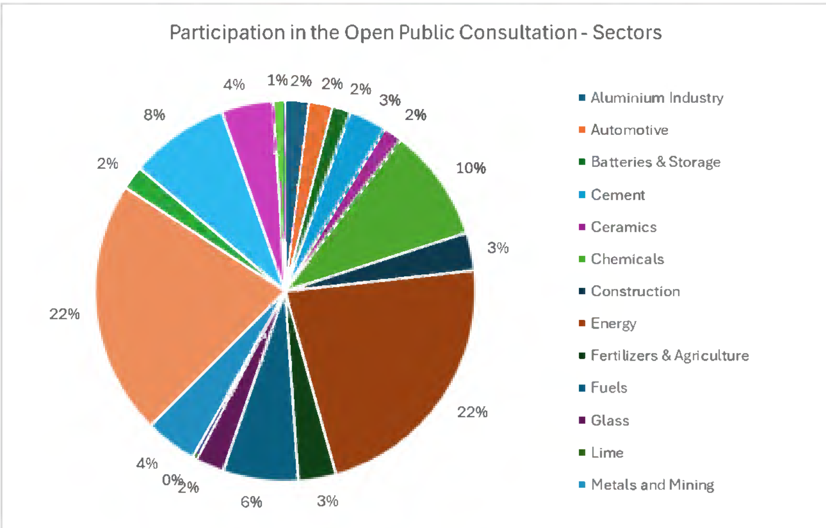

Figure 8: participation in the OPC by sector

For the targeted consultation, 62 answers were received, mainly coming from business associations/companies/business organisations (49 responses; 79%), followed by non-governmental organisations (8 responses; 13%), and other stakeholders (5 responses; 8%). Only 4 out of 62 responses (6%) came from SMEs. Among these, 2 respondents were from the cement industry, 1 from the steel sector, and 1 from the construction industry. 23 stakeholders submitted a policy paper following the targeted consultation, including the workshops. Replies came from various sectors, with the iron and steel sector contributing the most responses (17 replies, 34%), followed by cement (6 replies, 12%), non-ferrous metals (5 replies, 8%), glass and chemicals (4 replies each, 6%), and ceramics (3 replies, 5%). Only 1 reply (2%) was received from the pulp and paper sector. An additional 9 respondents (18%) selected "other".

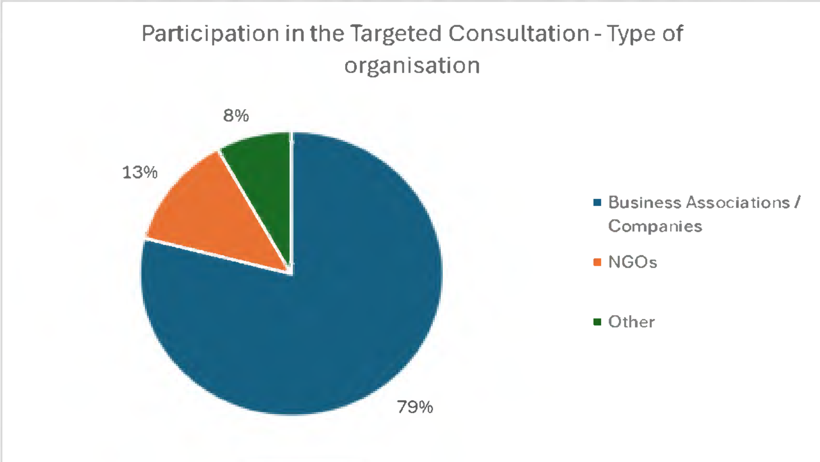

Figure 9: participation in the TC by type of organisation

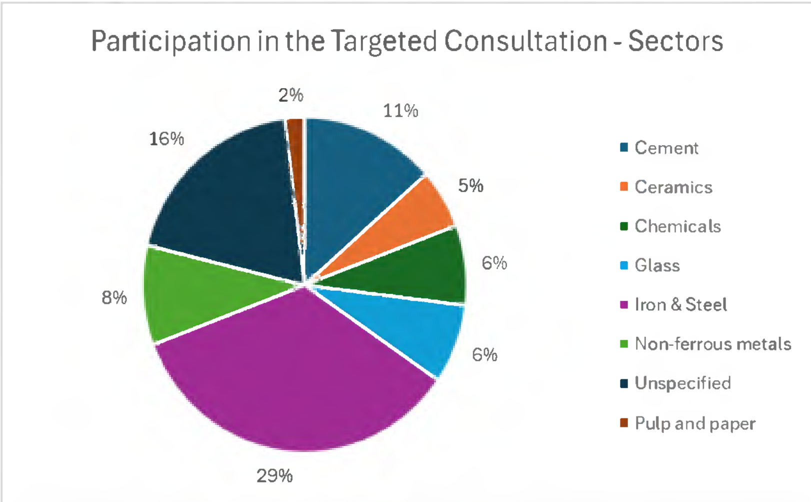

Figure 10: participation in the TC by sector

The reality check with energy intensive companies gathered around 40 participants, from 27 companies across sectors such as steel, chemicals, cement, glass, refining, aluminium, fertilizers, paper, and lime. The reality check with steel companies on EU low-carbon product label for steel gathered 34 participants from 26 European steel companies and associations. Lastly, the reality check with Member States brought together 46 participants across 17 Member States.

For the targeted consultation on EU content requirements for batteries, 63 responses were received, primarily from companies (56 responses; 89%), followed by business associations and industry groups (3 responses; 5%), civil society organisations and NGOs (2 responses; 3%), and other stakeholders (2 responses; 3%). Among these, 15 respondents (24%) identified as part of the downstream sectors, including automotive and battery energy storage systems. Sectoral representation was diverse, with many stakeholders active across multiple segments of the battery value chain. The most frequent mentions were in battery pack and recycling (each 37%), followed by battery cell and critical raw materials (each 29%), and battery management systems (26%). Other notable sectors included cathode active materials (23%), anode active materials (18%), and various chemicals (11%) and machinery (8%) components.

2. Public consultation

2.1 Public Consultation Survey

Overview

The public consultation survey included questions on barriers to industrial decarbonisation, permitting for industrial decarbonisation projects, identifying and promoting priority decarbonisation projects, the creation and protection of European lead markets for low-carbon and EU made products, and foreign direct investments for decarbonisation.

Barriers to industrial decarbonisation

Industrial stakeholders identified several key barriers to decarbonisation. The most widely acknowledged challenge was lack of sufficient access to affordable and decarbonised energy – 266 (85%) out of 314 respondents, followed by unfair international competition from non-EU countries (n=250, 80%), decarbonisation technologies not yet being widely available or deployed at scale (n=198, 63%), high operational costs (n=260, 83%), high capital costs (n=251, 80%) and high carbon abatement costs (n=251, 80%) Permitting complexity and duration was perceived as a major obstacle by 256 respondents (82%). Furthermore, 146 respondents (46%) agreed that **SMEs face greater decarbonisation barriers than larger companies,** of which, 52% (91 out of 176) were SME respondents.

Streamlining and speeding-up permitting procedures

Stakeholders identified the **permitting** process as a major bottleneck to advancing industrial decarbonisation in the EU. Among all identified issues, the fragmented regulatory landscape and complexity of the process stood out as the most significant (n=187, 60%). Of the 314 stakeholders surveyed, 218 (69%) agreed that **permitting challenges are widespread across Member States**. Furthermore, 222 respondents (71%) agreed that permitting **challenges differ between Member States**, highlighting fragmentation and national-level variation in implementation. A large majority—266 out of 314 respondents (85%)—agreed that **decarbonising energy-intensive industries requires addressing significant cross-border challenges**.

Based on the responses, the most reported permitting length across Member States falls within the range of 12 to 24 months. Grid access timelines vary by sector, with durations ranging from 15 months (pulp & paper, ceramics, lime) to 24 months in automotive. Energy and cement sectors face long waits of 80 to 100 and 40 to 80 months, respectively, while construction, waste management, and fertilisers often experience delays of 60 months or more.

When asked about the reasonable maximum timeframe for an industrial decarbonisation project between submission of the permit application to the permit being granted was identified by 56 (18%) respondents as 12 months, followed by 53 (17%) suggesting 6 months. Other 65% of respondents did not provide an answer. Respondents pointed to Environmental Permits (158 respondents, 50%), Building or Construction Permits (n=78, 25%), Grid Connection Permits (n=45, 14%) and Health & Safety Permits (n=33, 11%) as **the main types of permits relevant to industrial decarbonisation projects.**

Permitting at the **geographical cluster** level received support from 210 respondents (67%) while the **use of data repositories** and spaces to improve permitting processes by re-using relevant datasets was supported by 196 respondents (62%). S**implifying EU legislation** to facilitate industrial permitting also received strong endorsement (n=258, 82%).

From the received answers, several **preferred measures for speeding up the permitting processes** were identified: single points of contact (136 out of 174 answers), time limits for the permit-granting process (n=149, 81%), time limits for the environmental impact assessment (n=144, 79%), joint environmental assessment when required under multiple legal acts (n=133, 76%), tacit approvals for certain administrative decisions (n=144, 83%), overriding public interest status when it exists in national law (n=108, 62%), fully digitalised processes (n=114, 64%), and improved administrative cooperation via digital tools (n=114, 64%).

Identifying and promoting priority projects

The majority of respondents agreed that limited access to private funding (194 out of 314, 62%), public funding (n=245, 78%), and transition finance (n=196, 62%) is a **major barrier to industrial decarbonisation.**

On **risks associated with investing in industrial decarbonisation projects**, market uncertainty was identified as the top risk (269, 86%), followed by regulatory uncertainty (n=260, 83%) and financial risk (n=243, 77%).

63% of respondents (197 out of 314) supported the **introduction of a category of priority industrial decarbonisation projects**, with targeted benefits. The preferred criteria for identifying priority projects were contribution to industrial decarbonisation (n=100, 32%), to strategic value chains (n=64, 20%), to industrial electrification (n=9, 16%), economic importance (n=43, 14%) and expected increased demand for outputs (n=28, 9%).

When looking at the **benefits(s) strategic projects should receiv**e, 117 (37%) agreed with faster permit-granting procedures, 113 (36%) with priority status for administrative procedures, 113 (36%) with better access to funding.

Creation and protection of European lead markets for low-carbon products

The vast majority - 280 (89%) out of 314 respondents - believed that **measures to stimulate demand for clean industrial products** are essential to drive industrial decarbonisation, backed by all industries. This was further supported by the lack of willingness among downstream sectors and consumers to pay a premium for clean industrial products (n=253, 81%). When looking at the **downstream sectors supporting the uptake of clean energy-intensive materials**, the most important ones included construction and infrastructure (n=218, 70%), automotive (n=196, 62%), clean energy technologies (n=186, 60%), electrical and electronic equipment (n=136, 43%), defence (n=92, 30%) machinery (n=40, 13%), and other (n=72, 22%).

Most respondents—259 out of 314 (82%)—agreed that **public procurement** is a significant driver for lead markets for European and clean industrial products. Additionally, 246 respondents (78%) believe that public procurement is too heavily focused on price rather than on non-price criteria.

Non-price criteria identified for public procurement to help create lead markets included: resilience (n=53, 17%); environmental sustainability (n=53, 17%); EU content (n=44, 14%); employment and social requirements (n=22, 7%); and cybersecurity (n=10, 3%).

EU label on carbon intensity of industrial products

A majority of respondents (191 out of 314, 61%)[244] agreed that **introducing an EU voluntary label on the carbon intensity of industrial products** would support the uptake of sustainable industrial products and the creation of lead markets. However, respondents were more sceptical about the label's potential to curb the proliferation of labels and ensure a harmonised approach,

[244] 42 (13%) are neutral, 32 (10%) slightly disagree, 17 (5%) strongly disagree, 17 (5%) do not know and 17 (5%) did not respond

with only 129 respondents (41%) in agreement. Concerns about administrative and compliance costs were limited, as only 100 respondents (32%) believed that introducing a voluntary label would impose significant costs. On the **added value of an EU label on carbon intensity of industrial products**, respondents saw benefits in terms of increased transparency (n=195, 62%), comparability and market differentiation (n=187, 60%), and market uptake of greener products (n=160, 51%), while fewer agreed on its role in improving access to green finance (n=136, 43%) or compliance with regulatory requirements (n=108, 35%).

Foreign Direct Investments

The majority of respondents (166 out of 314, 63%), out of which, the majority (136) being business associations and businesses - agreed that foreign direct investments are valuable for bringing capital into Europe that is otherwise unavailable within the EU, to increase industrial decarbonisation investments. Additionally, 147 respondents (47%) believed such investments are beneficial for transferring know-how on products or processes currently not available in the EU. A further 118 respondents (38%) saw value in these investments for enhancing supply security for EU customers by localising production closer to demand. Only 12 respondents (4%) considered foreign direct investment to play no role in advancing industrial decarbonisation investments.

172 (55%) out of 314 respondents found it useful to **impose conditions on foreign direct investment** from an internal market perspective. Further opinions on these conditions showed that 79% (102 out of 129) agreed on the requirement to perform research, development, and innovation activities in the EU, 74% (93 out of 126) found the requirement to perform value-added production in the EU (rather than mere assembly of imported components) useful, 73% (92 out of 126) of respondents find the requirement to form a joint venture with a European partner and/or restrict foreign ownership percentages useful, 71% (91 out of 126) found the requirement to source equipment and inputs in the EU useful, 70% (88 out of 126) agreed on the requirement to hire and train EU citizens as staff, 67% (84 out of 126) supported the requirement to transfer intellectual property rights and know-how to the EU investment and/or grant irrevocable licenses, 50% (64 out of 128) supported the requirement to supply EU customers, and 39% (50 out of 126) supported the requirement to appoint EU citizens to key management positions.

2.2 Industry Position Papers

Overview

As part of the Open Public Consultation, 142 policy papers were submitted, across a wide range of industries such as aluminium (2 responses), cement (n=2) , chemicals (n=10) , fertilizers (n=5), glass (n=2), metals (n=3), pulp &paper (n=2) , and steel (n=7), with downstream sectors represented by the automotive industry (n=1), batteries and storage (n=2), construction (n=2), energy, including clean tech manufacturers (n=10), electricity (n=8), gas & oil (n=3), heat (n=2) and wind (n=3) - waste management & recycling (n=4) and other (n=54).

Barriers to industrial decarbonisation

Stakeholders across sectors cited high costs, regulatory uncertainty, and limited infrastructure as major obstacles to decarbonisation. Energy-intensive industries identified CAPEX and OPEX for new technologies—exacerbated by volatile energy prices—as key financial barriers. Many highlighted fragmented and unclear regulations across Member States. In sectors like metals, aluminium, and glass, current EU policies were seen as overly focused on breakthrough tech, neglecting scalable solutions. Steel stakeholders pointed to limited demand and lack of price premiums for low-carbon products. SMEs were also noted as challenged by complex permitting and funding systems.

Identifying and promoting priority projects

There was strong support for the prioritisation of decarbonisation projects. Respondents emphasised the importance of eligibility criteria remaining broad and flexible to reflect the technological diversity and specific decarbonisation pathways across sectors. There was broad agreement that prioritised projects should benefit from simplified permitting, fast-track approval processes, and access to de-risking instruments such as public guarantees.

Creation and Protection of European Lead Markets for Low-Carbon Products

Stakeholders broadly supported the development of lead markets as a key mechanism to stimulate demand for low-carbon products and foster investment in decarbonised production, confirming the results of the Public Consultation. A majority welcomed the introduction of low-carbon labels and minimum EU content requirements, although some expressed concern about possible market distortions and administrative burdens. Across sectors, there was strong support for harmonised environmental standards, including the application of life-cycle assessment (LCA) methodologies and the integration of social and resilience criteria in procurement practices.

While public procurement was broadly acknowledged as a potential driver of demand, several contributions pointed out that its current reach is too limited and must be complemented by initiatives for all products put on the market.

Streamlining and speeding-up permitting procedures

Permitting processes were identified across all sectors as one of the main challenges to the timely implementation of decarbonisation projects. Stakeholders described the permitting process as fragmented, non-transparent, and excessively slow. Particular concerns were expressed regarding the lack of uniformity across Member States and the complexity of navigating approvals for grid infrastructure, electrification, and hydrogen deployment.

In response, there was a strong call for the creation of a streamlined EU-wide permitting framework, which includes digitalised processes, legally enforceable deadlines, and centralised contact points. This included support for tacit approval and fast tracking. There was also recognition that SMEs actors face disproportionately high administrative burdens under the current system, and that simplified procedures are needed.

Foreign Direct Investments

FDI was viewed as essential for scaling infrastructure and clean technologies. Stakeholders stressed aligning FDI with EU goals and safeguarding domestic standards. High energy costs and regulation could deter FDI without better risk-sharing tools.

Stakeholders proposed several solutions, including the definition of clear sustainability benchmarks, incorporation of EU content requirements, and the design of FDI frameworks that complement rather than displace existing industrial capacities.

3. Targeted consultation for EIIs

3.1 Targeted survey

Overview

The targeted consultation questionnaire included questions on the creation and protection of European lead markets for low-carbon products, as well as the streamlining and acceleration of permitting procedures for industrial access to energy and decarbonisation.

Creation and Protection of European Lead Markets for Low-Carbon Products

A large majority of respondents, 56 (90%) out of 62, agreed that stimulating demand for low-carbon industrial products is essential, with support consistent across company sizes and stakeholder groups.

When looking at **key design principles for low-carbon requirements,** a technology-neutral, performance-based approach was backed by 13 respondents (21%) with another 13 (21%) stressing the need for regulatory flexibility. Lifecycle assessment methods were considered essential by 19 respondents (31%) and progressive tightening of benchmarks over time was proposed in 20 responses (32%). Green Public Procurement emerged as a key lever in 17 replies (27%), with calls for integrating CO_2 benchmarks, lifecycle criteria, and EU-origin rules. Additionally, 10 respondents (16%) recommended harmonised labelling and certification, while financial support was emphasised in 15 responses (24%).

Regarding the **cost impact of low-carbon alternatives and downstream pricing**, stakeholders across energy-intensive industries reported significant cost increases tied to low-carbon production—typically 10–50%, sometimes higher. However, most agreed the effect on final product prices is modest. By sector breakdown:

- Cement: All respondents agreed low-carbon cement has little or no impact on construction costs. Studies show even doubling cement prices raises building costs by only 1–3%.
- Steel: 14 of 18 (77%) respondents reported minimal downstream price effects from low-carbon steel, citing studies and internal data: <1% for an average car; 0.1–0.2% for buildings; 0.6–1.2% for industrial sites; 1.6–5.5% for appliances and offshore wind; 0.15–0.5% for military vehicles.
- Chemicals: Stakeholders noted variability across products; most estimates place end-product cost increases at 1–5%.
- Ceramics: Producers anticipate significant value chain cost increases, stressing low price elasticity in key downstream sectors.
- Glass, non-ferrous metals, pulp & paper: No figures or clear data.

Risks of material substitution due to low-carbon requirements vary across sectors; however, most respondents agreed that the risks can be mitigated with lifecycle-based, material-neutral policies applied consistently across sectors and imports.

Regarding **social and economic impacts of low-carbon requirements,** 45 (75%) out of 62 respondents saw long-term socio-economic benefits from low-carbon requirements. However, 27% warned of short-term risks, including higher production costs, investment pressure (CAPEX/OPEX), inflation, job losses, and delocalisation.

Stakeholder views on the **impact of low-carbon requirements on SMEs** were mixed. 29 (47%) out of 62 respondents believed the requirements are supportive of SMEs, while 24 (39%) expressed concern over barriers such as high upfront costs, administrative burden, and limited access to finance or technical support.

EU content requirements for industrial products

Support for stimulating demand for EU-made industrial products was strong across stakeholder groups, with 53 (86%) out of 62 respondents in favour. Stakeholders showed a clear preference for **defining "EU content" in industrial products** based on value creation within the EU, with 51% supporting minimum percentage of the value creation (i.e. value of the final product compared to initial input) in the EU, followed by a minimum share of specific materials used in a product to be manufactured in the EU (23%), products to have proof of origin or traceability certification showing compliance with EU content rules (10%) and specific production steps or final assembly taking place within EU (8%).

Regarding the most appropriate **policy instruments to introduce minimum EU content requirements**, the responses favoured all forms of public funding and support schemes (35%), followed by private procurement (i.e., product requirements) (23%), and public procurement (19%).

Stakeholder **views on traceability of EU origin** vary, with most supporting sector-specific or existing frameworks for practicality and enforceability. In cement, 43% supported traceability via tools like Environmental Product Declarations and origin disclosures under the CPR, while 29% viewed origin tracking as irrelevant. Ceramics unanimously supported direct application of EU Rules of Origin. In chemicals, 50% favoured sector-adapted Digital Product Passports, but 25% expressed uncertainty due to supply chain fragmentation. Glass stakeholders fully supported traceability using existing tools like CE marking and Declarations of Performance, especially with Digital Product Passports. In iron and steel, 72% backed traceability with the "Melted and Poured in the EU" rule, Mill Test Certificates, and Digital Product Passports, but warned of loopholes and complexity. Non-ferrous metals had 60% support for traceability through origin checks, mass-balance approaches, and import monitoring, with concerns over scrap-based supply chains. The sole pulp and paper respondent supported traceability using existing systems like the EU Deforestation Regulation, FSC/PEFC certifications, and Declarations of Compliance.

When asked about the potential **economic and social impacts** of EU content requirements, the pulp and paper sector sole respondent was entirely positive across economic, employment, and SME impacts. Non-ferrous metals stakeholders were divided: 60% supported the economic shift, while 20% were cautious and 20% opposed, mainly due to concerns about cost pass-through. Iron and steel respondents were largely positive on economic (61%) and skills (50%) impacts, with a smaller share noting conditional effects or risks. In the glass sector, economic views were evenly split—positive, mixed, negative, and conditional (each 25%). Chemicals perspectives were cautious and design-dependent. Ceramics respondents were unanimously positive on economic impacts, with some also anticipating job benefits. Cement stakeholders expressed mixed views on economic impacts; half emphasised the need for upskilling, particularly in carbon capture and digital technologies, while a third considered skills impacts not relevant.

Furthermore, 49% of respondents considered the introduction of EU content requirements for industrial products to be supportive of SMEs, with 47% SMEs agreeing as well.

The identified **downstream sectors** where it be technically and economically feasible to apply minimum EU content requirements were reported as follows: Automotive & transport equipment is strongly supported by steel (88%) and non-ferrous (80%) respondents as a relevant downstream sector. Buildings & construction had the highest support, backed by all ceramics and most steel, cement, and non-ferrous stakeholders. Civil infrastructure & public works gained support from steel (81%) and non-ferrous (60%). Clean energy & renewables saw moderate backing from steel (44%) and non-ferrous (60%). Machinery, white goods & heavy equipment were supported by 50% steel and 40% non-ferrous. Defence & security received support from 38% steel and 40% non-ferrous. Packaging, consumer goods & glassware were backed by glass (75%) and 40% of non-ferrous respondents.

Streamlining and speeding-up permitting procedures

Most respondents (63%) agreed that the permitting measures under the Net Zero Industry Act are not enough to improve permitting conditions for energy intensive industries. Sectoral support was high in glass, (100%), pulp and paper (100%), ceramics (100%), steel (72%), and non-ferrous metals (80%). The cement (43%) and chemical sector (25%) were however less aligned.

Most stakeholders highlighted the need for **further measures to improve the permitting processes**, with 72% support for facilitating access to grid and relevant energy infrastructure, 67% advocating for the digitalisation of the permitting process, and 67% for tacit approval for specific steps or permits. Meanwhile, 64% expressed the need for targeted environmental derogations for industrial clusters and projects and 59% supported the wider use of overriding public interest provisions.

Despite 2/3 of respondents indicating that tacit approval could be relevant to improve the efficiency of the permitting processes, only a few of them suggested specific steps: early procedural steps of the Environmental Impact Assessment (1 mention), environmental permits for known low-impact technologies (provided safeguards are in place) (1), changes to permits that will not increase the negative environmental impact (1), (low risk) modifications with limited impact (3), minor modifications to existing permits (1), renewed permits (1), non-critical administrative steps (completeness checks or intermediate reviews) (1), permitting for grid connection and land access (2), for iron & steel, the biomethane use (1), the for non-ferrous metals, the environmental permitting process (1). When asked which **EU legislation presents the bigger hurdles when addressing the permitting granting processes for a decarbonised industrial investment,** the main directives mentioned were: Industrial Emissions Directive (34%), Water Framework Directive (19%), Environmental Impact Assessment Directive (6%), Birds and Habitats Directives (5%), followed by Ambient Air Quality Directive, Waste Framework Directive, and Natura 2000 (each 3%), and finally, Nitrogen emission impact calculations, Hydrogen Delegated Acts, BREFs, Air Quality Directives, and Waste Shipment Regulation (1% each).[245] SMEs also reported various hurdles in the permit granting process for decarbonisation projects, including, from a regulatory perspective, complex and lengthy environmental assessments and other permitting processes (2 mentions), administrative delays and unclear procedures (n=2), unpredictable timelines (n=1), lack of technical and general support / guidance (n=3), lack of early access to pre-consultation services or tailored regulatory advice (n=1), complex documentation requirements and uncertainty about eligibility for permits or incentives (n=2), with permitting rules being designed around large installations rather than SMEs (n=2). On an internal level, they encounter high costs of compliance and consulting as well as limited internal capacity to navigate complex regulatory frameworks.

3.2 Reality Check with Industry on Industrial Accelerator Act

Overview

The consultation workshop with energy intensive industry representatives included preliminarily shared questions and discussion around the topics of (i) the creation of European lead markets for low-carbon products, with discussions on EU content, and (ii) streamlining and accelerating permitting procedures.

Regarding the creation and protection of European lead markets for low-carbon products, during the workshop participants broadly confirmed the results of the targeted survey. They agreed that there is currently only a niche market for low-carbon products, as customers tend to be price sensitive, and few incentives exist for a green premium. In this context, supporting the creation of lead markets for low-carbon products will increase demand and production, thereby aiding the decarbonisation of energy-intensive industries. Public and private procurement, EU content targets, and low-carbon labels, however, must be tailored to

[245] To note, some of the replies received via the consultation are not EU legislation per se but are covered by legislation mentioned earlier.

the needs and complexities of each industry and their supply chains. Participants noted varying demand shares currently met by public procurement, depending on the specific energy-intensive application in different end-use sectors, and mostly agreed that incentives for products put on the market are needed to grow the market for all industry players. **They also confirmed that EU content requirements** are important for ensuring that the market for low-carbon products is not undermined by non-EU competition.

Concerning streamlining and speeding-up permitting procedures, participants acknowledged that, permitting bottlenecks can cause significant delays, extra costs, and uncertainty which leads to postponement in investment or even idle operations. Suggested solutions include a central authority for permitting, a one stop shop for permitting procedures, digitalisation, regulatory sandboxes, support for permitting new technologies, tacit approval if time limits are exceeded, fast track permitting processes for decarbonisation projects, one application covering multiple permits, and early-stage public participation to accelerate approvals.

3.3 Reality Check with Steel Industry on the Carbon Intensity Label

Overview

The consultation workshop with steel industry representatives included preliminarily shared questions and discussion on the development of an EU low-carbon product label for steel.

Scope and methodology

- Product Coverage: There was broad consensus from participants that hot-rolled steel should serve as the reference product for the label. Stakeholders supported a comprehensive emissions scope for the label, particularly including emissions resulting from relevant upstream processes such as the use of alloying elements.
- Use of EU ETS Benchmarks: Stakeholders generally supported using EU ETS product benchmarks as the foundation for the label. However, they also called for the inclusion of additional upstream and indirect emissions not covered by these product benchmarks, and the need to align the approach with CBAM rules to ensure consistent treatment of imported steel.
- Hydrogen: Stakeholders agreed that hydrogen-related emissions must be included in the carbon footprint calculation. They emphasised the need for harmonised EU-level rules to ensure consistency in the methodology.
- CCUS: Captured and permanently stored CO□ should be eligible for exclusion from the product's carbon footprint, in alignment with the current EU ETS accounting rules.
- Electricity: The role of electricity-related emissions is becoming increasingly significant. Stakeholders were divided on whether to use market-based data, average national grid mixes or an average EU-mix.;
- Scrap: there was agreement about that emissions from scrap should not be differentiated based on source (pre-consumer vs. post-consumer). Stakeholders cited concerns over traceability, verification challenges, and the risk of manipulation.

Monitoring, Reporting, Verification, Certification

- Data Reporting: Stakeholders emphasised the need for accurate and verifiable emissions data, with broad agreement on the importance of transparency. The use of primary data should be the priority, while possible default factors should be sufficiently conservative.
- Baseline Data: Most stakeholders supported using a 12-month average as the baseline for emissions reporting, with some flexibility allowed in cases of significant

transformation or process upgrades. Verification: There was consensus among stakeholders that verification procedures must be comparable to those under the EU ETS framework, especially if the label is to apply equally to EU and non-EU steel.

- Certification: Some stakeholders recommended that certification responsibilities be assigned to existing EU ETS verification bodies, leveraging their established infrastructure and expertise. Larger companies indicated that they would be able to manage the administrative demands of regular audits under such a system.

Label Design Elements

The use of a sliding scale for differentiating the performance classes or of an alternative classification method not as a function of scrap was highly debated with no clear preference or compromise solution within industry. Supporters of the sliding scale which participated in the reality check view it as a fair mechanism for reflecting decarbonisation progress in primary steelmaking. Opponents on the other hand argued it could undermine the environmental value of secondary production, by diluting incentives for recycling and disadvantaging EAF producers. Some stakeholders were critical towards the idea of having two different classification systems, based on production route, as it would risk locking-in technological innovation.

- Production Route Transparency: Some participants called for including production route, recycled content, and place of origin data on the label, alongside carbon intensity.
- Harmonisation Needs: A consistent EU-wide methodology is necessary to build trust across markets and ensure clear messaging for both consumers and B2B customers.

3.4 Reality Check with Member States on Industrial Accelerator Act

Overview

The consultation workshop with Member States representatives included preliminarily shared questions and discussion around the topics of European lead markets for low-carbon industrial products and streamlining permitting procedures.

Creation and protection of European lead markets for low-carbon products

Member States welcomed the IAA's ambition to develop lead markets but emphasised the need for clarity of scope, particularly distinguishing IAA from the Net-Zero Industry Act (NZIA). The participants underlined the importance of alignment with existing EU legislation such as ESPR, Renewable Energy Directive, and Circular Economy initiatives. Several countries supported EU preference criteria in procurement, highlighting that minimum EU content requirements could drive market creation, especially in key sectors like steel, cement, fertilizers, and batteries. Technological neutrality was broadly supported, with calls for verified and interoperable labelling systems that build on ETS data without adding new burdens. Concerns were raised about electricity access, calling for EU support in addressing grid capacity constraints. There was consensus on avoiding new regulatory burdens and instead simplifying existing frameworks to attract investments.

Streamlining and speeding-up permitting procedures

All Member States called for streamlined permitting but rejected hard deadlines, with some emphasizing outcome-focused simplification, preferring procedural flexibility over rigid timelines. Others highlighted the complexity arising from regional administrative structures, which must be respected in any EU-level initiative. Some Member States called for identification and removal of legal inconsistencies that delay permitting, while others warned against creating new layers of bureaucracy. Digitalisation and standardised procedures were favoured, especially for environmental assessments, but cautioned that real-world constraints, such as limited regional capacity and financing, must be addressed. Beyond simplification, Member States raised practical implementation concerns. Some of them suggested narrowing IAA's permitting acceleration to large-scale decarbonisation projects to avoid over-prioritisation, while others called for a horizontal simplification approach, applicable to all decarbonisation projects.

4. Targeted consultation on the battery sector

The consultation focused on the potential introduction of EU content requirements for the battery sector, including their definition, implementation through policy instruments, and expected impacts on competitiveness, pricing, and employment.

Support for Policy Instruments

Out of 63 respondents, a large majority supported the inclusion of EU content requirements in various policy mechanisms. Public funding and support schemes received the highest endorsement (45 responses; 71%), followed by public procurement and private procurement (each with 39 responses; 62%). Notably, 29 respondents (46%) supported the use of all three instruments simultaneously. Only 7 respondents (11%) expressed opposition to any form of EU content requirement.

Definitions of EU Content

Respondents provided varied interpretations of what constitutes "EU content" in the battery value chain. The most common definition was "components made in the EU" (n=43, 68%), followed by "assembly in the EU" (n=36, 57%). Less frequently cited were "bill of materials produced in the EU" (n=14, 22%), "value generated in the EU" (n=12, 19%), and "weight/volume generated in the EU" (n=4, 6%). Only one respondent (2%) provided a definition that did not fit into these categories.

Expected Impacts

Stakeholders were asked to assess the expected impacts of EU content requirements in batteries across six dimensions:

- <u>Social Aspects (e.g. Jobs)</u>: 39 respondents (62%) anticipated very positive effects, with another 18 (29%) expecting positive outcomes. Only 5% saw no impact, and just one respondent (2%) foresaw negative consequences.
- <u>Economic Aspects (e.g. Profitability)</u>: 42 respondents (67%) expected positive or very positive impacts, while 12 (19%) anticipated negative effects. A small share (10%) saw no impact.
- <u>SMEs</u>: 40 respondents (64%) viewed EU content requirements as beneficial to SMEs, while 3 (5%) expressed concern about negative impacts. 14% saw no impact.
- <u>Skills and Workforce Development</u>: This dimension received strong support, with 30 respondents (48%) rating the impact as very positive and 26 (41%) as positive. No respondents anticipated negative effects.
- <u>Battery Price</u>: Stakeholders expressed concern about cost implications. 26 respondents (41%) expected negative impacts on battery prices, with 5 (8%) anticipating very negative effects. Only 11 (18%) saw positive effects, and 15 (24%) expected no impact.
- <u>Downstream Product</u> Price: 22 respondents (35%) anticipated negative impacts, and 4 (6%) expected very negative effects. Meanwhile, 20 (32%) saw no impact, and 10 (16%) expected positive or very positive outcomes.

Annex 3: Who is affected and how?

1. Practical implications of the initiative

Businesses – particularly EIIs, battery manufacturers, solar manufacturers, and key automotive component industries – will benefit the most from the initiative. It aims at creating lead markets for European, low-carbon products, depending on the industry, through public procurement mandates and/or mandates for all products put on the market, supported by a low-carbon label (in the case of steel).

For businesses that have already invested in decarbonisation, the impact will be felt in the short term, as markets for their products expand. For companies that have not yet invested in decarbonisation, IAA will provide an incentive on the demand side, increasing confidence in decarbonisation investments.

The initiative will also accelerate manufacturing industry's decarbonisation projects by speeding-up using tacit approval for intermediate steps (with certain limitations and safeguards), and simplifying permitting procedures, including by digitalisation of procedures. Decarbonisation will require high initial CAPEX as well as higher OPEX in the short and medium term. Some of these costs will be passed down the value chain – in the form of a "green premium" – to downstream sectors that have the capacity to absorb them to different degrees. Since most provisions focus on public procurement and public support schemes, these costs are likely to be absorbed by public administrations, but the extent and availability of such support will depend on national budgetary capacities and political priorities.

In the long term, the cost premium associated with producing low-carbon materials is expected to decline as relevant technologies mature and demand for low-carbon materials transitions from niche lead markets to larger-scale markets, while in parallel carbon intensive products are expected to become more expensive as a result of the tightening of the EU's climate policies, e.g. the EU ETS and CBAM.

Citizens and consumers will benefit by having a more reliable access to low-carbon products, which will be easier to differentiate, thereby being able to make more sustainable consumer choices. Initially, final consumer goods containing low-carbon industrial products will be more expensive, but in specific sectors analysed in the assessment (construction and automotive), the increase in the final product price will affect consumers only to some extent and until the lead markets become the norm.

In the long term the green premium will be reduced, therefore consumers will benefit from that as well. Public procurement and public support schemes measure would support lead markets, entailing fiscal benefits for purchasing products containing low-carbon and EU content materials, which are, for example, already in place for EVs. Citizens will also benefit from improved information and, more broadly, carbon emissions reduction.

Member States will play an important role in the implementation of this initiative. Public procurement and support schemes will contribute the most to the creation of lead markets of low-carbon, EU content products. Thereby, administrations will need to include these provisions in their procurement practices, including monitoring and reporting. Permitting provisions will also have to be implemented by Member States, where coordination across public authorities will be crucial.

The financial burden associated with low-carbon requirements in public procurement procedures and support schemes would primarily fall on Member States and other public authorities, requiring a limited increase in public spending on low-carbon products.

2. Summary of costs and benefits

I. Overview of Benefits (total for all provisions) – Preferred Option		
Description	***Amount***	***Comments***
	Direct benefits	
LAB 2 – Creation of label on carbon intensity steel	Steel businesses: Will benefit from a certification that will allow the differentiation of low-carbon steel on the market and increased transparency, leading to a competitive edge, reduced administrative burden from the multiplications of labels, and possibility to derisk investment in decarbonisation and new markets (combined with LEAD_EII 2). Downstream businesses: Customers will benefit from increased transparency on low-carbon steel, which will help them reduce their scope 3 emissions and achieve their own decarbonisation goals. Public administration: Will benefit from a common European, pre-verified label on the carbon intensity of steel, which will provide a clear reference for assessing compliance with low-carbon requirements in public procurement rules. It would also create a level playing field across the single market. It will eventually allow procedural and environmental costs saving.	A label for low-carbon steel, through the standardisation and improved information on the carbon emissions impacts of steel, will increase the value and marketability of low-carbon steel, open new markets, derisk investment and increase access to green finance or ESG-linked loans, and create a level playing field between steel companies engaged in decarbonisation activities.
LEAD_EII 2 - Increased demand for low-carbon EU EII products	EII businesses: Benefits include value added increases, market certainty and increased demand for European, low-carbon EII products, thereby facilitating investment in decarbonisation by providing security of offtakes. In the long term, this will result in decreased production costs and greater competitiveness in global markets. The introduction of a 25% low-carbon steel, a 5% low-carbon cement and a 25% low-carbon aluminium target in relevant downstream sectors can result in the following yearly CO_2 savings (2030): Steel: 3.37 Mtonnes CO_2, Cement: 0.69 Mtonnes CO_2 and Aluminium: 0.22 Mtonnes CO_2. Total: 4.28 Mtonnes CO_2. It would also lead to the preservation of up to 4 500 new jobs in the steel sector. Low-carbon measures in steel, cement and aluminium would result in GVA EUR 241 million for steel and aluminium sectors, and GVA EUR 445 million for cement (EUR 686 million).	Other benefits include preserving European industrial capacities in strategic sectors at risk of becoming too much imports dependent. See Annex 4 Section 2 for calculations of the benefits highlighted here.

I. Overview of Benefits (total for all provisions) – Preferred Option		
Description	***Amount***	***Comments***
LEAD_BAT 1 - Increased demand for EU batteries	Batteries manufacturing businesses: Secure demand for EU-made batteries and key battery components to develop a strong value chain and cut strategic dependencies for a sector crucial for achieving climate goals, defence applications, and the competitiveness of downstream sectors. The benefits of Made in EU on batteries include creating the market certainty needed to de-risk investments and anchor battery production along the supply chain within the EU. This measure would help anchor the total number of jobs expected under the current pipeline of projects, which stands at 170 000 by 2030, out of which around 85 000 are considered to be at medium or high risk. Additionally, LEAD_BAT 1 would result in 25.6 Mtonnes CO_2 savings in 2030. Upstream businesses: Expected benefits for the batteries-related critical raw materials projects. A stable demand of critical battery components will allow to de-risk investments into upstream critical raw materials projects related to battery materials.	In the long term, the benefits include decreased production costs and greater competitiveness in global markets. Securing manufacturing at scale through IAA can help narrowing the cost gap with China by approximately 40%.
LEAD_SOL 1 – Increased demand for EU solar manufacturing	Solar manufacturing businesses: Offtakes for the EU solar manufacturing supply chain are expected to be secured, in alignment with the projected 2030 manufacturing capacity based on the project pipeline. With the LEAD_SOL 1 policy option, over 20 GW of the deployment of PV would be covered which helps ensure the current existing project pipeline (as per the European Solar Industry Alliance[246]) to be realised. Thus, this would help bridge the gap between EU manufacturing capacity and the demand for EU-made solar modules. The measures focused on public procurement/auctions, as well as public support schemes for solar manufacturing could result in a combination of 58 852 jobs.	The benefits include increased demand for EU solar manufacturers and the preservation of existing EU production capacity while strengthening the business case for new manufacturing projects. Additionally, reduced investment risks will enable more solar manufacturing projects to reach their Final Investment Decision. Implications for consumers include more reliable delivery due to lower exposure to geopolitical or trade disruptions, easier warranty enforcement and repairs due to easier access to EU-firms/installers, increased traceability of material origin, lower environmental impact thanks to shorter transport distances, reduced risk of purchasing products linked to forced labour, and a contribution to strengthening local resilience and industrial sovereignty through job creation.

[246] Meet our members – European Solar PV Industry Alliance

I. Overview of Benefits (total for all provisions) – Preferred Option		
Description	***Amount***	***Comments***
LEAD_VC 1 – Increase demand for EU content in vehicle components	The increase in EU content of EVs sold in the EU would lead to higher sales of EU components. Furthermore, the measure is projected to lead to the generation of EUR 10.5 billion Global Value Added in 2027 and EUR 9.7 billion in 2030 when assessing the impact, taking into account only the first tier of the value chain. Notably: LEAD_VC 1 would lead to an overall increase in sales for vehicle component suppliers (referred to as: *"Companies"*: EUR 6.5 billion in 2027 and 6.9 billion in 2030. The extra cost for the downstream sector (EU EV manufacturers) of EUR 1.9 billion in 2030 would be completely offset by the increase in sales of EUR 9 billion in 2030 across all vehicle segments. When it comes to the consumers, Made in EU compliant EVs gain a price advantage, and cars are assumed to become more affordable.	The impact on EU automotive component suppliers should be positive in both scenarios due to increased sales to car manufacturers that sell in the EU market. In addition, for those EU manufacturers that comply with the requirements, the measure will not represent any additional adjustment costs, since the initial share of Made in EU content is estimated at 70%. Hence the first target would contribute to safeguarding the local vehicle component industry, while preventing further offshoring supply chains. The measure would imply an increase in costs (see: Section 6), however due to the increased sales of vehicles, the negative implications on the EU EV manufacturers would be mitigated. As the policy measure would apply indistinctively to EU and non-EU car manufacturers, the level-playing field would be preserved and EU EV manufacturers could gain competitive advantage in the EU single market, while not having significant impact on the competition. Overall, benefits of the measure are significant, and it would contribute to safeguarding the EU industry, re-establishing a level playing field, while providing a competitive advantage for the EU EV manufacturers in the internal market.
INV 2 – Maximise benefits of foreign investments in the EU via conditionalities	EII Businesses: Benefits include securing critical technologies and intellectual property vital for European innovation and competitiveness. Companies are also expected to embed more R&I and technologies in their EU operations. Domestic value-added production encourages long-term investment and a more predictable investment environment, including for SMEs.	The preferred option is not intended to deter investment but to enhance quality, stability, and long-term value of investments in the EU. Conditionalities aim to anchor foreign investors' technological, R&I, and production activities within Europe, ensuring that the EU remains an attractive and predictable destination for strategic and high-quality investment. By enforcing legal certainty, the measure supports continued inflows of productive investment rather than restricting them.

I. Overview of Benefits (total for all provisions) – Preferred Option		
Description	***Amount***	***Comments***
PERM 2 – Digitalisation of permitting procedures	Industrial manufacturing businesses (NACE code C): Cost savings of EUR 240 million for all manufacturing industries (2.2 million) in the EU could be perceived for the digitalisation of 5 similar administrative processes.[247] MS administrations: Digitalisation of permitting procedures per year in efficiency savings could lead up to EUR 1.3 billion for procedures with a volume of at least 100 000 transactions.[248]	
AREA 2 - Member States to designate industrial areas and facilitate access to public funding	Projects in industrial areas: Benefits include improved support for access to funding for decarbonisation projects, which is likely to accelerate investment decisions and support industrial decarbonisation efforts across companies in the EU.	
Indirect benefits		
Increased access to low-carbon products	Citizen / Consumers: The steel label will provide transparency regarding the carbon intensity of steel content, supporting market differentiation for low-carbon products and enabling consumers to make more sustainable choices.	Furthermore, when the label is linked to public support schemes, it can incentivise consumers to increase their demand for lower-carbon products.
Employment	LEAD_EII 2 – Low-carbon & Made in EU for EII products: increased stable demand for EU, low-carbon materials are expected to generate new employment opportunities linked to these technologies and supporting the industrial transition. Low-carbon steel requirements in public procurement could preserve up to 4 500 jobs by 2030. LEAD_BAT 1 – Made in EU for batteries: announced gigafactories expected to create by 2030 up to 85000 jobs LEAD_SOL 1 – Made in EU for solar manufacturers: In terms of the policy segments assessed in the impact assessment, this corresponds to an estimated 5 193 jobs created	The IAA provisions will generally lead to new job creation in the industry field, plus upskilling and reskilling opportunities in relation to decarbonisation projects.

[247] Commission estimations based on a study on business procedures carried out to underpin the Single Digital Gateway impact assessment concluded that for 9 procedures, the cost savings for all EU businesses - if e-procedures were introduced where missing - would be in the order of magnitude of EUR 7 billion. Procedures in the scope of the study were linked to ten tax procedures. An adjustment was made to reflect lower volume of processes, and to reflect industrial manufacturing companies only.

[248] Estimates based on digitalisation of procedures in the Netherlands, following a stakeholder consultation on the single digital gateway. These figures could be an overestimation, since costs and savings depend largely on the type of administrative procedure to be digitalised, the number of transactions/uses per procedure, amongst others. EUR-Lex - 52017SC0213 - EN - EUR-Lex

I. Overview of Benefits (total for all provisions) – Preferred Option		
Description	***Amount***	***Comments***
	by the public procurement provisions, 32 888 jobs by auctions, and 20 771 jobs by public support schemes, with a total of 58 852 jobs. INV 2 - Conditions on value added production (R&I, engineering, domestic processing and manufacturing) could lead to more EU quality jobs. Particularly, staffing requirements and social protection conditionalities could lead to more employment. **LEAD_VC 1** could stop, and possibly reverse, the trend of progressive job losses which has been materialising over the past years in the EU's vehicle components supply chain.	
GHG emission reductions	LAB 2 – Low-carbon steel label: will support the decarbonisation of the (high emissions) steel industry, covering up to 78% of steel emissions. LEAD_EII 2 – Low-carbon & Made in EU for EII products: Increased demand for low-carbon products will lead to carbon emission reductions for EII industries. Assuming low-carbon targets for steel, cement and can lead to GHG emission reductions of 4.28 Mtonnes CO_2 in 2030, with a monetary value of around EUR 428 million per year. LEAD_BAT 1 - EU-made batteries emit ~25% less CO□ than Chinese-made ones (based on average grid). Reductions extend across the upstream value chain and so boosting domestic supply chains create environment and climate benefits. This could lead to GHG emission reductions of 25.6 Mtonnes CO_2eq in 2030, with a monetary value of EUR 2 560 million. LEAD_SOL 1 – Solar PV systems produced in EU must comply with strict environmental standards throughout their entire life cycle, including requirements on carbon footprint, which will have a positive environmental effect. LEAD_VC 1- In the "*Internal market reaction*" scenario of the presented analysis, global GHG emissions from vehicle manufacturing decrease by 0.5 Mtonnes CO_2e in 2027 and by 0.6 Mtonnes in 2030 due to shifts in production; they further decline by 0.1 Mtonnes due to reductions in international transport associated with EU imports, with a total monetary value of EUR 70 million.	Indirect positive effect on society at large by reducing industrial carbon emissions, with energy intensive industries accounting for almost 20% of industrial GHG emissions in the EU.

II. Overview of costs – Preferred option [249]							
SO	Cost Type	**Citizens/Consumers**		**Businesses**		**Administrations (MS/COM)**	
		One-off	**Recurrent**	**One-off**	**Recurrent**	**One-off**	**Recurrent** [250]
LAB 2	Direct adjustment costs						
	Direct administrative costs					European Commission: 2 FTE (EUR 388 000 total) for developing the methodology for the low-carbon steel label	
LEAD_EII 2	Direct adjustment costs			Selected downstream sector: Expected moderate but non-quantified impact from the potential readjustment of supply chains, including finding manufacturers for low-carbon/EU products, and manufacturing processes to ensure compliance with low-carbon and Made in EU requirements For energy intensive industries: limited increase in cost,	Low-carbon measures: Automotive sector EUR 291 million from low-carbon steel and aluminium, The construction sector EUR 691 million from low-carbon steel, aluminium and cement,		

[249] For the calculations of the costs, including the assumptions made, see Annex 4, under 2. Analysis of impacts
[250] Recurring costs are yearly, unless otherwise stated. Applicable for citizens and businesses as well

				passed down to consumer			
	Direct administrative costs				1 week FTE per year for the automotive sector for demonstrating compliance with low-carbon and made in Made in EU requirements (including for batteries and vehicle components) And ¾ weeks FTE per year for the construction sector 3/4 weeks FTE per year for automotive sector for demonstrating compliance with low-carbon content requirements And ½ weeks FTE per year for the construction sector With a total cost of EUR 1 million for affected OEM and construction companies Steel label certification: EUR 6 700 per site per year, with a total of EUR 154 100 for 23 steel sites		Member States: 2 FTE (EUR 3.3 million total for all Member States) per year to design and monitor in relation to lead market provisions. (including for batteries and vehicle components) European Commission: 1 month FTE (EUR 16 167) per year for monitoring lead provisions (including batteries, solar and vehicle components)
LEAD_BAT 1	Direct adjustment costs		EVs: EUR 292-730 million for public support schemes	Selected downstream sector: Expected moderate but non-quantified impact from the potential readjustment of supply	EVs: EUR 0.9-2.2 billion for public support schemes		Member States total: Auctions for BESS: EUR 26-66 million Vehicle fleet EVs: EUR 132 – 331 million

				chains, including finding manufacturers for EU products, and manufacturing processes to ensure compliance with made in Made in EU requirements			
	Direct administrative costs				1/2-week FTE (EUR 2 117 total for all companies) per year for demonstrating compliance with made in EU requirements		Member States: 1/4 FTE (EUR 412 776 total for all Member States) per year to design and monitor in relation to lead market provisions
LEAD_SOL 1	Direct adjustment costs		EUR 241.8 million for public support schemes	Selected downstream sector: Expected moderate but non-quantified impact from the potential readjustment of supply chains, including finding manufacturers for EU products, and manufacturing processes to ensure compliance with Made in EU requirements.			Member States: EUR 60.45 million per year for public procurement EUR 382.85 million for auctions
	Direct administrative costs				1/2 week FTE (EUR 2 646 total for all companies) per year for demonstrating compliance with made in EU requirements		Member States: 1/2 FTE per Member State (EUR 825 552 total for all Member States) per year to design and monitor in relation to lead market provisions

LEAD_VC 1	Direct adjustment costs		EVs: EUR 689.66 million		Corporate fleet EVs: EUR 1.24 billion Downstream sector (OEMs): EUR 1.9 billion		Vehicle fleet EVs: EUR 100.29 million
	Direct administrative costs						
INV 2	Direct adjustment costs		Small price increase in the short term (e.g. ECs, buildings) as firms adapt supply chains to meet FDI conditionalities.	Non quantified but limited costs of implementing FDI conditionalities such as value-added production, including staffing requirements For downstream sector, expected moderate and temporary cost increases if suppliers pass through compliance costs.			
	Direct administrative costs			1 month FTE (EUR 117 600 total for all companies) for notification of Member State authorities for FDIs screening			European Commission:3/4 FTE (EUR 145 000) per year to ensure implementation and operation Member States: 1 FTE (EUR 1.65 million total for all Member States) per year
PERM 2	Direct adjustment costs					European Commission: investment in the	European Commission: EUR 20 000 per year per

						back-end SDG system EUR 20 000	section for expanding Annex I of the SGDR with permitting (Your Europe Portal) Member States: up to EUR 40 000 per year per section, with a total cost of EUR 1.08 million for all Member States
	Direct administrative costs						
	Direct adjustment costs						
AREA 2	Direct administrative costs						1 FTE (EUR 1.65 million for all Member States) per year to designate priority projects / acceleration areas and facilitate benefits

III. Application of the 'one in, one out' approach – Preferred option(s)			
EUR in million	**One-off** (annualised total net present value over the relevant period)[251]	**Recurrent** (nominal values per year)	**Total**
Businesses			
New administrative burdens (INs)	Total: EUR 0.01 million for FDI notification: Large Companies: EUR 0.0059 million SMES: EUR 0.0041 million	LEAD_EII & LEAD_VC:	EUR 1.17 million

[251] The annualised values were calculated using the one-off estimates from the main text, allocating them over a 10-year period and applying a 3% discount rate.

		• Automotive sector: EUR 0.0148 million (large companies)
		• Construction sector: EUR 0.988 million
		  ○ SMEs: EUR 0.982 million
		  ○ Large Companies: EUR 0.0067 million
		LEAD_SOL: EUR 0.0026 million (large companies)
		LEAD_BAT: EUR 0.0021 million (large companies)
		
		Total EUR 1.009 million for lead market provisions
		
		EUR 0.154 million for steel label certification (large companies)
		
		Total: EUR 1.16 million	

Removed administrative burdens (OUTs)	Total: EUR 28.14 million[252] for all manufacturing industries in the EU for the digitalisation of 5 permit-granting procedures: Large Companies: EUR 0.28 million SMEs: EUR 27.85 million	Not available	EUR 28.14 million
Net administrative burdens*	EUR - 28.13 million	EUR 1.16 million	- EUR 26.97 million
Adjustment costs**		EUR 3.7 million	

[252] This is the annualised value corresponding to one-off cost savings of EUR 240 million under Annex 4 - savings for PERM.

New adjustment cost			
Citizens			
New administrative burdens (INs)	Not available	Not available	
Removed administrative burdens (OUTs)	Not available	Not available	
Net administrative burdens*	Not available	Not available	
Adjustment costs**		EUR 1.442 million	
Total administrative burdens***	- EUR 28.13 million	EUR 1.16 million	- EUR 26.97 million

(*) Net administrative burdens = INs – OUTs;
(**) Adjustment costs falling under the scope of the OIOO approach are the same as reported in Table 2 above. Non-annualised values;
(***) Total administrative burdens = Net administrative burdens for businesses + net administrative burdens for citizens.

3. Relevant sustainable development goals

IV. Overview of relevant Sustainable Development Goals – Preferred Option(s)	
Relevant SDG	**Expected progress towards the Goal**
DG #7 Affordable and clean energy, SDG #13 Climate action	The creation of lead markets for EU solar manufacturing will enable the local development of clean and affordable energy. Similarly, ensuring demand for low-carbon, EU-made EIIs industrial products—including through the creation of a label for steel and content requirements—will result in reductions in carbon emissions from the most hard-to abate sectors.
SDG #8 Decent work and economic growth	The implementation of IAA is expected to have a positive impact on employment, reskilling, and upskilling—particularly in EII industrial regions, as well as in solar, battery, and automotive parts manufacturing. This will also generate positive effects on the specific downstream sectors targeted by IAA and, by extension, across the entire value chain.

IV. Overview of relevant Sustainable Development Goals – Preferred Option(s)	
Relevant SDG	**Expected progress towards the Goal**
SDG #9 Industry, innovation and infrastructure	The proposal is expected to strengthen EU industrial resilience by increasing demand for EU industrial products, supporting investment in decarbonisation through the identification of industrial decarbonisation priority projects and foreign direct investment conditionalities, and ensuring faster decarbonisation processes by speeding up and facilitating permitting procedures.

Annex 4: Analytical method

1. Models used

The analysis contained in this Impact Assessment builds on data collected from desk research (academic studies, economic reports, media items, input from stakeholder outreach activities) and Commission officials' expert knowledge.

In addition, the analytical framework used for some parts of this impact assessment builds on **CARMEN**, **FIGARO, FIDELIO, SMILE EU, and SCAN**. Information has been analysed against the main problems identified for the purpose of this initiative, the problem drivers as well as stakeholder positions. Whenever possible, the Impact Assessment provides a quantitative analysis of benefits and costs relating to the main economic, environmental and social impacts. The cost/benefit analysis, however, is not fully comprehensive due to data gaps, notably related to the short time available to request and collect information beyond questions identified early on in the call for evidence and the public consultation The views of stakeholders are transparently reflected in the Impact Assessment.

1.1. CARMEN

CARMEN **(Computable Analysis of the Regional Multipliers of the European economy)** is a model developed by the European Commission's JRC that allows for a wide range of policy relevant impact analyses at territorial and industry level. CARMEN is developed in a modular approach allowing, for the first time, to cluster groups of regions (e.g. regions with a significant share of high-tech component in their economy) throughout the EU and assessing the impacts of investments both in the regions inside and outside the cluster. CARMEN was used to evaluate the competitiveness gain of increased EU global market shares (e.g., 1%) in energy intensive industries.

We have identified eight clusters, one for each EII by selecting the top 60 EU NUTS2 regions in terms of their total industry output. The EIIs cluster comprises the following industries: paper and paper products; coke and refined petroleum products; chemicals and chemical products; other non-metallic mineral products; cement (subset of other non-metallic products); basic metals; steel (subset of basic metals); aluminium (subset of basic metals).

CARMEN[253]'s capability is to evaluate the short-term economic effects of external shocks, delivering outcomes with detailed insights by industry and specific regions.

CARMEN's main input is the FIGARO-REG Multi-regional Input-Output (MRIO) table, a comprehensive economic database that covers 240 EU regions (NUTS2), 48 non-EU regions (Norway and United Kingdom), and 16 main non-EU trading actors, with data for 56 industries (Garcia Rodriguez et al., 2023).

The FIGARO-REG tables encompass a complete description of all bilateral trade flows between the above mentioned 288 regions, for intermediate and final uses, as well as with other non-EU countries. This allows to measure the gross value added (GVA[254]) embodied in exports or in the final demand of specific products by NUT2 region. As such, it enables an understanding of the potential impact that economic shocks may have on activities in different regions. Therefore, the findings of this study here should be interpreted as a detailed snapshot of trade in terms of value added, rather than as an analysis of the effects of policy shocks on GVA.

Output multipliers measure the total change in production resulting from a one-unit change in the final use of a specific product. In this exercise, we calculated GVA multipliers as shown in Miller and Blair (2022) to estimate intraregional (i.e. regional value added generated within the energy-

[253] Other modules are related to the territorial impact analyses of supply chain disruptions of economic activities (Rueda-Cantuche et al., 2024a) or the analysis of the EU regional trade exposure to specific protectionist measures of non-EU countries (Rueda-Cantuche et al., 2024b).

[254] GVA is obtained as the sum of gross operating surplus, compensation of employees and other taxes less subsidies on production.

intensive industries cluster); interregional (i.e. regional value added generated by the interactions of the EIIs cluster with all non-energy-intensive industries outside the cluster) and feedback (i.e. value added generated by the interactions between non-energy-intensive industries outside the cluster) effects.

1.2. FIDELIO

JRC contribution with the FIDELIO (Full Interregional Dynamic Econometric Long-term Input-Output) model

FIDELIO stands for Fully Interregional Dynamic Econometric Long-term Input-Output model. It is a dynamic general equilibrium model developed by the JRC that has been used in this Impact Assessment to model the economic and competitiveness impacts of introducing Low-carbon and Made in EU requirements for steel, cement and aluminium in the construction and automotive industries in the EU.[255] FIDELIO (Rocchi et al., 2025)[256] is a general equilibrium model which provides results based on external "shocks" to the economy, which are then transmitted to the rest of the economy according to the model specifications, using the Eurostat's official statistics on input-output tables for the European Union - FIGARO database (Rueda-Cantuche and Remond Tiedrez, 2019[257]).

For simulating the impacts of low-carbon and Made in EU requirements for aluminium and steel, FIDELIO was used in combination with the FIGARO-E3 database (Cazcarro et al., 2025); a disaggregation of the Eurostat's global FIGARO input-output tables (Remond-Tiedrez and Rueda-Cantuche, 2019) that includes such materials explicitly represented.

Two scenarios were modelled:

- **Scenario 1:** the transition to *low-carbon requirements* within the FIDELIO framework is modeled as a shift towards higher-cost sustainable inputs. The "green premium" is incorporated into sectoral production costs by applying targeted cost shocks[258] to key industries (steel and aluminum procurement in the automotive sector (C29), as well as to cement, steel, and aluminum in the construction industry (F)). The results are then implemented when public intervention is present i.e. in public procurement or public support schemes (LEAD_EII_1 and LEAD_EII_2), as well as for the entire market, irrespective of the public intervention in the automotive and construction sectors. (LEAD_EII_3)
- **Scenario 2:** a '*Made in EU'* scenario of 85% European content requirement for steel, 70% for aluminium and 95% for cement is implemented to construction and automotive production (LEAD_EII_3).

The following assumptions were used:

- EU Member States can do a different effort to achieve the EU target, notably influenced by what the previous EU content of their production activities was before the policy implementation.
- Directly impacted downstream industries are automotive and construction.

Temporal profile to reflect gradual implementation:

- Scenario 1 assumes a gradual increase until 2030.

[255] Further information on FIDELIO and its underlying equations and data can be found in the FIDELIO manual

[256] Rocchi et al. (JRC) (2025). FIDELIO Manual: Model description, equations, data sources and econometric estimations.

[257] Remond Tiedrez (Eurostat) (2019). European Union inter-country supply, use and input-output tables — Full international and global accounts for research in input-output analysis (FIGARO).

[258] The calibration of these shocks resulted in estimated EU average price increases of 0.225% for automotive products and 0.45% for construction, reflecting the anticipated inflationary impact of the green transition.

- Scenario 2 assumes that the policy measure starts in 2025, gradually increasing until 2028, remaining constant until 2035 and fading from 2036 onwards. This reflects the anticipation of the activities by public authorities with the legislative proposal of the Commission adopted, but only a real entry into force of these provisions by 2028. The fact that this obligation fades post-2036 is here to reflect that such requirements will be subject to a review clause that could phase out these policy measures.

1.3. SMILE EU

JRC contribution with the SMILE EU (Single Market Integration through a MIcroeconomic LEns)

SMILE EU (Single Market Integration through a MIcroeconomic LEns) is a set of analytical and quantitative tools on market efficiency and microeconomic behaviour to provide tailor-made answers related to industrial, innovation and employment policies. At its core, there is a macroeconomic model where economic outcomes are the result of microeconomic decisions made by heterogeneous firms and/or households. In SMILE EU, the micro drives the macro. The impact assessment builds on various tools developed within SMILE EU. It leverages the methodology developed to disaggregate input-output data, which provides science-to-policy evidence at a more granular level.

JRC uses the econometric model behind to disentangle the production technology of EVs (electric vehicles) and ICE (internal combustion engine) vehicles from the macroeconomic industry C29 (Manufacture of motor vehicles, trailers and semi-trailers). The results also unveil the differences in the global value chain of EU car manufacturers when producing EVs as opposed to ICE vehicles. JRC utilised the modelling capabilities behind SMILE EU to account for how policy affects the microeconomic decisions of firms and households. Consumer reactions to prices, substitution between ICEs and EVs, and competition between EU and non-EU car manufacturers are crucial to get a comprehensive picture of the aggregate effects. The different mechanisms that come into place inform policymakers of the suitability of various instruments that can mitigate the side effects of the policy.

As with any modelling exercise, the scenarios analysed are a simplification of the reality. In the case of vehicle components, only one "average" EV (and one average ICE) is modelled (full battery EVs cannot be differentiated from other EVs such as plug-in EVs or fuel cell EVs). It is also assumed the same production technology (same input) to produce a vehicle over the years. Nevertheless, some of the modelling assumptions are relaxed through the analysis of two different scenarios on vehicle components (accounting for different potential reactions of non-EU manufacturers) – see Annex 14 – and a sensitivity analysis of key parameters (elasticities of demand and of substitution) is performed – see Annex 15.

1.4. JRC-GEM-E3

JRC assessment of environmental impact LEAD_VC using the JRC-GEM-E3 model

In a reference scenario which includes current policies[259], the JRC-GEM-E3 model projects the emission intensity (emissions including from electricity use divided by output) in the "Manufacture of motor vehicles, trailers and semi-trailers" sector in regions from which the EU imports vehicles to be at least twice as high as in the EU in 2025. This efficiency gap is projected to increase over time as the emission intensity in the EU declines faster than outside the EU. This intensity does not

[259] European Commission (2024). Commission Staff Working Document: Impact Assessment Report Part 1. Accompanying the document: Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Securing our future: Europe's 2040 climate target and path to climate neutrality by 2050, building a sustainable, just and prosperous society, SWD/2024/63 final.

contain the whole vehicle value chain. The difference in the emission intensity is used to calculate changes in emission from the production of vehicles.

1.5. SCAN

SCAN (Supply Chain Alert Notification), developed by DG GROW, complements these models by monitoring supply chain distress across the EU. It is an indicator-based quantitative system designed to detect early signs of shortages or inflationary pressures in strategic products and sectors. The SCAN combines:

- High-frequency indicators (Block 1), which track import prices and quantities using customs data updated every two weeks, identifying products that show a simultaneous rise in import prices and fall in import volumes as potential distress cases; and
- Structural indicators (Block 2), which assess ex-ante risks based on import concentration (Herfindahl-Hirschman Index), dependency on non-EU suppliers, and substitutability with EU production, using COMEXT and PRODCOM data.

At the sectoral level, the SCAN also integrates short-term business statistics and business surveys to identify industries where firms report material and equipment shortages, enabling a cross-check between quantitative and qualitative evidence.

In this Impact Assessment, SCAN indicators were used to assess the exposure of the EU's energy-intensive industries (EIIs) to external supply disruptions and dependencies

2. Analysis of impacts

All costs in this Impact Assessment are presented for the year 2030. The Impact Assessment explores measures in a short to medium term to be re-evaluated in 2030 to assess the success of the measures. As such, 2030 is identified as key year to measure potential impacts on costs and benefits.

Annex 15 provides a sensitivity analysis for some of the values analysed below to provide a full spectrum of potential cost impacts.

2.1. Administrative costs and benefits

- For the purpose of this exercise, it is assumed that the one-off costs and savings occur in 2030. In reality, however, these are expected to be incurred closer to the date of entry into force.
- Full Time Equivalents (FTEs were established based on internal Commission analysis. The hourly wage for Member States and businesses was estimated at EUR 29.4 /h. The European Commission costs per FTE are EUR 194 000/year.[260] The number of companies participating in public procurement was assumed to be 18% of total companies operating in the EU.[261]
- **LEAD_EII:** The number of affected automotive, battery and solar manufacturing companies was estimated based on available data on companies present in the European market.
  The number of affected construction companies in the context of administrative costs are limited to large and medium sized companies, due to limited compliance requirements only applicable to large and medium sized companies. The administrative costs shown for automotive manufacturers combines all impacts derived from different measures on steel, batteries and vehicle components jointly, under the EII table below. Public procurement measures are limited to purchase/lease, not services.

[260] Based on internal Commission documents.
[261] Uni Europa (2025), European data shows: companies fear lowest price tendering

- **LAB:** While the use of LAB 2 is voluntary by design, compliance for LEAD_EII measures on low-carbon steel would require the use of the label, or equivalent, to show compliance with the low-carbon measures. In this regard, the costs for LAB have been assigned to relevant steel sites. The low-carbon steel label costs for businesses can be estimated using the cost structure from ResponsibleSteel. This estimate took the average between costs for normal and large companies, resulting in a yearly approximate cost of EUR 6 700 per steel site.[262] Recurrent administrative costs of demonstrating compliance with steel label would be limited as companies are already obliged to report on relevant data under the EU ETS.

- **PERM**: The cost savings from implementing a digitally integrated permit granting process are calculated based on the study on business procedures carried out to underpin the Single Digital Gateway impact assessment[263]. It concluded that for 9 procedures, the cost savings for all EU businesses (EU business in 2023 represented 33 million enterprises[264]), - if e-procedures were introduced where missing - would be in the order of magnitude of EUR 6.5 billion for domestic users (i.e. 433.3 million for the 2.2 million businesses in the manufacturing sector). Following an adjustment to the EUR 6.5 billion to assume an average of 5 permit- granting procedures (average number of permits requested for industry), and assuming the costs for all procedures is equal, this could translate into savings of EUR 240 million specifically for the manufacturing sector for an average of 5 procedures.
- **For administrations,** benefits for national administrations from digitalising procedures proved difficult to assess, as the benefit figures can vary a lot (see tables 6.4 and 6.5 for the savings through digitalised procedures in the Single Digital Gateway Impact Assessment[265]).The reference values (EUR 79.4 million[266]) come from The Netherlands, which equals 6.1% of the EU's GDP.[267] To have a more nuanced and proportionate representation between the different Member States and their economic sizes -as a proxy to the use of this permitting systems by companies- a calculation based on Netherlands GDP in relation to the EU total is done (6.1% out of the EU 100%).
- It is difficult to give a meaningful figure for replacing an existing off-line procedure by an on-line version without considering the specific context of each Member State, and their level of digitalisation. The costs of moving procedures online vary widely depending on the complexity of the procedure, the availability of digitalised process infrastructure, and whether we are talking about both front end (user interface) or both front end and back office (processing of the data by the administrations involved).
- Moreover, in the absence of concrete data on digitalisation of industrial permitting, an approximation is taken with the digitalisation of business procedures in the framework of the Single Digital Gateway Impact Assessment to give a range.

LEAD_EII

LEAD_EII	Difference to the baseline		
	PO1	PO2	PO3
Member States			

[262] Responsible Steel Certification: cdn.prod.website-files.com/6538e481169ed7220c330f0a/6602e990a68fb2bab0a7ce49_Certification-Fees.pdf
[263] SWD/2017/0213 final - 2017/086 (COD)
[264] Large businesses make up only 0.2% of EU enterprises - News articles - Eurostat
[265] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52017SC0213#footnote176
[266] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52017SC0213#footnote176
[267] https://european-union.europa.eu/principles-countries-history/eu-countries/netherlands_en

LEAD_EII	Difference to the baseline		
	PO1	**PO2**	**PO3**
Administrative costs (recurring)	*Low-carbon and Made in EU requirements in public procurement:* 2 FTE (yearly) x 27 Member States Total cost: EUR 3.3 million (Vehicle requirements include batteries and vehicle components)	*Low-carbon and Made in EU requirements in public procurement:* 2 FTEs (yearly) x 27 Member States Total cost: EUR 3.3 million (Vehicle requirements include batteries and vehicle components)	*Low-carbon and Made in EU requirements in public procurement:* 2 FTEs (yearly) x 27 Member States Total cost: EUR 3.3 million (Vehicle requirements include batteries and vehicle components)
Businesses			
Administrative costs (recurring)	*Low-carbon requirements:* ¾ week FTE for automotive (low-carbon) No. of automotive OEMs: 13 (70 OEMs[268] x 18%) ½ weeks FTE for construction (low-carbon) No. of construction companies: 1 121 (6 229[269] large and medium sized companies x 18%) Total automotive cost: EUR 11 113 Total construction cost: EUR 659 277 **Total cost: EUR 670 391**	*Low-carbon and Made in EU requirements:* 1 week FTE for automotive (low-carbon + made in EU) No. of automotive OEMs: 13 (70 OEMS x 18%) ¾ weeks FTE for construction procurement (low-carbon + made in EU) For low-carbon reporting only, no. of FTEs as in PO1 No. of construction companies: 1 121 (6 229 large and medium sized companies x 18%) Total automotive cost: EUR 14 818 Total construction cost: EUR 988 916	*Low-carbon and Made in EU requirements:* For low-carbon + made in EU reporting, no. of FTEs as in PO2 No. of automotive OEMs: 70 No. of construction companies: 6 229 Total automotive cost: EUR 82 320 Total construction cost: EUR 5.49 million **Total cost: EUR 5.57 million** *Low-carbon steel label:* Certification: EUR 6 700/year No. of steel sites certified: 23

[268] S&P Database
[269] EUROSTAT (NACE Rev. 2)

LEAD_EII	Difference to the baseline		
	PO1	**PO2**	**PO3**
	Low-carbon steel label: Certification: EUR 6 700 / year No. of steel sites certified: 4 (23 steel sites[270] x 18%) **Total cost: EUR 27 738**	**Total cost: EUR 1 million** *Low-carbon steel label:* Certification: EUR 6 700 / year No. of steel sites certified: 23 **Total cost: EUR 154 100**	**Total cost: EUR 154 100**
European Commission			
Administrative costs (recurring)	½ month FTE Total cost: EUR 8 083 (Covering all lead market provisions)	1 month FTE Total cost: EUR 16 167 (Covering all lead market provisions)	1.5 month FTE Total cost: EUR 24 250 (Covering all lead market provisions)

LEAD_BAT

LEAD_BAT	Difference to the baseline		
	PO1	**PO2**	**PO3**
Member States			
Administrative costs (recurring)	*Made in EU requirements in public procurement/ auctions:* BESS: ¼ year FTE Total cost: EUR 412 776		*Made in EU requirements in public procurement/auctions:* BESS: ¼ year FTE Total cost: EUR 412 776
Businesses			
Administrative costs (recurring)	*Made in EU requirements:* BESS: ½ week FTE		*Made in EU requirements:* BESS: ½ week FTE

[270] The number of steel sites was based on internal Commission analysis of projected low-carbon steel projects in the EU

LEAD_BAT	Difference to the baseline		
	PO1	PO2	PO3
	No. of companies affected: 4 (20 BESS manufactures[271] x 18%) Total cost: EUR 2 117		No. of companies affected: 20 BESS manufactures Total cost: EUR 11 760

LEAD_SOL

LEAD_SOL	Difference to the baseline		
	PO1	PO2	PO3
Member States			
Administrative costs (recurring)	*Made in EU requirements in public procurement/auctions:* 1/2 year FTEs x 27 Member States Total cost: EUR 825 552		*Made in EU requirements in public procurement/auctions:* 1/2 year FTEs X27 Member States Total cost: EUR 825 552
Businesses			
Administrative costs (recurring)	*Made in EU requirements:* 1/2 week FTE No. of companies affected: 5 (25 large utilities[272] x 18%) Total cost: EUR 2 646		*Made in EU requirements:* 1/2 week FTE No. of companies affected: 25 large utilities Total cost: EUR 14 700

LAB

LAB	Difference to the baseline		
	PO1	PO2	PO3
Businesses			

[271] Europe Battery Energy Storage System (BESS) Companies - Top Company List

[272] SolarPower Europe webpage. Our Members.

Administrative costs	EUR 0	EUR 0 (voluntary label), however, the cost of steel label certification is included under LEAD_EII administrative costs, as steel sites must obtain low-carbon steel certification to comply with lead market provisions	
European Commission			
Administrative costs (one off)	4 FTE Total cost: EUR 776 000	2 FTEs Total cost: EUR 388 000	

INV

INV	**Difference to the baseline**		
	PO1	**PO2**	**PO3**
Member States administrations			
Administrative costs (recurring)		*FDI conditionalities* 1 year FTE x 27 Member States Total cost: EUR 1.65 million	
Businesses			
Administrative costs (one off)	EUR 0 (voluntary)	*FDI conditionalities* 1 month FTE No. of companies affected: 25 battery companies[273] for notification and documentation of compliance with conditionalities. **Total cost: EUR 117 600**	
European Commission			
Administrative costs (recurring)	½ year FTE Total cost: EUR 97 000	3/4 year FTE Total cost: EUR 145 500	

[273] Operational, announced and under construction battery factories. Source: internal Commission documents

PERM

PERM	Difference to the baseline		
	PO1	**PO2**	**PO3**
Member States			
Administrative costs (recurring)	*Single Digital Gateway:* Up to EUR 40 000 annually per section x 27 Member States Total cost: EUR 1 080 000 million		
Administrative savings (recurring)	*Digitalisation of permitting procedures* Up to 79.4 million[274] for one Member State (the Netherlands as reference), which accounts for 6.1% EU GDP.[275] Therefore, for the entire EU's GDP, up to EUR 1.3 billion for Member State administrations. Total savings: Up to EUR 1.3 billion[276]		
Businesses			
Administrative savings **(one-off)**	*Digitalisation of permitting procedures* EUR 240 million, annualised at 28.14 million over a 10-year period		
European Commission			
Administrative costs (one-off and recurring)	*Single Digital Gateway:* Investment in the back-end SDG system EUR 20 000 (one –off) EUR 20 000 for expanding Annex I of the SDGR with permitting (Your Europe Portal – recurring) **Total cost: EUR 40 000**		

[274] European Commission (2017). Commission Staff Working Document - Impact Assessment Accompanying the Document. Proposal for a Regulation of the European Parliament and of the Council on establishing a single digital gateway, COM(2017) 256 final, Brussels, 2 May 2017, table 6.6.

[275] European Union webpage. Netherlands.

[276] This figure could be an overestimation, as it is based on business procedures with a volume of at least 100 000 transactions and costs for the procedure at hand can vary greatly. The reference values (EUR 79.4 million) come from The Netherlands's feedback to the Single Digital Gateway Impact Assessment. To have a more nuanced and proportionate representation between the different Member States and their economic sizes, we use the EU's GDP as a proxy to the use of permitting systems by companies. A calculation based on Netherlands's share of the EU's GDP in relation to the EU total is done (6.1% out of the EU 100%. (79.4x100)/6.1= 1.3 billion).

AREA	Difference to the baseline		
	PO1	PO2	PO3
Member States			
Administrative costs (recurring)	EUR 0 (voluntary)	*Designation of industrial area* 1 FTE x 27 Member States Total cost: EUR 1.65 million	

Administrative costs total

TOTAL	Difference to the baseline					
	PO1		PO2		PO3	
	One Off	*Recurring*	*One Off*	*Recurring*	*One Off*	*Recurring*
Member States	EUR 0	EUR 5.62 million	EUR 0	EUR 8.92 million	EUR 0	EUR 8.92 million
Businesses	EUR 0	EUR 702 891	EUR 117 600	EUR 1.16 million	EUR 117 600	EUR 5.76 million
European Commission	EUR 796 000	EUR 125 083	EUR 408 000	EUR 181 667	EUR 408 000	EUR 189 750
Total Administrative Costs	EUR 796 000	EUR 6.45 million	EUR 525 600	EUR 10.27 million	EUR 525 600	EUR 14.87 million
Member states	EUR 0	EUR 1.3 billion	EUR 0	EUR 1.3 billion	EUR 0	EUR 1.3 billion
Business	EUR 240 million	EUR 0	EUR 240 million	EUR 0	EUR 240 million	EUR 0
European Commission	EUR 0	EUR 0	EUR 0	EUR 0	EUR 0	EUR 0
Total Administrative Savings	EUR 240 million	EUR 1.3 billion	EUR 240 million	EUR 1.3 billion	EUR 240 million	EUR 1.3 billion

2.2. Adjustment costs

LEAD_EII

Assumptions taken for adjustment costs for the **automotive sector**:

Low-carbon provisions:

Price increase:

- The adjustment cost for a midsize passenger vehicle is estimated to range from 0.3% to 0.7% of the final price, with a 100% low-carbon steel depending on the decarbonisation pathway.[277] A 25% low-carbon steel target would see a price increase ranging from 0.075% to 0.175% (EUR 28 – 65 per passenger vehicle).
- Based on assumptions regarding future increases in the levelized cost of low-carbon aluminium production[278], the use of 100% low-carbon aluminium is projected to increase the cost of a new EV by approximately 0.32%.[279] Accordingly, a 25% low-carbon aluminium target would be expected to result in only a 0.08% to 0.10% or EUR 22.6 increase in the price of a new light commercial EV.
- An average price increase of 0.225% is taken for the calculation of total costs from low-carbon steel and aluminium. Therefore, a price increase of **EUR 69.27** per vehicle can be expected for commercial and light commercial vehicles for both materials.
- Final costs/benefits are calculated with the percentage change estimated of different sectors' GVA from FIGARO data per Member State and monetised.

Made in EU provisions:

- Made in EU costs are obtained from the FIDELIO modelling results (please see Annex 4 section 1.2 for more information on the model used) of the different sectors' GVA, which are presented both in percentage compared to baseline and monetised.

Assumptions taken for adjustment costs in the **construction sector:**

Low-carbon provisions:

Price increase:

- Low-carbon steel estimates can result in a price increase ranging from 0.1% to 1.2% for public procurement works depending on the type (office buildings or steel halls), based on 100% low-carbon steel.[280]
- An assumption is taken that the premium associated with low-carbon steel in the construction sector accounts for 1% of total building costs. Therefore, a 25% low-carbon steel target would lead to a price increase of 0.25%
- Assumptions for low-carbon cement or concrete on the final price of a house or construction project can range from less than 1% to 3% increase for a 100% low-carbon cement or

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[277]BCG (2022). Transforming the Steel Industry May Be the Ultimate Climate Challenge.

[278] Mission Possible Partnership (2022). Making net-zero aluminium possible. An industry-backed, 1.5ºC-aligned transition strategy.

[279] Underlying assumptions were that the average cost of an EV in 2030 is approximately EUR 28.500 (internal estimation, JRC) and an EV utilizes 0.31 tonnes of aluminium in 2030 (European Aluminium). The cost for ICE or other types of motors will be lower as the electric motor is a key driver for aluminium usage in the overall amount per car.

[280] JRC (2024). Draft preparatory study on iron and steel – ecodesign measures under the ESPR; Global Efficiency Intelligence, TransitionAsia and Solutions for Our Climate (SFOC) (2024). Green Steel Economics.

concrete[281]. With 2% average increase, a 5% low-carbon cement target would result in a 0.10% increase in a construction project.

- In the absence of construction-sector-specific data, the cost increase associated with low-carbon aluminium is assumed to mirror that observed in the automotive sector. On this basis, a price increase of approximately 0.1% is projected.
- Based on the low-carbon targets proposed, the price increase for combining both low-carbon steel, aluminium and cement is therefore projected at an average 0.45%.

Cost distribution:

- No available information was found on the market segment covered by public support schemes for EU construction. Therefore, cost calculations are always a hard split between public procurement (PO1/PO2) and the full market (PO3).

Made in EU provisions:

- Costs linked to Made in EU measures are obtained from the FIDELIO modelling results (please see Annex 4 section 1.2 for more information on the model used) of the different sectors' GVA, which are presented both in percentage compared to baseline and monetised.

LEAD_EII	Difference to the baseline		
	PO1	**PO2**	**PO3**
Member States administrations			
Adjustment costs (recurring)			
Citizens/Consumer			
Adjustment costs (recurring)			
Businesses			
Adjustment costs (recurring)	*Low-carbon measures:* Automotive EUR 291 million GVA Construction EUR 691 million GVA	*Low-carbon measures:* Automotive EUR 291 million GVA Construction EUR 691 million GVA *Made in EU measures:* No GVA change[282]	*Low-carbon measures:* Automotive EUR 396 million GVA Construction EUR 2 229 million GVA *Made in EU measures:* EUR 6 651 million for *automotive* sector from Made in EU requirements

[281] Agora Industry (2024). Creating markets for climate-friendly basic materials. Potentials and policy options, p. 13; Bellona Foundation (2018). Building with Low Carbon Cement is Affordable.

[282] Assuming traditional supply chains for steel, aluminium and cement remain the same, the domestic supply for these materials is already higher than the proposed targets for PO2. Therefore, no additional costs would be expected from Made in EU requirements, only from the additional low-carbon cost.

LEAD_EII	Difference to the baseline		
	PO1	**PO2**	**PO3**
			EUR 13 996 million for *construction* sector from Made in EU requirements

LEAD_SOL

Assumptions taken for adjustment costs:

- Assumptions of a deployment rate of 65 GW by 2030, using 2024 deployment rates which could go down, in which case the costs would decrease respectively.
- The costs associated with auctions and public procurement are assigned to Member States, while citizens and consumers are attributed costs related to public support schemes and the non-supported market. By the time the provisions enter into force we could expected that the Chinese solar module price stabilises to sustainable levels of 15.9 € ct/W□
- Under NZIA rules diversification would kick in and we assume this would come from Southeast Asia for which prices are calculated at 16.5 € ct/W□ for fully Southeast Asian solar modules.
- Final price of EU modules will depend on the Member State application of the Competitiveness Fund options and CISAF, as it would impact CAPEX and OPEX of the manufacturers and thus the final price. But as this is uncertain, the SolarPower Europe and Fraunhofer study [283] offers the following minimum sustainable price (MSP) range:
    - 19 € ct/W□: NZIA EU components with polysilicon and ingot wafer from CN.
    - 13.2 € ct/W□: South East Asia (SEA) cell and module with polysilicon and ingot wafer from CN.
- The EU solar market is assumed to be split as follows:
    - Public procurement is assumed to account for 3% of the PV capacity deployed.
    - Renewable energy auctions are assumed to account for 19% of the PV capacity deployed.
    - Public support schemes are assumed to account for 12% of the PV capacity deployed.

Two different price scenarios compare the cheapest alternative for PV (e.g. Chinese imports) to a European NZIA-compliant PV with polysilicon and wafers / ingots from China.

- 65 GW of Chinese modules: EUR 10.335 billion
- 65 GW of European products with poly-wafer come from China: EUR 12.35 billion

The delta between them is EUR 2.015 billion for 65 GW of solar PV, which is broken down per market segment as follows:

- Public procurement: 0.03 × 2.015 = EUR 0.06045 billion
- Auctions: 0.19 × 2.015 = EUR 0.38285 billion
- Schemes: 0.12 × 2.015 = EUR 0.2418 billion
- Private procurement: 0.66 × 2.015 = EUR 1.3299 billion

LEAD_SOL	**Difference to the baseline**		
	PO1	PO2	PO3

[283] SolarPower Europe and Fraunhofer (2025). Reshoring Solar Module Manufacturing to Europe.

Member States		
Adjustment costs (recurring)	Public procurement: EUR 60.45 million Auction margins decrease by: EUR 382.85 million	Public procurement: EUR 60.45 million Auction margins decrease by: EUR 382.85 million
Citizens/Consumer		
Adjustment costs (recurring)	Public support schemes: EUR 241.8 million	Public support schemes: EUR 241.8 million Other PV placed on the market: EUR 1.33 billion

LEAD_BAT

Assumptions taken for adjustment costs:

- The total adjustment costs compare the average cost of manufacturing the same battery chemistries (i.e., localised battery cells, cathodes and anodes) in the current cheapest market, China, with those manufactured in the EU with a cost differential ranging from 26% to 50% (see Annex 9). These costs do not take into account the phased approach, which would reduce the impact on prices during the first years of entry into force.
    - Battery cell manufactured in China by Tier 1 manufacturers (i.e., 60 EUR/kWh in 2024).
    - Battery cell manufactured in in the EU with localised CAM (Cathode Active Material) and AMM, (i.e., 75.6-90 EUR/kWh).
- Import costs of 10% over the total costs are assumed for the Chinese batteries.
- Additionally, global price decreases in batteries have been accounted for, as these are expected to drop significantly in the upcoming years. As battery cell costs decline over time, the total cost differential with China is expected to decrease, ranging between 11-21 EUR/kWh in 2028, 9-17 EUR/kWh in 2030, and between 6-12 EUR/kWh in 2035.
- The baseline scenario assumes that only currently operational facilities and their expansions are considered active by 2030 (i.e. none of the current battery project currently under construction, announced or on-hold are considered). As a result, unmet demand is assumed to be covered by imports from China.
- For BESS, since the requirements on the battery cell will enter into force by 2030 and the EU battery production is currently focused on EV batteries, the entire demand in the baseline scenario is assumed to be met through Chinese imports, and cost comparisons are made accordingly.
- Adjustment costs are passed down from the downstream sectors or business to final consumers, this being either citizens or Member States.

The costs are calculated based on demand projections for both EVs and BESS in kWh and manufacturing costs expressed in EUR/kWh. Therefore, final impact on price can be calculated for all applications by assuming the average battery power pack.

Cost comparison 2024-2035	2024	2028	2030	2035
Cost difference EV passenger car (average 68 kWh)	EUR 653-1632	EUR 457-1142	EUR 360-900	EUR 268-670

Cost difference EV truck (average 279 kWh)[284]	EUR 2678-6696	EUR 1875-4687	EUR 1477-3691	EUR 1099-2747
Cost difference EV bus (average 441 kWh)	EUR 4233-10584	EUR 2964-7409	EUR 2334-5835	EUR 1737-4342

Figure: Cost comparison for EVs equipped with batteries using EU-made battery cells with locally sourced CAM and AAM, compared to using Chinese imports.

Total adjustment costs have been calculated based on the market distribution assumptions expressed below:

- Assumptions of the market distribution between EVs
  - 3.5% through public procurement
  - 80.2% public schemes, of which 60% are for corporate consumers and 20.2% for private consumers.
  - 16.3% through consumers.
- Assumptions of the market distribution for BESS
  - 5% through BESS auctions
  - 95% through consumers (57% citizens and 38% companies)

In LEAD_BAT 1, for those consumers, private or corporate, choosing to buy vehicles without European batteries, the price would not be impacted but would not benefit from a public subsidy either. This means that the total cost calculated for consumers is only a theoretical maximum, not considering consumer decisions, and based on the assumption that the demand side incentives will continue to cover part of the European EV demand.

LEAD_BAT	Difference to the baseline		
	PO1	**PO2**	**PO3**
Member States administrations			
Adjustment costs (recurring)	Auctions for BESS (5% of total BESS demand): EUR 26 – 66 million (average EUR 46 million) Public procurement for EVs (3.5% of total EV demand): EUR 132 – 331 million (average EUR 231.5)		Auctions for BESS (5% of total BESS demand): EUR 26 – 66 million (average EUR 46 million) Public procurement for EVs (3.5% of total EV demand): EUR 132 – 331 million (average EUR 231.5)
Citizens/Consumer			
Adjustment costs (recurring)	Public subsidy schemes for EVs[285] (20.2% of total EV demand): EUR 292-730 million (average EUR 511 million)		BESS (57% of total BESS demand): EUR 282-706 million (average EUR 494 million)

[284]Weighted average truck battery pack size and cost, 2020-2024, IEA

[285] We assume that there is public support to buy EV vehicles in Europe for corporate purchases. In contrast, public support is only available for consumers in Austria, Belgium, Croatia, Cyprus, Czechia, Estonia, France, Greece, Hungary, Ireland, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Slovenia, Spain, and Sweden (ACEA, 2025). Against this background, we estimate that LEAD_VC 1 would affect 80.2% of EV registrations, including 60.0% from corporate purchases, and 20.2% from consumers.

LEAD_BAT	Difference to the baseline		
	PO1	**PO2**	**PO3**
			EVs (36.5% of total EV demand): EUR 0.5 – 1.3 billion (average EUR 0.9 billion)
Businesses[5]			
Adjustment costs (recurring)	Public subsidy schemes for EVs (60% of total EV demand): EUR 0.9-2.2 billion (average EUR 1.55 billion)		BESS (38% of total BESS demand): EUR 107-268 million (average 187.5) EVs (60% of total EV demand): EUR 0.9-2.2 billion (average EUR 1.55 billion)

LEAD_VC:

The following assumptions have been taken to calculate adjustment costs:

- On one hand, vehicles produced outside Europe will likely not be able to comply with the measure, given their current very low EU content (below 20%). On the other hand, vehicles produced in Europe will likely be able to comply with the measure, eventually at a cost, given their current EU content (70%). As a proxy, non-EU manufacturers will be assumed to be non-compliant, meaning that in this case, they will lose access to public procurement and the subsidies, whereas EU manufacturers will be assumed to be compliant, maintaining access to public procurement and the subsidies.[286]
- Non-EU manufacturers will face a relative price increase as a result of EU buyers losing access to public subsidies.
- The public subsidies that are no longer accessible to buyers of non-EU manufactured vehicles are partially redistributed. The model assumes that 50% of this liberated amount is going to increase the available subsidies/vehicle for EU manufacturers.[287]
- There is an aggregate demand effect as the measure affects average price.
- There is a substitution between ICE and EVs and substitution between EU and non-EU manufacturers
- The presented scenarios take into account obligation to sell only zero-emission vehicles in 2035.[288]
- We consider for this impact assessment a 30% price premium for EU-manufactured components compared to import prices.
- This calculation does not take into consideration the price increase as a result of Made in EU requirement on the electric batteries set out in LEAD_BAT of this proposal nor in LEAD_EII.

Non-EU vehicle manufacturers will not be able to access public procurements or benefit from support schemes. In the latter case, they will not be able to cover the loss of subsidies coming from

[286] Definition of EU and non-EU manufacturers has been derived from PRODCOM and COMEXT databases.
[287] As a baseline, this Impact Assessment assumes EUR 14 billion of public subsidies for passenger cars and LCVs, which is based on existing public support schemes already put in place. The findings of CEEPR in the Global Clean Investment Monitor: Government Support for Electric Vehicles and Batteries - CEEPR (2025). In the model, it is assumed that 50% of the subsidies that would have been used for non-EU manufacturers is redistributed among the EU manufacturers. The model is taking into account the fact that Member States may decide to allocate the liberated resources elsewhere, hence for the sake of a conservative calculation, it is assumed that only 50% of this liberated amount is used to subsidy EU manufacturers.
[288] European Commission. Fit for 55.

the support schemes and the prices of their vehicles will increase by the amount of the lost subsidies. In other words, consumers will face a price increase equalling the lost subsidies for non-EU vehicles.

Calculations are made for both 2027 and for 2030 – using the assumption that the share of made in Made in EU would increase gradually over time from 70% in 2027 to meet the second target of 75% set out for 2030.

Under LEAD_VC 1, the measure focuses on vehicles that are impacted by public procurement and public subsidies. We estimate that this scenario would affect 83.7% of EVs put on the EU market, which includes all vehicles either publicly procured or supported by a public scheme in Europe.[289]

Under LEAD_VC 2, we assume that 100% of the EVs put on the market will be impacted.

Light Commercial Vehicles (LCVs):

In the case of LCVs[290], due to the unavailability of data, for the sake of this Impact Assessment, the same assumptions apply as set out at the beginning of this Section.

Heavy Duty Vehicles (HDVs):

In the HDV[291] segment, the Impact is difficult to assess due to the unavailability of data and the limitations of the applied model when it comes to estimating the current share of Made in EU in this vehicle segment. For this reason, the same assumptions are taken as for the passenger cars for the sake of this Impact Assessment.[292] Anecdotal evidence suggests that the Made in EU in HDV is likely to be higher than the assumed requirements, consequently the measure may result in zero cost implications for EU HDV manufacturers, while preserving the positive effect on sales and overall competitiveness. It would also act as a safeguard mechanism in case of a sudden and rapid decrease in European market shares for components.

When measuring the impacts for LEAD_VC, two scenarios were modelled to take into account uncertainties regarding the possible reaction of non-EU manufacturers: one purely based on the *"Internal market reaction*" and an alternative scenario in which *"non-EU manufacturers absorb the price increase"*. The scenario based on the "*Internal market reaction*" was used to assess impacts through the Impact Assessment and are the costs and benefits reflected for final calculations in the adjustment costs table below, as well as final costs throughout all POs. However, for comparative analysis of both scenarios see Annex 14.

<u>Further assumptions taken into account to build the potential scenarios[293]:</u>

The economic impact depends critically on three elements that reflect the reaction of the agents:

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[289] We assume that public and corporate purchases account for 3.5% (JRC technical report, 2022) and 60.0% (COM(2025) 96 final), respectively, of total vehicle registrations in the EU, while the remaining 36.5% corresponds to consumer purchases. We assume that there is public support to buy EV vehicles in Europe for corporate purchases. In contrast, public support is only available for consumers in Austria, Belgium, Croatia, Cyprus, Czechia, Estonia, France, Greece, Hungary, Ireland, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Slovenia, Spain, and Sweden (ACEA, 2025). Against this background, we estimate that LEAD_VC 1 would affect 83.7% of EV registrations, including 3.5% from public procurement, 60.0% from corporate purchases, and 20.2% from consumers.

[290] In this Impact Assessment, LCVs refer to Light Commercial Vehicles below 3.5 tonnes of GVW.

[291] In this Impact Assessment, HDVs refer to 3 sub-categories: Medium Commercial Vehicles (between 3.5 and 32 tonnes of GVW), Heavy Commercial Vehicles (above 32 tonnes of GVW) and Buses (between 20 and 30 tonnes of GVW).

[292] This means that a 70% share of EU content is assumed in the HDV segment as well. Furthermore, owing to limitations of data regarding the amount of public subsidies, for HDVs, we estimate a public subsidy of EUR 1 billion, taking into account already existing schemes in the EU Member States.

[293] When measuring the impacts for LEAD_VC, two scenarios were modelled to take into account uncertainties regarding the possible reaction of non-EU manufacturers: one purely based on the "Internal market reaction" and an alternative scenario in which "non-EU manufacturers absorb the price increase". The scenario based on the "Internal market reaction" was used to assess impacts through the Impact Assessment and are the costs and benefits reflected for final calculations. However, for comparative analysis of both scenarios see Annex 14.

- **Price effect:** Supposes that car manufacturers can pass through a potential increase in cost to prices. In that case, the demand for cars will reduce as the average car price increases. The price elasticity of demand captures this effect.[294]
- **Product substitution:** Supposes that a potential price increase occurs only in the EV segment, the one directly affected by the policy measure. In that case, there could be a substitution in demand for EVs over ICEs if mitigation measures not foreseen, as ICEs become relatively cheaper after the policy is implemented. The product's cross-price elasticity of demand captures this substitution effect. The following matrix of product cross-price elasticity of demand is assumed (Leard and Wu, 2023):

		price	
		ICE	**EV**
quantities	**ICE**	-0.58	0.30
	EV	0.50	-1.50

- **Region substitution:** Supposes that vehicles produced by EU manufacturers benefit from a relative price decrease in comparison with vehicles produced by non-EU manufacturers. This is determined on one hand by the loss of access to public subsidies by non-EU manufacturers, and on the other hand by the expected increase of the available subsidies/vehicle for vehicles produced by EU manufacturers. The region's cross-price elasticity of demand captures this substitution effect. The region substitution within one segment, i.e., ICE or EVs, is larger than the product elasticity across the segments and assume the following matrix of region cross-price elasticity of demand (Leard and Wu, 2023): [20]

		price	
		EU	**non-EU**
quantities	**EU**	-1.23	1.00
	non-EU	1.00	-2.00

Furthermore, the following assumptions were taken into consideration when calculating the cost pass through:

In 2030, EV car sales are expected to reach the following figures:

Type of car	**PO1 & PO2**	**PO3**
Passenger EVs	9 094 347	9 079 484
Light commercial EVs	1 107 046	1 107 463
Heavy duty EVs	156 333	158 009

The projected price increases are estimated at:

Type of car	PO1 & PO2		PO3	
	% increase	Total increase	% increase	Total increase
Passenger EVs	1.2%	EUR 343	1.4%	EUR 400

[294] We assume a demand price elasticity for the car industry of -0.5 (Leard and Wu, 2023). This elasticity implies that a 1% increase in the average car price results in a 0.5% decrease in the number of cars sold in the EU.

Light commercial EVs	0.4%	EUR 91.46	0.5%	EUR 114
Heavy duty EVs	1.2%	EUR 1300	1.4%	EUR 1516.84

The cost distribution of the different market segments follows the same structure as under LEAD_EII for the automotive sector.

To ensure consistency with the assumptions applied in LEAD_EII regarding vehicle cost impacts, the effect of subsidies has not been taken into account in the calculation below.

For the purpose of the exercise, full cost pass through onto consumers is presumed.

LEAD_VC

LEAD_VC	Difference to the baseline		
	PO1	**PO2**	**PO3**
Member States administrations			
Adjustment costs (recurring)	Public procurement for EVs (3.5% of total EV demand): EUR 100.29 million		Public procurement for EVs (3.5% of total EV demand): EUR 139.97
Citizens/Consumer			
Adjustment costs (recurring)	Public subsidy schemes for EVs (20.2% of total EV demand): EUR 690 million		EVs (36.5% of total EV demand): EUR 1.37 billion
Businesses			
Adjustment costs (recurring)	Public subsidy schemes for EVs (60% of total EV demand): EUR 1.249 billion		EVs (60% of total EV demand): EUR 2.49 billion

Cumulative adjustment costs for citizens and businesses (corporate fleets) as consumers (LEAD_EII, LEAD_BAT, LEAD_VC, LEAD_SOL):

Sector	**Impacted Stakeholders**	**PO1**	**PO2**	**PO3**
Automotive - passenger vehicles	Citizens	EUR 1.20 billion	EUR 1.20 billion	EUR 2.77 billion
Automotive - corporate fleet	Businesses[295]	EUR 3.09 billion	EUR 3.09 billion	EUR 11.27 billion

[295] All cost results from LEAD_EII in the automotive sector have been allocated to the automotive industry, in the business category. However, some or all of these costs may be transferred to consumers (either citizens or companies for corporate fleets).

Subtotal – automotive (LEAD_EII, LEAD_VC, LEAD_BAT)		EUR 4.29 billion	EUR 4.29 billion	EUR 14.04 billion
Construction	Citizens & business	EUR 691 million	EUR 691 million	EUR 16.23 billion
Electricity	Citizens	EUR 242 million	EUR 242 million	EUR 1.57 billion

Cumulative adjustment costs for downstream sector[296]:

Downstream sector	PO1	PO2	PO3
Automotive (LEAD_EII, LEAD_VC, LEAD_BAT)	EUR 4.41 billion	EUR 4.41 billion	EUR 14.20 billion
Construction (LEAD_EII)	EUR 691 million	EUR 691 million	EUR 16.23 billion
Electricity utilities (LEAD_SOL, LEAD_BAT)	EUR 729 million	EUR 729 million	EUR 2.91 billion

Cost increase per type of vehicle (LEAD_EII, LEAD_BAT, LEAD_VC):

Type of car	PO1	PO2	PO3
Passenger EVs (LEAD_EII , LEAD_BAT and LEAD_VC)	EUR 1 042.28	EUR 1 042.28	EUR 1 099.44
Heavy duty EVs (LEAD_EII , LEAD_BAT and LEAD_VC)	EUR 4 353.38	EUR 4 353.38	EUR 4 570.07
Passenger ICEs (LEAD_EII)	EUR 59.52	EUR 59.45	EUR 59.45
Heavy duty ICEs (LEAD_EII)	EUR 277.96	EUR 277.96	EUR 277.96

Cumulative administrative and adjustment costs, and benefits for Member States:

Member States	PO1	PO2	PO3
Adjustment Costs	EUR 3	EUR	EUR

[296] Where the costs for the downstream sector are cumulative of the costs reflected under citizens & businesses, and Member States, assuming cost increases are passed down to consumers.

Member States	PO1	PO2	PO3
	821 million	821 million	860 million
Administrative Costs	EUR 5.62 million	EUR 8.92 million	EUR 8.92 million
Benefits	EUR 1.3 billion	EUR 1.3 billion	EUR 1.3 billion
Net benefits	**EUR 473 million**	**EUR 469 million**	**EUR 430 million**

Adjustment costs total

Difference to the baseline			
	PO1	**PO2**	**PO3**
Member States	EUR 821 million	EUR 821 million	EUR 860 million
Businesses	EUR 3.7 billion	EUR 3.7 billion	EUR 27 8 billion
Citizens	EUR 1.4 billion	EUR 1.4 billion	EUR 4.3 billion
Total Adjustment Costs	EUR 6 billion	EUR 6 billion	EUR 32 billion

2.3. Benefits: environmental

LEAD_EII, *LEAD_BAT, LEAD_SOL and LEAD_VC:* In relation to the monetisation of GHG emissions, a cost of carbon is used.[297] Figures underpinning the analysis are below, with the central value used (as most consistent with the climate commitments) and the 2030 value used of 100 EUR per tCO_2eq. This is an approximation, and no variation is made to reflect the time profile of when emissions will occur.

Values in current EUR per tCO_2

	Low	Central	High
Up to 2030	60	100	189
Post 2030	156	269	498

[297] European Commission (2019). Handbook on the external costs of transport.

Summary of LEAD benefits: monetisation of GHG saved

	PO1	PO2	PO3
LEAD_EII (low-carbon steel, cement and aluminium)	Steel: 3.37 Mtonnes CO2 (EUR 337 million) Cement: 0.69 Mtonnes CO2 (EUR 68 million) Aluminium: 0.22 Mtonnes CO2 (EUR 22 million) Total: 4.28 Mtonnes CO2 (EUR 428 million)	Steel: 3.37 Mtonnes CO_2 (EUR 337 million) Cement: 0.69 Mtonnes CO_2 (EUR 68 million) Aluminium: 0.22 Mtonnes CO2 (EUR 22 million) Total: 4.28 Mtonnes CO_2 (EUR 428 million)	Steel: 10.26 Mtonnes CO_2 (EUR 1 025 million) Cement: 2.22 Mtonnes CO_2 (EUR 222 million) Aluminium: 1.1 Mtonnes CO2 (EUR 110 million) Total: 13.58 Mtonnes CO_2 (EUR 1 358 million)
LEAD_BAT	25.6 Mtonnes CO_2 (EUR 2 560 million)	25.6 Mtonnes CO_2 (EUR 2 560 million)	34.17 Mtonnes CO_2 (EUR 3 417 million)
LEAD_VC	0.7 Mtonnes CO_2 (EUR 70 million)	0.7 Mtonnes CO_2 (EUR 70 million)	0.9 Mtonnes CO_2 (EUR 90 million)
TOTAL	**30.58 Mtonnes CO_2** **(EUR 3 058 billion)**	**30.58 Mtonnes CO_2** **(EUR 3 058 billion)**	**48.65 Mtonnes CO_2** **(EUR 4 865 billion)**

LEAD_EII

Emission savings from low-carbon ***steel****:*

- Low-carbon steel calculated at 0.575 t CO_2 / t steel based on the Steel label methodology.
  - Based on the assumption that 50% of steel in 2030 will be produced via the primary route, and 50% via the secondary route.
  - Based on low-carbon steel label developed through the act, with the average primary steel emission factor at 0.9 t CO_2 / t steel and secondary steel at 0.25 t CO_2 / t steel.
- Fossil fuel-based steel calculated at 1.06 t CO_2 / t steel based on the Steel label methodology.
  - Based on the assumption that 50% of steel in 2030 will be produced via the primary route, and 50% via the secondary route.
  - Based on 2019 data of average primary steel emission factor at 1.8 t CO_2 / t steel and secondary at 0.32 t CO_2 / t steel.[298]
- Demand assumptions for 2030:
  - 37% of steel demand coming from construction[299], of which 11% can be attributed to public procurement.[300]

[298] VUB Brussels School of Governance (2024). Public procurement of steel and cement for construction. Assessing the potential of lead markets for green steel and cement in the EU.
[299] EUROFER (2025). European Steel Figures 2025.
[300] VUB Brussels School of Governance (2024). Public procurement of steel and cement for construction. Assessing the potential of lead markets for green steel and cement in the EU.

- 20% of steel demand coming from automotive[301], of which 73.6% can be attributed to public procurement and subsidy schemes.[302]
- Total EU steel demand in 2030 estimated at 150 Mtonnes.[303]

Emission savings from low-carbon ***aluminium****:*

- Based on the assumption that CO2 emissions from European primary aluminium production will decline by 36.9% of by 2030[304] compared to the 2021 baseline, resulting in a cumulative reduction of 11 Mtonnes of CO_2 between 2021 and 2030.
- Considering the cumulative 11 Mtonnes CO_2 reduction from 2021 to 2030, the yearly absolute emissions reduction is 1.22 Mtonnes CO_2.
- Demand assumptions for 2030:
    - 18% of aluminium demand coming from construction[305], of which 30.2% can be attributed to public procurement.[306]
    - 20% of aluminium demand coming from automotive[307], of which 73.6% can be attributed to public procurement and subsidy schemes.[308]
    - Demand for primary aluminium is assumed to be equal to supply, due to lack of granular data. Primary supply of aluminium in 2030 estimated at 3.6 Mtonnes,[309] assuming no growth from the 2021 levels.[310]

Emission savings from low-carbon ***cement****:*

- Internal analysis showed 44.47 Mtonnes CO_2 of emissions for 100% low-carbon cement used in construction in 2030.
- Demand assumptions for 2030:
    - Total EU demand for cement in construction in 2030 estimated at 160.7 Mtonnes.[311]
    - 31% of cement used in construction is attributed to public procurement projects.[312]

LEAD_BAT

Emissions for 2030 are estimated by calculating the projected share of battery demand in GWh for that year within the 2024–2030 period and applying it to the total aggregated CO□ emissions savings compared to China for the same period, which amount to a total 133 Mtonnes of CO□.[313]

- For PO1/PO2 emission savings would account to 25.6 Mtonnes CO_2 savings or EUR 2.5 billion.
- PO3 it would amount to 34.17 Mtonnes CO_2 savings or EUR 3.4 billion.

LEAD_VC

Changes in GHG emissions due to the policy options come from three aspects. Firstly, emissions during the manufacturing process influenced in both the EU and non-EU regions; reductions in emissions are driven by cleaner manufacturing in the EU compared to vehicle production outside the EU. Secondly, emissions from international transport emissions are influenced as EU imports

[301] EUROFER (2025). European Steel Figures 2025.
[302] European Commission internal analysis (2025).
[303] OECD (2025). OECD Steel Outlook 2025.
[304] European Aluminium (2023). Net-Zero By 2050: Science-Based Decarbonisation Pathways for The European Aluminium Industry.
[305] Agora Industry (2024). Creating markets for climate-friendly basic materials. Potentials and policy options.
[306] VUB Brussels School of Governance (2024). Public procurement of steel and cement for construction. Assessing the potential of lead markets for green steel and cement in the EU. The 30.2% share was calculated dividing the value of the public procurement construction industry EU by the value of the construction industry EU in 2019.
[307] 2025. Agora Industry (2024). Creating markets for climate-friendly basic materials. Potentials and policy options.
[308] European Commission internal analysis (2025).
[309] European Aluminium (2023). Net-Zero By 2050: Science-Based Decarbonisation Pathways for The European Aluminium Industry, p. 32.
[310] Eurometaux and KU Leuven (2022). Metals for Clean Energy: Pathways to solving Europe's raw materials challenge, p. 36.
[311] Onestone Consulting (2023). The cement industry in Europe at the crossroads. Published in ZKG International.
[312] Bellona Foundation (2024). Green Public Procurement of cement and steel in the EU: An overview of the state of play.
[313] T&E (2024). An Industrial blueprint for batteries in Europe.

are affected. Finally, emissions during the use phase of vehicles are affected as the number of ICEs and EVs in EU sales is influenced; considering the higher fuel use emissions of ICEs compared to EVs.

The impacts depend mostly on the reaction of foreign producers (Table 6).

Table 6: Changes in global greenhouse gas emissions (Mt CO_2e), JRC calculations based on emission projections from the JRC-GEM-E3 model.

	Internal market reaction			
	LEAD_VC 1		LEAD_VC 2	
	2027	2030	2027	2030
Production	-0.5	-0.6	-0.9	-0.7
Intl. transport	-0.1	-0.1	-0.2	-0.1
Usage (passenger vehicles only)	0.8	0.1	1.0	0.1
Total	**0.2**	**-0.7**	**-0.1**	**-0.8**

The JRC-GEM-E3 reference scenario is in line with the trade projections used for analysis of policy options. International transport emissions due to all EU imports of "Manufacture of motor vehicles, trailers and semi-trailers" are calculated to be about 0.8 Mtonnes CO_2 in 2025 and 2030. This is used to calculate the emission reduction in international transport, assuming reduced imports translate to emission reductions proportionally.

For the utilisation phase, different lifetime emissions from fuel use for ICEs, PHEVs and ICEs are derived and multiplied with EU sales.[314] Emissions attributed to the substitution of vehicles are accounted in the year when vehicles are purchased. An increasing share of EVs in the fuel mix is considered in line with the CO_2 standards for cars, implying a reduced impact in 2030 as substitution to ICE cars is increasingly limited.

2.4. Benefits: gross value added and employment

Employment

Table 7: Summary of LEAD benefits: jobs gained or preserved

	PO1	PO2	PO3
LEAD_EII		Low-carbon steel: Up to 4 500 jobs (preserved) [315] Total: up to 4 500 jobs	Made in EU cement: 4 272 jobs (preserved) Made in EU steel and aluminium: 3 762 jobs (preserved) Low-carbon steel: up to 4 500 jobs (preserved)

[314] This is in line with the results for Buberger, J., Kersten, A., Kuder, M., Eckerle, R., Weyh, T., & Thiringer, T. (2022). Total CO2-equivalent life-cycle emissions from commercially available passenger cars. *Renewable and Sustainable Energy Reviews*, *159*, 112158. Emissions from utilisation are only quantified for passenger cars.

[315] Strategic Perspectives (2025). Lead markets: driving net-zero industries made in Europe. Estimate from dataset used in report's underlying analysis.

	PO1	PO2	PO3
			Total: up to 12 534 jobs
LEAD_BAT	85 000 jobs (new)		85 000 jobs (new) (More jobs expected but cannot be quantified)
LEAD_SOL	Public procurement: 5 193 jobs (new) Auctions: 32 888 jobs (new) Public support schemes 20 771 jobs (new) Total: 58 852		Public procurement: 5 193 jobs (new) Private procurement 114 243 jobs (new) Auctions: 32 888 jobs (new) Public support schemes 20 771 jobs (new) Total: 173 095
TOTAL	**143 852**	**148 352**	**270 629**

LEAD_EII:

Employment benefits linked to Made in EU requirements for steel, aluminium and cement sectors are calculated based on the number of workers below and multiplied for each % of GVA gained from the made in EU measures outlined in Section 2.2 of this Annex.

Table 8 shows impacts on employment, value added and output on energy-intensive industries for each 1%[316] of their global final demand.

Table 8: Top potential impacts for each 1% of global final demand in energy-intensive industries, JRC elaboration based on CARMEN results

Industry impacted	**Employment (# workers)**	**Value Added in EUR million**	**Output in EUR million**
Paper and paper products	3 849	243	730
Refineries	7 216	585	2 161
Chemicals	8 370	702	1 935
Non-metallic mineral products (Total)	3 729	199	542
Non-metallic mineral products (Cement)	1 780	110	300

[316] CARMEN is a linear model, where a 10% decrease/increase in global final demand would yield a result 10 times worse/better than the baseline. To facilitate understanding, a 1% reduction is used as a reference point, providing a more manageable and comparable outcome.

Industry impacted	Employment (# workers)	Value Added in EUR million	Output in EUR million
Basic metals (Total)	1 945	101	410
Basic metals (Steel Upper Value Chain)	714	38	188
Basic metals (Aluminium)	458	20	131

LEAD_SOL

- At full GW-scale production, each gigawatt of solar PV manufacturing capacity is estimated to generate around 1 065 direct full-time jobs, including approximately 70 in polysilicon, 75 in ingot production, 75 in wafering, 200 in cell manufacturing, 85 in solar glass, 200 in module assembly, and 360 in inverter production. Applying an indirect jobs multiplier of 1.5, this results in an additional 1 598 indirect jobs, bringing the total employment impact to roughly 2 663 jobs per GW.
- For private procurement, targeting the remaining market, 114 243 jobs could be created (should it apply to over 40GW).

Value added

Table 9: Summary of LEAD benefits in 2030

LEAD	PO1	PO2	PO3
LEAD_EIII	*Low-carbon measures:* GVA EUR 241 million for the steel and aluminium sectors GVA EUR 445 million for the cement sector	*Low-carbon measures:* GVA EUR 241 million for the steel and aluminium sectors GVA EUR 445 million for the cement sector *Made in EU measures:* No GVA added	*Low-carbon measures:* GVA EUR 327 million for the steel and aluminium sectors GVA EUR 1 509 million for the cement sector *Made in EU measures:* GVA EUR 2 883 million for the *steel and aluminium* sector from made in EU requirements GVA EUR 2 079 million for the *cement* sector from made in EU requirements
LEAD_VC	EUR 9.7 billion in Value Added	EUR 9.7 billion in Value Added (value chain for intermediate inputs)	EUR 11.5 billion in Value Added (value chain for intermediate inputs)
TOTAL	**EUR 9.7 billion**	**EUR 10.41 billion**	**EUR 12.57 billion**

Environmental and value-added benefits total

TOTAL	Difference to the baseline		
	PO1	**PO2**	**PO3**
Total Monetised Benefits *(not including admin savings in Section 2.1 of this same Annex)*	**EUR 12.47 billion**	**EUR 14.13 billion**	**EUR 17.17 billion**

2.5. Final costs and benefits

Table 10: Aggregated overview of costs and benefits

	Difference to the baseline					
EUR in millions	**PO1**		**PO2**		**PO3**	
	One Off	**Recurring**	**One Off**	**Recurring**	**One Off**	**Recurring**
Costs and benefits						
Member States						
Adjustment costs	€0,00	€821,09	€0,00	€821,09	€0,00	€860,78
Administrative costs	€0,00	€5,62	€0,00	€8,92	€0,00	€8,92
Administrative savings	€0,00	€1.300,00	€0,00	€1.300,00	€0,00	€1.300,00
EU Commission						
Administrative costs	€0.80	€0.13	€0.41	€0.18	€0.41	€0.19
Citizens						
Adjustment costs	€0,00	€1.442,47	€0,00	€1.442,47	€0,00	€4.337,96
Administrative costs	€0,00	€0,00	€0,00	€0,00	€0,00	€0,00
Businesses						
Adjustment costs	€0,00	€3.782,05	€0,00	€3.782,05	€0,00	€27,498.35
Administrative costs	€0,00	€0,70	€0,12	€1,16	€0,12	€5,76
Administrative savings	€240,00	€0,00	€240,00	€0,00	€240,00	€0,00
Increase in GVA/VA	€0,00	€10.386,92	€0,00	€10.386,92	€0,00	€18.299,67
Other benefits						
GHG emission reduction savings	€0,00	€3.058,23	€0,00	€3.058,23	€0,00	€4.865,13
Increase in jobs (not monetised)		143.852		148.352		270.629
Total costs	€0.80	€6,052.06	€0.53	€6,055.88	€0.53	€32,711.96
Total benefits	€240,00	€14.745,15	€240,00	€14.745,15	€240,00	€24.464,80
Net benefits	**€239.20**	**€8,693.08**	**€239.47**	**€8,689.27**	**€239.47**	**-€8,247.16**

Annex 5: Competitiveness check

1. Overview of impacts on competitiveness

Dimensions of Competitiveness	Impact of the initiative (++ / + / 0 / - / -- / Not available)	References to sub-sections of the main report or annexes
Cost and price competitiveness	0	6.1.1.1; 6.1.1.2; 6.1.1.3; 6.2.1.1; 6.2.1.2; 6.2.1.3.
International competitiveness	+	6.1.1.1; 6.1.1.6; 6.2.1.6; 6.2.1.8.
Capacity to innovate	+	5.2; 6.1.1.1; 6.1.1.7; 6.1.1.2.
SME competitiveness	+	6.1.1.4; 6.2.1.4.

Synthetic assessment

<u>Cost and price competitiveness</u>

The impacts on cost and price competitiveness primarily arise from the creation of lead markets (**SO2**) and maximising benefits of foreign investments in the EU (**SO3**).

In terms of lead market development, **low-carbon requirements for EIIs** for products put on the market will affect product prices across various downstream sectors. However, as outlined in Section 6, available estimates suggest these impacts are expected to remain limited:

- 0.225% increase in price increase in the cost of passenger vehicles from low-carbon steel and aluminium.
- 0.45% total increase price construction project from low-carbon steel, aluminium and cement:

Over time, the cost premium associated with low-carbon materials is expected to decline[317], while carbon-intensive production methods will likely become more expensive due to rising CO_2 prices – gradually narrowing the cost gap between conventional and low-carbon alternatives. Therefore, the impact on costs and prices will be visible in the short term, while in the long term it will tend to neutralise, helping companies to improve their competitiveness.

Introducing **Made in EU requirements in EIIs, batteries and solar panels** for public procurement, auctions and public support schemes will also have cost implications – although the phased approach would ensure that the costs of the final product are not significantly increased.

- Using EU made battery cells with both local cathode and anode active materials would increase total downstream products costs if compared with China by approximately 16-30 EUR/kWh. However, due to projected price decreases in battery cells the total cost differential with China is expected to decrease, ranging between 11-21 EUR/kWh in 2028, 9-17 EUR/kWh in 2030, and between 6-12 EUR/kWh in 2035.

Similarly, Made in EU requirements for solar PV would modestly increase the overall cost of a PV module in public procurement, public support schemes and auctions.

[317] As related technologies matures and demand for low-carbon materials move from niche, lead markets to larger scale markets.

- Chinese solar modules are currently offered in Europe at approximately 8.7 €ct/Wp, which is significantly below their estimated sustainable production cost of 15.9 €ct/Wp in China and 16.5 €ct/Wp in Southeast Asia. By comparison, a module manufactured in the EU compliant with the Policy Option 1 and 2 (ie combining EU manufacturing of inverters, cells and modules with Chinese polysilicon, ingot and wafers) is estimated to cost around 19 €ct/Wp. Once Chinese market prices return to their sustainable level, the price differential between EU-made and imported modules would therefore be moderate rather than disproportionate.

While a price gap with non-EU imports may initially persist, this is expected to narrow as European manufacturers scale up, vertically integrate and improve cost competitiveness.

Regarding **FDI conditionalities**, measures that may restrict supply based on value-added production or securing critical value chains may raise the price of certain products, particularly in the short term, as local supply chains adjust to new FDI-driven demand. However, a more harmonised and predictable investment framework is expected to yield longer-term benefits for industry, including on their competitiveness in strategic supply chains, outweighing the operational costs of complying with such conditionalities. **Streamlined permitting provisions** will also accelerate decarbonisation investments across industrial manufacturing sectors, facilitating compliance with EU climate objectives and increasing the shift towards a low-carbon economy.

The preferred policy option is expected to significantly strengthen the competitiveness of EU EIIs and clean tech manufacturers (batteries and solar cells) by securing demand and supporting investment within EU value chains (**SO2**).

Low-carbon requirements for EIIs would send strong market signals to drive investment in low-carbon technologies by creating stable demand. Nevertheless, less stringent requirements in other regions could create export disadvantages for EU companies.

Made in EU requirements for EIIs in public procurement and support schemes will redirect demand toward EU producers, reduce reliance on imports ~~support import substitution~~ and help shield EU EIIs from unfair competition, in combination with existing trade defence instruments. While these measures are expected to boost job creation and regional growth, they may not fully prevent resource shuffling, given the global role of some partner countries.

Regarding Made in EU requirements in batteries, these measures would boost demand for EU-made batteries, helping to secure ongoing projects and attract future investments in the sector, fostering a more vertically integrated value chain and reducing strategic dependencies on third countries.

In solar manufacturing, Made in EU requirements are expected to drive scale-up and lower costs through large-scale manufacturing, vertical integration and innovation, and foster a resilient industrial ecosystem. Applying such requirements in public tenders would incentivise EU-based investment and improve supply chain security, in line with broader industrial policy objectives. Overall, Made in EU requirements, by creating strong and predictable demand, help ensure that the EU builds competitive supply chains, contributing to its resilience and strategic autonomy. Should trading partners impose countervailing measures, this could however negatively impact the EU industry's competitiveness on global markets. FDI conditions (**SO3**) are also expected to strengthen the long-term competitiveness of the European industries by securing access to critical technologies and intellectual property, offering immediate market advantages and improve their position within key value chains. Ownership and joint venture requirements would support the development of strategic value chain segments in the EU.

Combined with value added production and securing technological advancements, these measures can deliver lasting, structural benefits for EU industrial competitiveness. Permitting measures (**SO4**) will reduce regulatory uncertainty and enable economies of scale for next-generation low-carbon manufacturing, further improving EU industrial competitiveness.

Capacity to innovate

Developing a common EU label on the carbon intensity of steel **(SO1)** will increase customer awareness and preference for low-carbon steel, driving demand for these products. This will, in turn, encourage companies to invest in cleaner production technologies, fostering innovation in the industry.

(**SO2**) By anchoring guaranteed offtake, low-carbon and Made in EU requirements in EIIs and clean tech manufacturing can serve as catalyst of domestic investment and manufacturing expansion - laying the foundation for sustained innovation. As European industrial ecosystems grow, companies are better equipped to develop, commercialise, and scale innovative solutions.

FDI conditions (**SO3**) are expected to strengthen the EU's capacity to innovate by securing access to critical technologies, IP, and value chains. While they may place some limits on business models, these measures would promote value retention in the Single Market and give European companies greater access to advanced technologies and know-how - key drivers of long-term innovation and competitiveness.

(**SO4**) Permitting measures will support innovation by relying on technical assistance by the European Commission to Member States for first-of-a-kind decarbonisation projects, as currently the case through INCITE, or the Technical Support Instrument, helping to streamline approvals and accelerate deployment. Additionally, regulatory sandboxes for innovative technologies (such as renewable hydrogen production) could ensure these innovations are future-proof while maintaining regulatory safeguards.

SME competitiveness

Made in EU requirements in public support schemes and procurement will encourage localisation and partnerships with EU suppliers, opening up new market opportunities - particularly in batteries and solar, where SMEs play a major role. While low-carbon requirements may impose higher costs on SMEs compared to larger firms, these impacts are expected to be limited (**SO2**).

FDI conditionalities will largely affect larger enterprises, but SMEs could benefit indirectly through increased activity in value chains (**SO3**). Permitting reforms, including digitalisation and streamlined procedures, will reduce administrative burden and improve cross-border access, supporting SME competitiveness across the Single Market (**SO4**).

2. Competitive position of the most affected sectors

Energy intensive industries

Annex 7 provides an overview of the competitive position of EIIs. As outlined in the problem section[318], the competitiveness challenges facing EU EIIs are driven by a combination of economic and geopolitical factors - most notably high energy costs, global non-market overcapacity, and unfair competition. Production declines have been observed in several sectors, including refineries, glass, ceramics, with the most severe impacts in steel, chemicals,

[318] And complemented in Annex 7.

and aluminium. Risks related to global overcapacity are particularly evident in steel, refineries, and aluminium; they are also present at a regional level in cement and ceramics and are growing in the chemicals sector.

The impact of declining production in energy-intensive industries is unevenly distributed across the Union. Analyses show that manufacturing employment in EIIs is regionally concentrated[319], with certain NUTS-2 regions highly exposed to further industrial decline. In regions where basic metals, chemicals, or non-metallic minerals account for a large share of manufacturing employment, additional closures could translate directly into local job losses and widening regional disparities.

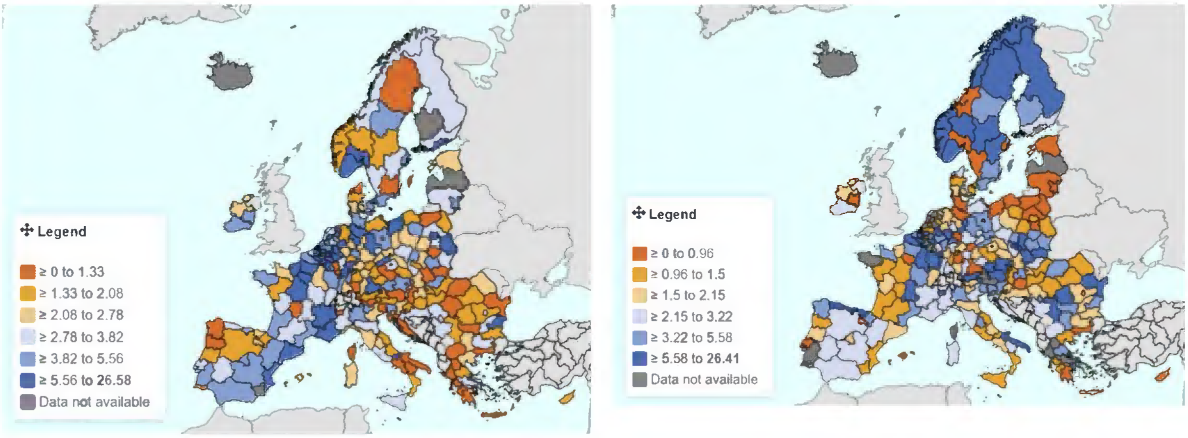

Figure 11 Regional manufacturing employment share: manufacturing of chemicals and chemical products (left) and basic metals (right)

Solar

The EU's competitive position in the solar sector is increasingly weakening, as it struggles to compete with Chinese manufacturers who dominate global production and drive prices below cost through overcapacity. Between 2021 and 2023, the EU imported nearly 190 GW of PV modules, almost double what was installed, leaving massive stockpiles and pushing local producers out of the market. Meanwhile, Chinese firms are expanding production in countries like Vietnam and Malaysia to avoid U.S. trade barriers, further intensifying global competition.

Batteries

The EU's battery sector is losing ground when it comes to competitiveness, as it faces intense pressure from overseas manufacturers who dominate global production. Massive overcapacities in China have led to a surge of cheap imports into Europe, undermining local producers and distorting market dynamics. Additionally, competitors in Asia benefit from vertically integrated value chains, enabling them to scale rapidly and reduce costs across production stages. In contrast, many European battery projects have been delayed or cancelled due to deteriorating market conditions and uncertain policy support. As the Act aims to create lead markets for the above-mentioned sectors, their competitiveness will be positively affected.

[319] Chief Economist Unit, DG GROW, based on Eurostat regional structural business statistics (sbs_r_nuts2021).

Annex 6: SME Check

Overview of impacts on SMEs

Relevance for SMEs
Based on SME filter and the ISSG discussion, this initiative is relevant for SMEs, as they represent up to 99% of companies from the manufacturing and EII sectors, as well as for clean tech (solar and batteries) and automotive (vehicle components).

(1) Identification of affected businesses and assessment of relevance

Are SMEs directly affected? In which sectors?

Yes, SMEs are directly affected by the preferred policy option.

All SME manufacturing industries will benefit from the permitting measures for decarbonisation projects. This would impact notably those companies in the manufacture of wood and of products of wood and cork (except furniture), manufacture of wearing apparel and textiles, repair and installation of machinery and equipment or manufacture of fabricated metal products (except machinery and equipment), where the share of SMEs in the sector is the highest in the EU.

For measures impacting energy intensive industries, such as the creation of lead markets, SMEs represent 99% of companies active in the entire EIIs ecosystem and account for 51% of employees, 31% of the EIIs ecosystem turnover and 37% of value added.

Made in EU requirements in solar, batteries and key vehicle components will also impact SMEs, where they represent 80% of solar and 99% key vehicle components sector respectively.

The introduction of low-carbon and Made in EU requirements (**SO2**) in EIIs, batteries, solar cells, and key vehicle components will affect SMEs in downstream sectors, most notably in the construction, automotive and potentially wind energy.

Estimated number of directly affected SMEs

Manufacturing sector: The potential number of impacted SMEs within the scope of the permitting provisions would be more than 2 million, corresponding to the broad number of SMEs active in the manufacturing sector.[320]

Key size class indicators, Manufacturing (NACE Section C), EU, 2022

	Number of enterprises (thousands)	Number of persons employed (thousands)	Value added (€ million)	Apparent labour productivity (thousand € per head)
All enterprises	2 152.0	30 026.4	2 419 774.9	80.6
All SMEs	2 136.1	15 509.3	821 479.9	53.0
Micro	1 816.7	3 740.0	122 000.0	32.6
Small	257.0	5 268.1	274 159.4	52.0
Medium-sized	62.4	6 501.2	425 320.5	65.4
Large	15.9	14 514.2	1 598 207.7	110.1

Note: For confidentiality issues rounded or calculated figures have been used. The sum of all categories does not equal the total of all enterprises due to estimated values with lower reliability.

Source: Eurostat (online data code: sbs_sc_ovw)

eurostat

Energy intensive industries: In 2022, the estimated number of SMEs in EIIs was 577 796.[321]

Solar manufacturing: SMEs represent 80% of the membership in ESIA.[322] The majority of the EU manufacturing segment and projected projects consist of SMEs. The installation sector is also largely made up of SMEs (rooftop and small commercial segments).

[320] Eurostat 2022.
[321] Industrial Ecosystem key SME figures 2025, link: SME Performance Review - European Commission
[322] INNO/Solar Alliance webpage. Meet our members – European Solar PV Industry Alliance.

Batteries: SMEs accounted for 43% of respondents in the targeted battery survey.

Automotive: SMEs represent around 99% of all companies (i.e. 1.8 million companies) operating in the automotive sector and are responsible for 26% of the value added.[323] They are however not expected to be directly affected as lead market provisions would apply to original equipment manufacturers.

Construction: 99% of construction companies are SMEs (i.e. 5.29 million companies).[324] However, only a subset of companies would be affected by the lead market provisions, the ones in the lead on new building or infrastructure projects.

Estimated number of employees in directly affected SMEs

Manufacturing sector: Estimated number of employees in these SMEs would be more than 15 million, roughly half of the employment of the manufacturing[325]

EIIs: In 2022, SMEs were estimated to employ approximately 3.91 million people, accounting for 50.5% of total employment in EIIs.[326]

Solar: Although SME-specific data is not available, the solar sector employed 648 000 people in 2022.[327]

Batteries sector: Data currently not available.

Automotive: SMEs employ around 1.5-2 million people in direct car manufacturing (roughly 60-70% of the total direct employment in the sector), and an additional 6-8 million jobs in related industries, such as automotive services, trade, and distribution.[328]

Wind energy: The exact number of jobs related to wind power in SMEs is not known. However, overall, in 2022, wind energy sustained 300 000 jobs in the EU.[329]

Construction: SMEs employed 20.6 million people in 2022, representing 76.5% of the employment in the construction sector.[330]

Are SMEs indirectly affected? In which sectors? What is the estimated number of indirectly affected SMEs and employees?

This initiative is expected to indirectly affect SMEs in the value chain of EII and clean tech manufacturing, especially in the downstream part, such as the finishing steps of the production process or road transport. It is not possible to estimate the number of indirectly affected SMEs and employees, since these span across a wide number of downstream sector players.

(2) CONSULTATION OF SME STAKEHOLDERS

How has the input from the SME community been taken into consideration?

Are SMEs' views different from those of large businesses? (Yes/No)

The **Open Public Consultation** (OPC) received 176 answers from SMEs, out of a total of 314 (56%).

When analysed alongside large companies' responses, there was **substantial alignment**, indicating that both small and large companies face similar decarbonisation challenges. This coherence also applies to the solutions considered by the IAA, which would seemingly benefit both SMEs and large enterprises. While the level of support varied slightly throughout the consultation, alignment remained on most points detailed in the OPC analysis set out in Annex 2.

Some differences were however observed, especially in the context of permitting, with a higher percentage of SMEs responding to the permitting questions and showing a stronger support for the

[323] Euroclusters and RESIST (2023). Future challenges for SMEs in automotive, transport and mobility vehicle production and their manufacturing suppliers.
[324] European Commission (2023). Transition Pathway for Construction.
[325] Eurostat 2022
[326] Industrial Ecosystem key SME figures 2025, link: SME Performance Review - European Commission
[327] SolarPower Europe (2023). EU Solar Jobs Report 2023.
[328] Euroclusters and RESIST (2023). Future challenges for SMEs in automotive, transport and mobility vehicle production and their manufacturing suppliers.
[329] WindEurope webpage. Wind energy and the economy.
[330] European Commission (2025). SME Performance Review - Annual report on European SMEs.

proposed solutions. This is further supported by the results of the **targeted consultation**, where respondents highlighted that SMEs typically have fewer resources to manage the administrative workload and costs associated with the permitting processes. Furthermore, in the section on identifying and promoting industrial decarbonisation priority projects, most SMEs (90, 96%) favour improved access to funding - an option that ranked lower among general respondents. This is followed by support for faster permit-granting procedures (85, 90%) and priority status for administrative procedures (81, 86%). In comparison, only 50% of large companies selected faster permitting, suggesting again that permitting is a more pressing issue for SMEs.

(3) ASSESSMENT OF IMPACTS ON SMEs[331]
What are the estimated direct costs for SMEs of the preferred policy option?
Qualitative assessment
Assuming the low-carbon steel label (**SO1**) applies to the most energy-intensive stages of steel production, it is likely to affect primarily the largest steel producers, which typically are not SMEs. Costs impact for SMEs is thus expected to be marginal. Low-carbon and Made in EU requirements (**SO2**) will however imply costs for SMEs, when procuring low-carbon and EU-made products. However, these costs are expected to be distributed across the value chain and leading only to a limited increase in the final price. These costs are expected to be passed on to consumers or absorbed by economic operators or public authorities – though SMEs may be less able to do so than larger firms. Made in EU requirements in solar cells (**SO2**) may lead to a temporary slowdown in solar panel installations by SMEs. This impact is expected to be limited and manageable, as Europe's commitment to ambitious PV deployment targets remains firm and unchanged. Conversely, it will support the establishment of manufacturing SMEs.
Quantitative assessment
There is no available data on price increases specific to SMEs, however, the financial impacts of the policy measures, as outlined in Annex 3, are expected to apply to SMEs to a similar extent as to other (large) companies.
What are the estimated direct benefits/cost savings for SMEs of the preferred policy option?
Qualitative assessment
SMEs are expected to benefit directly from an expanded market for their European, low-carbon products, and indirectly through their role in the supply chains of larger companies. As outlined in Annex 3, these benefits—excluding those related to FDIs—are anticipated to apply to SMEs in the same way as to (large) companies. Permitting measures are expected to deliver significant cost savings and benefits for SMEs (**SO4**), by speeding-up and facilitating the administrative process (see, also below on administrative burden reduction), while also creating legal certainty. The definition of criteria for priority projects (**SO5**) is expected to facilitate access to funding for decarbonisation projects, including those led by SMEs. This is likely to accelerate investment decisions and facilitate the participation of SMEs in industrial decarbonisation efforts across the EU.
Quantitative assessment
Provisions on permitting will apply to all manufacturing and EII SMEs, which stand to benefit from administrative cost savings, as detailed in Annex 3 and reflected in the 35% burden reduction target outlined below.
What are the indirect impacts of this initiative on SMEs?
By improving the competitiveness of EIIs and clean tech ecosystems, which are largely composed of SMEs, this initiative is expected to generate positive spillover effects for SMEs operating across

[331] The costs and benefits data in this annex are consistent with the data in annex 3. The preferred option includes the mitigating measures listed in Section 4.

related value chains. Improved market conditions, increased demand, and enhanced innovation capacity will help SMEs grow, scale, and better integrate into domestic and international markets.

(4) MINIMISING NEGATIVE IMPACTS ON SMEs
Are SMEs disproportionately affected compared to large companies? No **If yes, are there any specific subgroups of SMEs more exposed than others?**
This initiative is expected to lead to additional administrative costs for companies, particularly within downstream sectors such as automotive and construction, which will be required to demonstrate compliance under lead market provisions (LEAD) and notify authorities under FDI conditionalities (INV). As can be seen from the table above, the majority of companies operating in the manufacturing sector are SMEs. For PO2, under LEAD_EII measures, SMEs will face some administrative costs due to demonstrate compliance reporting. In the construction sector, where the Act may impact up to 921 948 companies, only large and medium-sized companies are proposed required to demonstrate compliance, excluding small and micro companies (totalling 915 729). This aims to reduce the administrative and financial burden on SMEs. In other sectors such as automotive and energy, most companies complying with the measures are expected to be large organisations, as outlined in the company size breakdown in Annex 3. The administrative cost per company remains minimal, at EUR 882 per year for construction companies, and EUR 1176 per year for automotive. These total administrative costs for SMEs, calculated at EUR 982 191 annually, will be outweighed by permitting savings, calculated at EUR 27.85 million annually, leading to total net savings in administrative costs for SMEs of EUR 26.86 million. PO1 and PO2 will result in lower administrative costs for SMEs, as lead market provisions are limited to public procurement and public support schemes. Meanwhile, in PO3, those costs would increase, as lead market provisions expand to products placed on the market.
Have mitigating measures been included in the preferred option/proposal? (Yes/No)
Yes, some SMEs, such as the small and micro companies operating in the construction sector, could use self-declaration to demonstrate compliance with low-carbon and Made in EU requirements.

CONTRIBUTION TO THE 35% BURDEN REDUCTION TARGET FOR SMEs
Are there any administrative cost savings relevant for the 35% burden reduction target for SMEs?
Permitting measures under the preferred policy option (SO4) are expected to deliver administrative cost savings relevant for the 35% burden reduction targets for SMEs. SMEs consistently cite red tape as a major barrier to offering services across borders. Streamlining procedures - particularly through the digitalisation of permit-granting processes under the SDG - can significantly ease this burden. Moreover, by providing access to clear information on rules and procedures, the SDG can help SMEs—who often lack the resources of larger firms - better navigate and seize opportunities in the Single Market.

Annex 7: Sectoral analyses

The following subsection outlines a sectorial analysis and, where possible, the readiness and cost evolution of industrial technologies utilised to decarbonise energy intensive industries processes. According to an internal JRC analysis, a common dominator across all the EIIs considered is that the promising decarbonisation technologies are either not cost competitive in the current scenario or have not reached sufficient technology readiness levels (TRLs). Furthermore, the analysis clearly outlines the need for future large-scale investment to transition these sectors and its industrial applications. For the iron and steel sector only, the impact assessment for the 2040 Climate Target plan an investment need of EUR 80 billion between 2031 and 2040 and EUR 100 billion between 2031 and 2050. [332, 333] No clear indication can be derived from the projections on to when the various decarbonisation technologies are reaching cost parity with the conventional technologies, as these depends on many parameters, varying according to the specific technology pathway. However, according to the analysis, there is a correlation between the attractiveness of these CAPEX intensive investments and a sufficient high ETS price in 2030.

1. Energy intensive industries

For the purposes of this impact assessment, we consider the following energy-intensive industrial sectors and their related products: chemicals, steel, pulp and paper, plastics, oil and gas refining, cement, non-ferrous metals, glass, and ceramics. Their production process is characterised by the highest energy consumption and emissions intensity, accounting for a significant share of the EU's industrial GHG emissions. These sectors hold strategic importance for EU value chains and autonomy, providing input materials to downstream sectors and key net-zero technologies. They involve processes with hard-to-abate emissions that make decarbonisation costly and challenging and contribute substantially to economic activity and employment.[334]

In 2021, energy intensive industries (EIIs) contributed EUR 549 billion in added value (corresponding to 4.55% of EU value added) and employ 7.8 million people in Europe.[335] The map below shows that EIIs are present throughout Europe:[336]

[332] European Commission (2024)., Commission Staff Working Document: Impact Assessment Report (Part 3), accompanying the document Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Securing our future - Europe's 2040 climate target and path to climate neutrality by 2050, building a sustainable, just and prosperous society, COM(2024) 63 final, pp.164-167.

[333] Draghi, M. (2024). The future of European competitiveness: In□depth analysis and recommendations (Part B), p. 99.

[334] European Commission (2019). Masterplan for a competitive transformation of EU energy-intensive industries enabling a climate-neutral, circular economy by 2050.

[335] European Commission (2021).. Commission Staff Working Document. For a resilient, innovative, sustainable and digital energy-intensive industries ecosystem: Scenarios for a transition pathway, SWD(2021) 277 final.

[336] JRC (2025). Energy and Industry Geography Lab (EIGL).

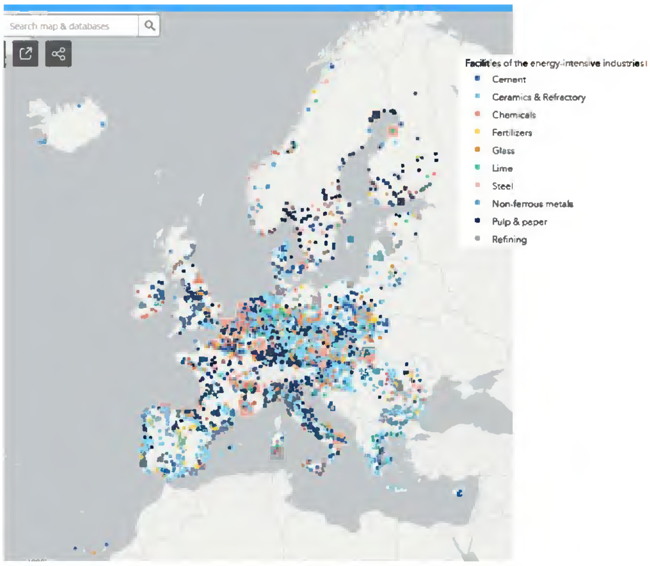

Figure 12 – Facilities of Energy-intensive industries in the EU, JRC/EIGL, 2025

1.1. Aluminium

Key facts

EU aluminium market: valued at EUR 40 billion,[337] 1 million direct and indirect jobs.[338] In 2023, the EU produced 0.925 Mtonnes of primary[339]. EU aluminium exports in 2024: EUR 18.4 billion, imports: EUR 29.5 billion. Major trading partners: UK, USA, Switzerland and China.[340]

Key challenges

High energy costs, unfair global competition, including market-distorting tariffs and persistent overcapacity in some producing countries.

Aluminium production has decreased with jobs being lost, and permanent loss of production capacity - with 50% of primary production capacity being idled since 2021.[341] EU share of global primary aluminium production only represents 3.8%.[342] EUs primary and secondary aluminium production covers 46% of the region's domestic demand[343] whereas a demand growth until 2050 is expected by 33%.[344]

In 2023, the EU aluminium industry emitted approximately 6.6 Mtonnes of CO□[345] in the production of primary aluminium. In line with EU climate goals, the aluminium industry is shifting toward cleaner production through different decarbonisation pathways, including increasing recycling rates and improving energy efficiency.[346]. To deploy further decarbonisation technologies, an investment of EUR 33 billion and additional R&I efforts are required[347]. Since 1990, the aluminium industry reduced its CO_2 emissions by 53%.[348]

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[337] European Aluminium (2024). The Strategic Role of European Aluminium.
[338] European Aluminium (2024). The Strategic Role of European Aluminium.
[339] JRC analysis based on JRC IDEES 2026 Database.
[340] Eurostat (2025). EU recorded a trade deficit of €11.1 billion in aluminium.
[341] European Commission (2025). A European Steel and Metals Action Plan, COM(2025) 125 final, 19 March 2025.
[342] European Commission (2025). A European Steel and Metals Action Plan, COM(2025) 125 final, 19 March 2025.
[343] European Commission (2025). A European Steel and Metals Action Plan, COM(2025) 125 final, 19 March 2025.
[344] Eurometaux and KU Leuven (2022). Metals for Clean Energy: Pathways to solving Europe's raw materials challenge.
[345] European Aluminium (2025). Environmental Profile Report 2024 V.2.0 – Executive Summary.
[346] JRC (2026). Mapping the transition of the EU aluminium industry to carbon neutrality.
[347] European Aluminium (2024). Our Policy Recommendations for an Ambitious Clean Industrial Deal and Metals Action Plan.
[348] Eurometaux webpage. About our industry.

Cost evolution

In detail, the CAPEX figures for smelters (Inert Anodes, CCS) are based on greenfield investments. Conversely, CAPEX for alumina refining (Boilers, MVR, Electric Furnaces) is calculated assuming brownfield investments (retrofitting existing facilities). CAPEX estimates for downstream segments like semi-fabrication and recycling are explicitly noted as approximations based on thermal energy share relative to calcination, reflecting a lack of publicly available data.

Table 11 below displays the decarbonisation pathways for the EU aluminium industry, which primarily focuses on switching to low-carbon electricity, adopting inert anodes in smelting, and transitioning high-temperature thermal processes (refining, casting, recycling) from fossil fuels to electric or hydrogen-based systems. The CAPEX estimates are primarily sourced from techno-economic models, converted to cost per tonne of annual aluminium (Al) or alumina capacity, with costs generally referenced to EUR 2022 prices.

In detail, the CAPEX figures for smelters (Inert Anodes, CCS) are based on greenfield investments. Conversely, CAPEX for alumina refining (Boilers, MVR, Electric Furnaces) is calculated assuming brownfield investments (retrofitting existing facilities). CAPEX estimates for downstream segments like semi-fabrication and recycling are explicitly noted as approximations based on thermal energy share relative to calcination, reflecting a lack of publicly available data.[349]

Table 11: CAPEX estimates for the aluminium industry compiled by the JRC, 2025

Technology Pathway	Current Value/Reference CAPEX (per tonne capacity)	CAPEX in 2030 (per tonne capacity)	CAPEX in 2040 (per tonne capacity)	CAPEX in 2050 (per tonne capacity)
Primary Smelting: Inert Anodes (IA)[350, 351]	EUR 6 309.1/t Al (Greenfield investment, 2022 prices). TRL 7.	EUR 6 309.1/t Al (Mass deployment expected to begin around 2035).	Costs expected to remain stable after full commercialisation. Full market coverage expected 2040–2045.	Costs expected to remain stable after full commercialisation.
Primary Smelting: Carbon Anode + CCS[352, 353]	TRL 9 (CCS component) / TRL 3-4 (Smelter integration).	EUR 6 688.6/t Al (Greenfield investment, 2022 prices) Commercial readiness expected by 2035.	EUR 6 688.6/t Al.	EUR 6 688.6/t Al.

[349] Mission Possible Partnership (2022). Making Net-Zero Aluminium Possible. An industry-backed, 1.5-aligned transition strategy.
[350] European Aluminium. (2023). Net-Zero by 2050: Science-based decarbonisation pathways for the European aluminium industry.
[351] Mission Possible Partnership (2022). Making Net-Zero Aluminium Possible. An industry-backed, 1.5-aligned transition strategy
[352] Ibid.
[353] Zore, L. (JRC) (2024). Decarbonisation Options for the Aluminium Industry.

Technology Pathway	Current Value/Reference CAPEX (per tonne capacity)	CAPEX in 2030 (per tonne capacity)	CAPEX in 2040 (per tonne capacity)	CAPEX in 2050 (per tonne capacity)
Alumina Refining: Electric Boiler (Digestion)[354,]	EUR 30.7/t Al (Brownfield retrofit, 2022 prices). TRL 9 (Mature).	EUR 30.7/t Al. Deployment expected from 2025.	EUR 30.7/t Al.	EUR 30.7/t Al.
Alumina Refining: MVR (Digestion) [355, 356, 357]	EUR 76.9/t Al (Brownfield retrofit, 2022 prices). TRL 7–8.	EUR 76.9/t Al (Commercial readiness 2027). Deployment grows significantly towards 2030.	EUR 76.9/t Al MVR systems play a dominant role in digestion by 2050.	EUR 76.9/t Al.
Alumina Refining: Electric Furnace (Calcination)[358]	TRL 4–5 (In trial phase).	EUR 155.6/t Al (Brownfield retrofit, 2022 prices). Commercial readiness expected 2030.	EUR 155.6/t Al (Full market penetration expected by 2040).	EUR 155.6/t Al.
General High Temp: Electric Furnace (e.g., Remelting/Cast House)[359, 360]	TRL 9 (Heating technologies exist)	EUR 31.3–EUR 38.3/t Al (Brownfield estimate for Cast House/Anode Paste, 2022 prices). Commercial readiness 2030.	EUR 31.3–EUR 38.3/t Al.	EUR 31.3–EUR 38.3/t Al.
General High Temp: Hydrogen Furnace (e.g., Remelting/Cast House)[361]	TRL 8 (High maturity in other sectors).	EUR 15.1–EUR 18.4/t Al (Brownfield estimate for Cast House/Anode Paste, 2022 prices). Commercial readiness 2035.	EUR 15.1–EUR 18.4/t Al.	EUR 15.1–EUR 18.4/t Al.

Total Investment Needs (TCI) for EU Transition

354 European Aluminium (2023).Net-Zero by 2050: Science based decarbonisation for the European aluminium industry.
355 European Aluminium. (2023). Net-Zero by 2050: Science-based decarbonisation pathways for the European aluminium industry.
356 Mission Possible Partnership (2022). Making Net-Zero Aluminium Possible. An industry-backed, 1.5-aligned transition strategy.
357 Zore, L. (JRC) (2024). Decarbonisation Options for the Aluminium Industry.
358 European Aluminium (2023). Net-Zero by 2050: Science-based decarbonisation pathways for the European aluminium industry.
359 Ibid.
360 Zore, L. (JRC) (2024). Decarbonisation Options for the Aluminium Industry
361 European Aluminium (2023). Net-Zero by 2050: Science-based decarbonisation pathways for the European aluminium industry.

The EU aluminium industry will need approximately EUR 33 billion in cumulative investments for new technology deployment between 2021 and 2050 to meet the 1.5°C scenario, with about EUR 22 billion (67% of the total) expected between 2031–2040. This investment peak is primarily directed towards greenfield smelter facilities with inert anode technology. These figures exclude R&I costs and necessary energy system developments, such as grid upgrades and new renewable capacity, which will also drive up the overall cost.

1.2. Cement

Key facts

EUR 25.8 billion sales and EUR 8.5 billion Gross Value Added (cement and clinker) in 2022, 40.3 thousand direct jobs in 2023, plus 14.5 million in construction, 161.1 Mtonnes production in 2023[362], main EU producers: Germany, Italy, France, and Spain.[363] EU exports in 2022: EUR 1.1 billion, imports: EUR 0.7 billion. Major trading partners: Türkiye, Egypt, China, and Ukraine.[364]

Key challenges

High energy costs, tightening environmental regulations, and declining construction demand. Production volumes decreased by 3.3% between 2022 and 2023.

The EU cement industry emits over 120 Mtonnes of CO□ annually.[365] In line with EU climate objectives, the industry is moving toward cleaner production through several decarbonisation pathways,[366] including the use of alternative fuels, process electrification, deployment of carbon capture, utilisation and storage (CCUS)[367], and clinker substitution with low-carbon materials.[368] These approaches aim to cut emissions across key production stages, from raw material processing to downstream applications in construction. The investment need is estimated at EUR 94.4 billion by 2050. Key challenges to achieve decarbonisation include limited availability of proven low-carbon alternatives at scale, insufficient CO□ transport and storage infrastructure, and the technical difficulty of reducing process-related emissions from clinker production.

Cost evolution

Table 12 below synthesizes these CAPEX estimates for main decarbonisation pathways in the EU cement industry. Unless otherwise specified, the specific CAPEX values for capture technologies are derived from techno-economic assessments based on a 1 Mtonne clinker/year reference plant capacity, with base costs set to EUR 2014.[369]

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362 Cembureau (2025). Cembureau Key Facts & Figures
363 Onestone Consulting (2023). The cement industry in Europe at the crossroads. Published in ZKG International.
364 Cembureau (2023).Cembureau, Activity Report 2023.
365 JRC (2021). Deep decarbonisation of industry: The cement sector.
366 JRC144123 (2026). Mapping the transition of the EU Cement Industry to Carbon Neutrality.
367 JRC (2024). The role of carbon capture across hard-to-abate industries in the EU.
368 Cavalett, O. (2024). Paving the way for sustainable decarbonization of the European cement industry. *Nat Sustain* 7, 568–580 (2024).
369 ECRA (2022). ECRA Technology Papers.

Table 12: CAPEX estimates for the cement industry compiled by the JRC, 2025

Technology Pathway	Current Value (per tonne clinker capacity)	CAPEX in 2030 (per tonne clinker capacity)	CAPEX in 2040 (per tonne clinker capacity)	CAPEX in 2050 (per tonne clinker capacity)
Post-Combustion Capture (MEA) [370, 371]	EUR 28.6/t clinker (Base Case, 2014). TRL 8–9.	Expected to remain stable or decrease slightly after initial deployment and learning curves.	Expected to remain stable/mature.	Expected to remain stable/mature.
Chilled Ammonia Process (CAP) [372, 373, 374]	EUR 36.4/t clinker (Base Case, 2014). TRL 7–8.	Expected to decrease due to learning curve assumption of 1% per year up to 2030.	N/A (Deployment expected post-2025/2030).	N/A
Membrane-Assisted Liquefaction (MAL)[375, 376]	EUR 46.7/t clinker (Base Case, 2014). TRL 4–5.	Projected costs highly sensitive to maturity and demonstration efforts. TRL >8 expected 2030–2040.	Potential for maturity by 2040.	N/A
Oxyfuel Technology[377, 378]	EUR 35.0/t clinker (Base Case, 2014). TRL 6.	EUR 220-EUR 250 million (Total Investment, 2 Mtonnes clinker/y).	EUR 200-EUR 230 million (Total Investment, 2 Mtonnes/y capacity).	EUR 200-EUR 230 million (Total Investment, 2 Mtonnes/y capacity).
Calcium Looping (CaL) - Tail-End[379]	EUR 330–EUR 495 million (Total Investment, 2 Mtonnes clinker/y, 2020 prices). TRL 7–8.	EUR 330–EUR 450 million (Total Investment, 2 Mtonnes clinker/y, 2020 prices). TRL >8 expected 2025.	EUR 330–EUR 450 million (Total Investment, 2 Mtonnes clinker/y, 2020 prices).	EUR 330–EUR 450 million (Total Investment, 2 Mtonnes clinker/y, 2020 prices).

[370] Voldsund et al. (2019). D4.6 CEMCAP comparative techno-economic analysis of CO□ capture in cement plants.
[371] ECRA (2022). ECRA Technology Papers.
[372] Voldsund et al. (2019). D4.6 CEMCAP comparative techno-economic analysis of CO□ capture in cement plants.
[373] ECRA (2022). ECRA Technology Papers.
[374] IEAGHG (2013). Deployment of CCS in the Cement Industry.
[375] ECRA (2022). ECRA Technology Papers.
[376] Voldsund et al. (2019). D4.6 CEMCAP comparative techno-economic analysis of CO□ capture in cement plants.
[377] Ibid.
[378] ECRA (2022). ECRA Technology Papers.
[379] Ibid.

Technology Pathway	Current Value (per tonne clinker capacity)	CAPEX in 2030 (per tonne clinker capacity)	CAPEX in 2040 (per tonne clinker capacity)	CAPEX in 2050 (per tonne clinker capacity)
Calcium Looping (CaL) - Integrated[380]	EUR 44.9/t clinker (Base Case, 2014 prices). TRL 6–7.	TRL >8 expected 2030. Investment ranges (New Install., 2 Mtonnes clinker/y, 2020 prices): EUR 300–EUR 425 million.	Expected stability/maturity post-2030.	Expected stability/maturity post-2030.
Indirect Calcination (e.g., LEILAC)[381, 382]	CAPEX range: EUR 90–EUR 135 million (Leilac unit only, 1.2 Mtonnes clinker/y). TRL 6–7.	EUR 220–EUR 290 million (Total Investment New Install., 2 Mtonnes clinker/y, 2020 prices). TRL >8 expected 2025.	Expected stability after commercialisation.	Expected stability after commercialisation.
Alternative Cements: LC3 (Limestone Calcined Clay Cement)[383]	Investment for calcined clay unit (New Install., 2 Mtonnes clinker/y, 2020 prices): EUR 20–EUR 40 million	EUR 20–EUR 40 million.	EUR 20–EUR 40 million.	EUR 20–EUR 40 million.
Waste Heat Recovery (WHR)[384, 385]	EUR 15–EUR 30 million (Installation Cost, constant price from 2015 to 2050). TRL 9.	EUR 15–EUR 30 million.	EUR 15–EUR 30 million.	EUR 15–EUR 30 million.

[380] Ibid.
[381] Ibid.
[382] Leilac (2023). A techno-economic analysis of the Leilac technology at full commercial scale.
[383] ECRA (2022). ECRA Technology Papers.
[384] Ibid.
[385] Marmier, A. (JRC) (2023). Decarbonisation options for the cement industry.

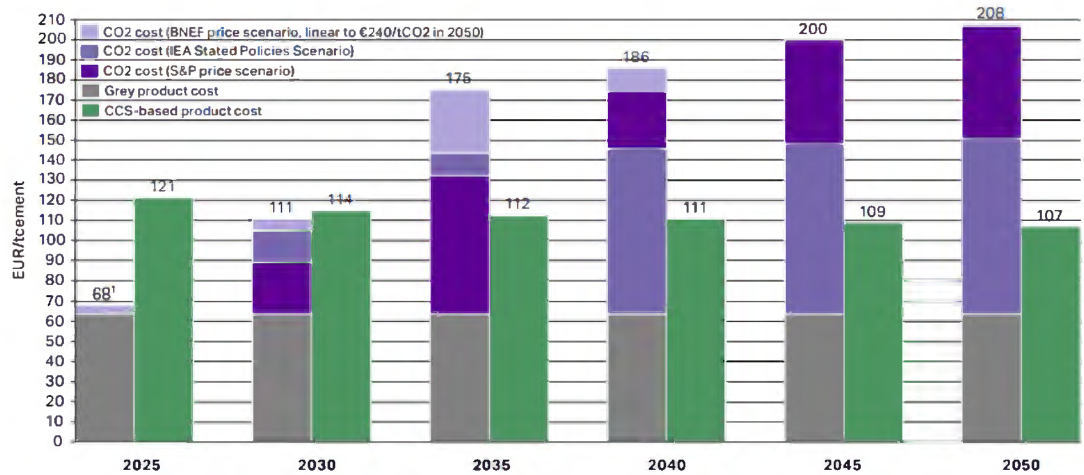

Figure 13: Evolution of CCS and non-CCS based cement production costs in Europe under different CO_2 price scenarios[386]

Total Investment Needs (TCI) for EU Transition

Initial investments in the 2020s are crucial for scaling up these technologies and achieving cost reductions through learning-by-doing. Early initiatives are focused predominantly on CO_2 capture and associated infrastructure, while higher estimates include broader technological transformations such as alternative raw materials, fuel changes, and process electrification. The corresponding estimation are a TCI of EUR 16-22 billion[387] on the low estimate and EUR 40-80 billion[388] on the more holistic view. Between 2030 and 2040, the cement industry is anticipated to invest heavily in deep decarbonisation technologies.

The materialisation and attractiveness of these CAPEX intensive investments is heavily linked to constant EU ETS price of EUR 100-150/tCO_2 from 2030. These carbon price levels have often been cited as a critical enabler.

Mature CO_2 capture technologies have stable costs, while newer ones like Calcium Looping may see CAPEX reductions over time. However, the sheer scale of investment required to retrofit or replace existing capacity may offset these savings. Beyond plant-level CAPEX, significant investments are needed for shared CO_2 transport and storage infrastructure, as well as new energy infrastructure (e.g., hydrogen pipelines, renewable electricity grids) to support decarbonised cement plants.

1.3. Ceramics

Key facts

EUR 25.5 billion revenue in 2022 employing 338 thousand direct jobs,[389] 172 Mtonnes production in 2023, main EU producers: Italy, Germany, France, and Spain.[390] EU exports in 2022: EUR 10.2 billion, imports: EUR 4.4 billion. Major trading partners: USA, Switzerland, UK and Türkiye.[391]

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[386] Mission Possible Partnership (MPP), E3G and the Industrial Transition Accelerator (ITA) (2025). Building the EU's Clean Industrial Future: Unlocking Investment through Lead Markets.
[387] ECRA (2022). ECRA Technology Papers.
[388] Voldsund et al. (2019). D4.6 CEMCAP comparative techno-economic analysis of CO_2 capture in cement plants.
[389] European Commission webpage. Ceramics.
[390] Market Data Forecast (2025). Europe Ceramic Tiles Market.
[391] Cerame-Unie webpage. Ceramic Industry.

Key challenges

High energy costs, competition from low-cost producers in emerging economies, supply chain disruptions, and stringent environmental regulations. Production volumes decreased by 2–3% between 2022 and 2023.[392]

The EU ceramic industry emits over 20 Mtonnes of CO□ annually.[393] In line with EU climate goals, the sector is transitioning toward more sustainable production through trajectories such as electrification of kilns, fuel switching to low-carbon gases or hydrogen, implementation of energy efficiency measures, and the integration of circular raw materials and recycling practices.[394] These measures aim to reduce greenhouse gas emissions across manufacturing processes and product life cycles. Main decarbonisation challenges include high investment needs to retrofit existing facilities, limited technological readiness of electric and hydrogen kilns at industrial scale, insufficient infrastructure for clean energy supply, and the technical complexity of maintaining product quality under altered processing conditions.

1.4. Chemicals

Key facts

EUR 655 billion sales in 2023[395], 1.2 million direct jobs.[396] 218 Mtonnes production of industrial chemicals in 2023, main producers: Germany, France, The Netherlands, Italy and Belgium. EU exports in 2023: EU 523 billion, imports: EUR 325 billion. Major trading partners: USA, Switzerland, UK, and China.[397]

Key challenges

High energy costs, weak demand, increased regulatory pressure, and global competition. Production volumes have decreased by 14% between 2021 and 2023 putting at risk up to 200 000 jobs.[398]

The chemical industry is the third-largest source of global CO□ emissions, after the cement and steel sectors. In 2022, the EU chemical industry emitted 104 Mtonnes CO_2 equivalent. In line with EU climate goals, the sector is shifting toward cleaner production through different decarbonisation pathways, including electrification of processes, deployment of low-carbon hydrogen, implementation of carbon capture, utilisation and storage (CCUS),[399] and increased use of circular feedstocks and recycling.[400] These approaches aim to reduce greenhouse gas emissions across core chemical production processes, interconnected value chains, and end-use applications. The main barrier to decarbonising is the high investment requirement. In the impact assessment for the 2040 climate target, the estimated investment needs for decarbonisation in the chemical sector average EUR 13 billion per year for the 20 year period of 2031-2050, summing to around EUR 260 billion by 2050.[401] Additional challenges include

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392 Blog Sicer (2024). From the record of 2022 to the decline of 2023: fluctuations in the Italian Ceramic Industry.
393 Cerame-Unie webpage. Continuing our Path towards Climate Neutrality - Ceramic Roadmap 2050.
394 JRC (2026). Mapping the Transition of the EU Ceramics Industry to Carbon Neutrality.
395 Statista. Revenue distribution of the chemical industry in the European Union from 2016 to 2022, by country.
396 Statista. Number of employees in the European Union's chemical industry from 2008 to 2023.
397 Statista. Revenue distribution of the chemical industry in the European Union from 2016 to 2022, by country.
398 Commission staff working document, impact assessment report, Securing our future Europe's 2040 climate target and path to climate neutrality by 2050 building a sustainable, just and prosperous society, SWD/2024/63 final.
399 JRC (2024). The role of carbon capture across hard-to-abate industries in the EU.
400 Cefic (2024). 2024 Facts and Figures of the European Chemical Industry.
401 European Commission (2024). Commission Staff Working Document: Impact Assessment Report (Part 3), accompanying the document Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Securing our future - Europe's 2040 climate target and path to climate neutrality by 2050, building a sustainable, just and prosperous society, COM(2024) 63 final, p. 167.

limited availability and scalability of low-carbon technologies, insufficient infrastructure for clean energy supply, and the complexity of electrifying high-temperature chemical processes.

Cost evolution

Table 13 below synthesizes the available CAPEX data for key chemical industry decarbonisation pathways, primarily derived from techno-economic modelling assumptions hydrogen cost projections. However, the estimated CAPEX for decarbonisation technologies in the EU chemical industry vary widely depending on the technology's maturity, the reference year used for the cost calculation, and whether the costs refer to process equipment (PCE), total installed cost (CAPEX), or costs per unit of capacity (EUR/Mtonne product or EUR/kW power).

Table 13: CAPEX and PCE for the chemical industry compiled by the JRC, 2025

Technology Pathway	Current Value (Reference Year)	CAPEX/PCE in 2030	CAPEX/PCE in 2040	CAPEX/PCE in 2050
Electrolyser Systems (Installed CAPEX, per kWel)[402,403]	EUR 2 250/kW (Low-Temp, 2024 estimate, typical project). EUR 5 400/kW (High-Temp SOEC, 2024 estimate).	EUR 600–EUR 800/kW (System Cost, projection). Conventional parts should be below EUR 1 000/kW (Alkaline) and EUR 1 500/kW (PEM).	Expected continued decline due to mass manufacturing.	Expected convergence around EUR 500/kW(ALK/PEM) to EUR 600/kW(SOE).
Partial Electrified Steam Cracking (High Value Chemicals, PCE/Mtonnes capacity)[404]	EUR 265/Mtonnes (PCE, Million 2019 prices).	EUR 265/Mtonnes (PCE, Million 2019 prices).	EUR 265//Mtonnes (PCE, Million 2019 prices).	EUR 265/Mtonnes (PCE, Million 2019 prices).
Fully Electrified Steam Cracking (High Value Chemicals, PCE/Mtonnes capacity)[405]	Not yet commercially mature (TRL expected 2035).	Not widely available or modelled at cost/capacity until post-2035.	EUR 522/Mtonnes (PCE, Million 2019 prices).	EUR 522/Mtonnes (PCE, Million 2019 prices).
CO□ Hydrogenation to Methanol (CCU route, PCE/Mtonnes capacity)[406]	EUR 289/Mtonnes (PCE, Million 2019 prices).	EUR 287//Mtonnes (PCE, Million 2019 prices).	EUR 282/Mtonnes (PCE, Million 2019 prices).	EUR 277/Mtonnes (PCE, Million 2019 prices).

[402] Hydrogen Europe (2024). Clean Hydrogen Production Pathways - Report 2024.
[403] Fuel Cells and Hydrogen Joint Undertaking (2014). Development of water electrolysis in the European Union.
[404] CEFIC webpage. The carbon managers - iC2050 model.
[405] Ibid.
[406] Ibid.

Technology Pathway	Current Value (Reference Year)	CAPEX/PCE in 2030	CAPEX/PCE in 2040	CAPEX/PCE in 2050
Chemical Recycling (Plastic Waste Pyrolysis, PCE/Mtonnes capacity)[407]	EUR 1 453/Mtonnes (PCE, Million 2019 prices).	EUR 1 180/Mtonnes (PCE, Million 2019 prices).	EUR 958/Mtonnes (PCE, Million 2019 prices).	EUR 958/Mtonnes (PCE, Million 2019 prices).
Carbon Capture (Amine Capture) (PCE/Mtonnes CO_2 capacity) [408, 409]	EUR 292/Mtonnes CO_2 (PCE, Million 2019 prices).	EUR 287/Mtonnes CO_2 (PCE, Million 2019 prices). (Targeted CAPEX reduction: 20%). Expected further reduction based on innovation targets.	EUR 278/Mtonnes CO_2 (PCE, Million 2019 prices).	EUR 278/Mtonnes CO_2 (PCE, Million 2019 prices). (Targeted CAPEX reduction: 50%).

Total Investment Needs (TCI) for EU Transition

To facilitate the transition to a low-carbon future, the primary chemicals sector globally requires over $6.5 trillion in additional cumulative investments by 2050, with the majority directed towards green ammonia (60%) and green methanol (27%). This split can be justified by the fact that ammonia is expected to be the world's most produced chemical by 2030.[410] In Europe, the chemical sector alone will need EUR 318 billion referenced to EUR 2019 in cumulative discounted capital investments (CAPEX) between 2019 and 2050, under a "Base Case" scenario.

Investment urgency in Europe is critical, as 58% of the continent's primary production capacity needs reinvestment by 2035, risking fossil fuel lock-ins. Consequently, the majority of significant investments in abatement solutions are anticipated to occur between 2030 and 2040.

1.5. Plastics

Key facts

EU plastics production in 2024 was 54.6Mtonnes, with a turnover of €398 billion, 1,5 million direct jobs in over 50.000 companies and a trade deficit of 1,6Mtonnes, with 19.5Mtonnes exported and 21.1Mtonnes imported.

Key challenges

EU plastics production has experienced a sustained decline, falling from 62.3 Mtonnes in 2018 to 54.6 Mtonnes in 2024. This trajectory includes a 13% reduction in output over the past two years alone, without any increase in recycling capacity. Europe's share of global plastics

[407] Ibid.
[408] Ibid.
[409] A.SPIRE aisbl (2021). SPIRE. Processes4Planet 2050 Roadmap.
[410] JRC (2026). Mapping the transition of the EU ammonia industry to carbon neutrality.

production has contracted from 22% in 2006 to 12% in 2024, and the EU has transitioned to a net importer of both plastics resins and finished goods.

These market dynamics affect and challenge the entire plastics value chain in the EU, including primary manufacturers, compounders, processors, and recyclers, thereby creating risks for established industrial supply networks within the EU.

Cost of low-carbon plastics

Low-carbon plastics carry a cost premium relative to fossil-based virgin alternatives. Mechanically recycled plastics, the lowest-cost low-carbon option, exhibit a premium of 10-15% when destined for specification-grade applications. [411] However, market prices for certain mechanically recycled plastics are currently lower than for virgin alternatives but the total cost to end-users tend to be at parity or exceeds virgin plastic prices due to additional requirements including certification, quality assurance protocols, and audit procedures. [412] [413] Current price levels are to be considered with caution, as global over-supply and market disturbances have introduced significant market volatility for both recycled and virgin materials, reducing also transparency of future cost trajectories.

Mechanical recycling is projected to achieve cost parity with virgin fossil plastics by 2035, contingent upon increasing costs for CO2 emissions and fossil fuel inputs. The timeline for chemical recycling is longer; competitive positioning could be achieved once cumulative global volume reaches 650Mtonnes of polyolefins recycled through pyrolysis[414], calling for policy incentives to accelerate the cost convergence with fossil counterpart. Bio-based plastics carry currently a premium of 20-50% but are already established on markets.

The proposed measures

To support decarbonisation of the EU plastics sector and ensure sustained production capacity in EU, "Made in EU" and low-carbon requirements could be proposed with the aim to create demand for low-carbon plastics that incentivise industrial investment and subsequent cost reductions. The plastics products considered in this analysis are within the construction sector, which is the second-largest plastics consumer in Europe using 20% of plastics production (10-11Mtonnes annually). Plastic pipes, insulation materials, and window/door frames account for 60% of plastics consumption in the construction sector. These products can be effectively addressed with proportionate administrative complexity and deliver a meaningful impact for the plastics supply chain. These are also long-lived applications, likely to result in permanent emission reductions.

Public procurement and works represent approximately 40% of the addressed market (i.e. plastics in construction). Application of the 30% European low-carbon content requirement is projected to generate EU-made low-carbon plastics demand of approximately 0.8 Mtonnes annually[415].

Projects receiving public subsidies will create additional demand, but an estimation of volumes contain significant uncertainty regarding leverage ratios and supported project typologies post-

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[411] ING Economics Department, "How the plastics industry can go green and at what cost". Available at: think.ing.com/articles/how-the-plastics-industry-can-go-green-and-at-what-cost/

[412] bvse Market Report – Plastics 2025. Available at: plasticker.de/docs/preise/bvse_market_report_plastics_2025_05.pdf

[413] European Environment Agency, "Competitiveness of secondary materials". Available at: eea.europa.eu/en/circularity/thematic-metrics/business/competitiveness-of-secondary-materials

[414] Packaging Gateway, "Europe chemical recycling vs virgin plastics". Available at: packaging-gateway.com/news/europe-chemical-recycling-virgin-plastics/

[415] Based on volume in construction sector of 11Mt, a 60% share of the 3 product categories, a 40% share of public procurement, and the 30% target for the products covered.

2030. A very approximative estimate of this additional demand, assuming focus on renovation and larger share of thermal insulation compared to piping and frames, is a range of 0.3-0.9 Mt of low-carbon plastics demand[416]. The design of public support measures will impact this estimate significantly, driving investments to any combination of, for example, insulation, heating, ventilation, renewable installations, and holistic renovation of the building envelope.

In total, this measure could generate additional demand of 1.1-1.7 Mt for EU-made low-carbon plastics. While this represents 11-17% of current recycling volumes (10.6 Mt in 2024), it provides a meaningful incentive to maintain and expand the low-carbon plastics supply chain within the EU. Such supply chain development is also expected to stimulate additional voluntary demand for low-carbon plastics from private sector actors.

The projected additional demand requires investments of at least €1.5-2.6 billion into production capacity, based on established investment parameters for mechanically recycled plastics. The annual trade balance is expected to improve with €1.1-1.7 billion, assuming substitution of virgin imports at €1,000 per tonne.

Cost of measures

The cost impact on the covered construction activity is limited, as plastics represent only 2-4% of total building costs[417], the proposed three products cover 60% of plastics and analysed targets apply to 30% of that plastic. In favourable market conditions the costs for low-carbon plastics could approach parity with conventional alternatives. However, in the initial years of implementation a 10-20% premium is likely, set by mechanical recycling cost levels, which when applied to total construction costs implies an overall increase of 0.036-0.14% [418].

Benefits of measures

The societal benefits, including employment creation, emissions reductions, and reduced waste disposal costs, are expected to generate a positive economic case at the societal level well before cost parity is achieved at production plant level.

The measures contribute to robust industrial supply chains and reduced dependencies on fossil inputs, the main intended impacts. But these are joined by several other benefits. The impact on direct employment is significant, with projected job creation of 29 000-45 000 positions, applying the sector average employment ratio per unit capacity. The substitution of fossil-based plastic will reduce annual CO2 emissions with 3-4,8Mt[419].

[416] The estimate is strongly influenced by assumptions on the building renovation rate, and availability and form of public financing. The total renovation activities in scope are difficult to assess due to many and heterogeneous public support programs. Annual renovation needs are estimated at €300bn but has a €165bn financing gap, which indicate that significant renovation volume will exist beyond 2030. If annual €20bn publicly supported renovation materialise post-2030, and is in scope of this regulation, with an average share of 15-19% of spending into the 3 plastic products at an average cost of €1500/t, the plastics demand is 2-2,5mt, whereof 30% is 0,6-0,76Mt. However, with the large uncertainty on the assumptions and support programs a significantly larger bracket of 0,3-0,9Mt is considered.
https://energy.ec.europa.eu/topics/energy-efficiency/financing/financing-building-renovations_en
https://energy.ec.europa.eu/topics/funding-and-financing/recovery-and-resilience-facility-clean-energy_en

[417] The plastic sector turnover share, based on 10Mtonnes, of the construction sector turnover of €1500bn is a function of the mix of different products, resulting in plastic sector turnover of between €30bn and €60-70bn. The lower bracket is set by plastic pipes in civil engineering and profiles at €3000/ton, and the upper bracket by higher-spec insulation at €6000-7000/ton in product market value. This is 2-4% of the total construction sector turnover. [sources: https://www.ela.europa.eu/sites/default/files/2023-09/ELA_construction-sector-report-2023.pdf ; https://www.teppfa.eu/about-us ; https://www.eurowindoor.eu ; https://publications.jrc.ec.europa.eu/repository/bitstream/JRC108692/kj1a28816enn.pdf ; https://www.acrplus.org/docs/2024104804_guide-en.pdf]

[418] The bracket is a calculation of the values referenced in text, with 0.036-0.14% calculated as [0.02*0.6*0.3*0.1 - 0.04*0.6*0.3*0.2].

[419] Based on 1.1-1.7Mt /13*37, extrapolating from a national transition scenario: CE Delft, "Mandatory percentage of recycled or bio-based plastic" (Dutch Transition Agenda for Plastics). [cedelft.eu/wp-content/uploads/sites/2/2022/03/CE_Delft_200289_Mandatory_percentage_of_recycled_or_bio-based_plastic_Def.pdf]

The increase in procurement costs is to a large share borne by the contracting or supporting public authorities. These authorities will in most cases benefit from several meaningful positive effects within their jurisdictions:

- Economic development: Activities linked to the low-carbon plastics supply chain are generating economic value, employment, and tax revenues.
- Climate action: The emission reductions contribute to voluntary or mandatory climate targets through more sustainable building stock.
- Waste management: Enhanced recycling addresses plastic disposal challenges and reduces associated waste management costs.

Administrative burden

Manufacturer compliance costs will remain limited, primarily because Regulation (EU) 2024/3110 (Construction Products Regulation) already mandates the underlying product information infrastructure, including Digital Product Passports (DPP) and environmental declarations.

Certification and verification requirements at manufacturer level will have minimal impact on product costs, with a likely range of 0,02-0,05% additional cost[420].

Additional administrative cost for the public authorities will be generated from costs for procurement staff training, tender specification updates, bid evaluation and monitoring for compliance, but these costs are very limited as this regulation add only one element into an existing set of requirements and does not necessitate introduction of new systems or major procedures.

1.6. Glass

Key facts

EUR 6.3 billion in glass sales in 2021[421], 178 500 direct jobs[422], 37 Mtonnes production in 2023[423], main EU producers: Germany, France, Italy and Poland.[424] EU exports in 2023: 3.4 Mtonnes, imports: 4.9 Mtonnes. Major trading partners: China, UK and Switzerland.[425]

Key challenges

High energy costs and intense international competition. As a result, production volumes decreased by 18% since 2022, with a steady decline in employment since 2019.[426]

The EU glass industry emits approximately 22 Mtonnes of CO_2[427]. In line with EU climate goals, it is shifting towards cleaner production through different decarbonisation pathways, including shifting to electric and hybrid furnaces, greater use of renewable energy, improved recycling systems, and innovation in glass design to support circularity.[428] This industry faces

[420] As example, annual certification and verification costs of €40,000 for a 100,000 ton facility would increase plastics production costs by €0.40 per tonne, equivalent to 0.04% for a polymer priced at €1,000/t.
[421] JRC Analysis.
[422] statistical-report-glass-alliance-europe.pdf.
[423] Ibid.
[424] Tendate. Global Glass Exports by Nation in 2023 -.
[425] Glass Alliance Europe (2025). Statistical Report 2024-2025.https://www.wko.at/bgld/industrie/glasindustrie/statistical-report-glass-alliance-europe.pdf
[426] Ibid.
[427] European Commission (2022). How LIFE is reducing emissions from glass production.
[428] FEVE (2024). One destination, multiple pathways: How the European container glass industry is decarbonising glassmaking.

significant barriers in implementing these measures, including high capital and operational expenditure and complex EU regulatory requirements.[429]

1.7. Pulp and paper

Key facts

EUR 100 billion sales[430] in 2023, 180 000 direct jobs[431], 47.6 Mtonnes production[432] in 2023, roughly 22% of global paper production[433], main EU producers: Sweden, Finland, Portugal and Germany.[434] EU exports in 2023: 23.2 Mtonnes, imports 10.7 Mtonnes. Major trading partners: other European countries, Asia and Latin America.[435]

Key challenges

High energy costs and geopolitical instability potentially affecting trade and supply chains.[436] Although paper and board output declined in 2022-23 due to weakened demand, production increased by 5.2% in 2024.[437]

In 2023, the EU pulp and paper industry emitted approximately 33 Mtonnes of CO□.[438] In line with EU climate goals, the sector is shifting toward cleaner production through different decarbonisation pathways, including deployment of heat pumps, electrification, energy efficiency improvements[439], carbon capture and storage (CCS), and a switch to renewable energy.[440] However, significant implementation challenges exist. Key barriers include capital intensive infrastructure and high upfront costs for new technologies, as well as legal uncertainty and complexity.[441] So far, the sector reduced its CO□ emissions by 46% since 2005.[442]

Cost evolution

Table 14 below includes the Capital Expenditure cost estimates for the key decarbonisation technologies applicable to the EU pulp and paper industry. Since the sector prioritizes process heat, energy efficiency, and Carbon Capture and Storage (CCS), most cost estimates are given as unit costs for essential equipment (e.g., boilers or heat pumps) or as inputs for determining the total capture cost (Total Capital Requirements (TCR) or Nth-of-a-Kind (NOAK) estimates.

Table 14: CAPEX for the pulp and paper industry compiled by the JRC, 2025

Technology Pathway	Current Value/Reference CAPEX	CAPEX in 2030	CAPEX in 2040	CAPEX in 2050
Biomass Boiler (New	850 EUR/kWth (Reference cost for boiler).	850 EUR/kWth (Costs for mature, deployed	850 EUR/kWth.	850 EUR/kWth.

[429] FEVE (2024). One destination, multiple pathways: How the European container glass industry is decarbonising glassmaking.
[430] Cepi (2023). Key Statistics 2023 - European pulp & paper industry,
[431] Ibid.
[432] Ibid.
[433] European Commission webpage. Pulp and paper industry.
[434] Cepi (2024). Key statistics 2023 - European pulp & paper industry.
[435] Cepi (2024). Press release: In a very difficult context, pulp and paper industry has shown resilience in 2023.
[436] EMGE (2025). EMGE Paper and Pulp Industry Outlook: 2026.
[437] Cepi (2024). Press release: In a very difficult context, pulp and paper industry has shown resilience in 2023.
[438] Reinvent webpage. Paper.
[439] Cepi (2023). Press release: Pulp and paper manufacturers are innovating their way out of CO_2 emissions.
[440] Lipiäinen, S. et al. (2023). Decarbonization Prospects for the European Pulp and Paper Industry: Different Development Pathways and Needed Actions, Energies, 16(2), 746.
[441] Engie Impact (2024). Overcoming Decarbonization Hurdles in the Pulp and Paper Industry.
[442] Cepi (2025). Press Release: Pulp and Paper Industry Showcases Commitment to Phase out Fossil Energies, at European Parliament Event.

Technology Pathway	Current Value/Reference CAPEX	CAPEX in 2030	CAPEX in 2040	CAPEX in 2050
Installation)[443]		technology typically considered stable).		
High-Temperature Heat Pumps (HTHP)[444, 445]	EUR 300–EUR 1 000/kWth (Estimates for systems like reverse-Rankine cycle, typical project range).	Maximum acceptable specific CAPEX threshold for economic viability in Sweden is up to EUR 1 600/kW. Broad deployment requires significant cost reductions.	Expected stability after deployment and cost optimisation.	Expected stability after full technological maturity.
Electric Boiler (Direct Electrification) [446]	Requires significant investments in electricity grid connections, which acts as a barrier.	Cost remains largely dependent on required grid upgrades.	Cost remains largely dependent on required grid upgrades.	Cost remains largely dependent on required grid upgrades.
Carbon Capture (PCC - Amine/Carbonate) [447, 448]	CAPEX calculated using Nth-of-a-Kind (NOAK) factors, meaning current costs are likely higher than estimates.	NOAK costs are assumed, reflecting a high level of maturity where technology is expected to be deployed.	Expected CAPEX stability, as major cost reductions (learning curve of 1%) are primarily assumed only until TRL 8 is reached, typically before 2030.	Expected CAPEX stability.

Total Investment Needs (TCI) for EU Transition

To achieve its GHG emission reduction targets by 2030 the European pulp and paper industry estimates a TCI of EUR 24 billion is needed throughout the 2020s. Of this amount, EUR 6 billion is allocated to immediate emission reduction measures, while EUR 18 billion is

[443] ECN, TNO and PBL Netherlands Environmental Assessment Agency (2019). Decarbonisation options for the Dutch paper and board industry.
[444] Ibid.
[445] Ciambellotti et al. (2024). High-Temperature Heat Pumps for Electrification and Cost-Effective Decarbonization in the Tissue Paper Industry.
[446] ECN, TNO and PBL Netherlands Environmental Assessment Agency (2019). Decarbonisation options for the Dutch paper and board industry.
[447] ACCSESS (2024). Providing access to cost-efficient, replicable, safe and flexible CCUS. D5.3 Advanced capture configurations for selected pulp and paper plants incl. technoeconomic analysis.
[448] ECRA (2022). ECRA Technology Papers.

earmarked for further technological advancements and infrastructure upgrades. A significant portion of these investments will target advanced CO_2 capture technologies. However, these estimates are considered optimistic compared to near-term implementation, because the current estimates assume a more mature technology base than likely to be available in the short term.

1.8. Refining

Key facts

EUR 487 billion sales in 2022[449] 130 000 direct jobs, 602.8 Mtonnes production of refined petroleum products in 2022, Germany, Italy, the Netherlands, and Spain.[450] EU exports in 2021: EUR 186 billion, imports: EUR 150 billion. Major trading partners: USA, Norway, Middle East and Russia.[451]

Key challenges

Dependency on crude oil imports, exposure to global price volatility, and increasing regulatory pressure to decarbonise. Production volumes have decreased by 8% between 2022 and 2023.[452]

EU refineries emit approximately between 150 and 200 Mtonnes of CO_2 per year.[453] In line with EU climate goals, refineries are transitioning toward cleaner production and de-fossilisation of their products through several decarbonisation pathways, including fuel switching to low-carbon hydrogen, electrification of heat processes, deployment of carbon capture, utilisation and storage (CCUS), and increased production of advanced biofuels and synthetic fuels. The estimated investment requirement is EUR 650 billion by 2050. Main decarbonisation challenges include the limited availability of low-carbon technologies at scale, underdeveloped infrastructure for clean hydrogen and CO_2 transport and storage, and the complexity of adapting current assets to new energy systems.

1.9. Steel

Key facts

Third-largest global steel producer (7-8% of global production) after China and India [454], EUR 177 billion of Gross Value Added in 2024, 298 000 direct and 1 550 000 indirect jobs, 130 Mtonnes production, main EU producers: Germany, Italy, Spain and France.[455] EU exports in 2024: 16.7 Mtonnes, and imports: 27.4 Mtonnes of finished steel products Türkiye, South Korea, India, Vietnam, China, Taiwan) for imports, and USA, Türkiye and Switzerland for exports.[456]

Key challenges

High energy costs, unfair competition, increased import pressure resulting from global overcapacity and low demand for green steel.[457] As a result, production volumes have decreased by 34 Mtonnes since 2018, and nearly 100 000 jobs have been lost over the past 15

[449] ERT (2024). Europe's energy transition: ERT releases analysis on the EU's competitiveness for energy-intensive industries and state of energy infrastructure.
[450] T&E (2023). The 'biofuels first, e-fuels later'strategy of European refining sector. What future for European refining?
[451] Insight EU Monitoring (2024). Eurostat reports drop in imports of energy products to the EU.
[452] Eurostat webpage. EU imports of energy products.
[453] Sector Analyses (2024). Chemical Industry.
[454] Eurofer (2025). European Steel in Figures 2025.
[455] Ibid.
[456] Ibid.
[457] Deloitte (2023). Steel – Pathways to decarbonization.

years.[458] Capacity utilisation has dropped to an unsustainable level of around 65% [459] compared to the minimum 85% to remain competitive under market conditions. While Europe was a net exporter of steel in 2012, by 2022 imports had surged to EUR 20 billion - an increase of 640%.[460]

In 2023, the EU steel industry emitted approximately 49.15 Mtonnes of CO□.[461] In line with EU climate goals, the steel industry is shifting toward cleaner production through different decarbonisation pathways, including electric furnaces, such as direct reduced iron (DRI) and electric arc furnaces (EAF), as well as the implementation of carbon capture and storage (CCS).[462, 463, 464] These technologies aim to reduce greenhouse gas emissions across the production processes, as 95% of emissions come from the steelmaking, finishing and distribution. The main barriers to decarbonisation include limited availability of green infrastructure, the need for capital investment until 2030 estimated at over EUR 31 billion and EUR 54 billion for operating expenditure (OPEX),[465] lack of market demand for premium-priced green steel, varying maturity levels of decarbonisation technologies, and regulatory uncertainty, particularly regarding the ongoing CBAM/ETS implementation standards.[466]

Cost evolution

Table 15 below and its subsequent data presents CAPEX as (1) the specific CAPEX per tonne of annual crude steel capacity, adjusted for inflation to the base year (EUR 2022 or USD/EUR 2023), and (2) the projected specific capital costs associated with future technology maturity by 2030, 2040 and 2050. Certain decarbonisation technologies within the steel industry like DRI in combination with EAF have been around for decades, however the utilisation of hydrogen has yet to be seen on an industrial scale. In comparison, certain CCS and electrolysis technology pathways are currently projected to not reach necessary industrial scale before the beginning of the 2030s, which is reflected in the high prognosed CAPEX.

Table 15: CAPEX estimates for the steel industry compiled by the JRC, 2025

Technology Pathway	CAPEX (Current Value/Reference)	CAPEX (2030)	CAPEX (2040)	CAPEX (2050)
H-DRI-EAF (Integrated DRP + EAF) (Excluding Electrolyser)[467, 468]	EUR 592/t (Literature Median, 2022 prices) EUR 751/t (Announced Projects Median, 2022 prices)	\$75 – \$85/t (Crude steel capacity, specific capital costs for facilities)	N/A	N/A
H-DRI-EAF (Including Integrated Electrolyser)[469, 470]	EUR 886/t (Literature Median, 2022 prices) EUR 1 600/t	Up to EUR 1 000/t (Upper bound scenario estimate,	Expected to decrease due to anticipated	Expected to decrease due to anticipated

[458] Steel Times International (2024). European steel industry facing irreversible decline, says Eggert. ERT (2024). Competitiveness of European Energy Intensive Industries.
[459]Eurofer (2024). European Steel in Figures.
[460] UN Comtrade data; ERT (2024). Competitiveness of European Energy-Intensive Industries.
[461] World Steel (2025). Sustainability Indicators Report 2025.
[462] JRC144070 (2026) Mapping the Transition of the EU Steel Industry to Carbon Neutrality.
[463] JRC (2024). The role of carbon capture across hard-to-abate industries in the EU.
[464] Deloitte (2023). Steel – Pathways to decarbonization.
[465] Eurofer (2025). Low-CO2 emissions projects in the EU steel industry.
[466] Deloitte (2023). Steel – Pathways to decarbonization.
[467] Huttel A, Lehner J. (2024). Revisiting investment costs for green steel: Capital expenditures, firm level impacts, and policy implications.
[468] Agora Industry, Wuppertal Institute and Lund University (2024): Low-carbon technologies for the global steel transformation. A guide to the most effective ways to cut emissions in steelmaking
[469] Huttel A, Lehner J. (2024). Revisiting investment costs for green steel: Capital expenditures, firm level impacts, and policy implications.
[470] Agora Industry, Wuppertal Institute and Lund University (2024): Low-carbon technologies for the global steel transformation. A guide to the most effective ways to cut emissions in steelmaking.

Technology Pathway	CAPEX (Current Value/Reference)	CAPEX (2030)	CAPEX (2040)	CAPEX (2050)
	(Announced Projects Median, 2023 prices)	including electrolysis unit)	electrolyser cost reduction	electrolyser cost reduction
BF-BOF + CCS (73% Capture)[471]	TRL 3–4 (Pilot stage)	$34 – $66/t (Crude steel capacity, specific capital costs) (Expected Readiness: 2030–2035)	N/A	N/A
HIsarna + BOF + CCS (93% Capture)[472]	TRL 5–6 (Pilot plant status, development unclear)	$41 – $85/t (Crude steel capacity, specific capital costs) (Expected Readiness: 2030–2035)	N/A	N/A
NG-DRI-EAF + CCS[473, 474]	N/A (TRL 8–9)	$77 – $90/t (Crude steel capacity, specific capital costs for facilities)	N/A	N/A
Near-Zero Emissions Scrap EAF[475]	TRL 9 (Ready)	$22/t (Crude steel capacity, specific capital costs)	N/A	N/A
Molten Oxide Electrolysis (MOE) [476]	TRL 3–4 (Pilot Plant)	Not applicable (Not available at necessary scale before 2030)	Expected Readiness: 2035–2040	$60 – $122/t (Crude steel capacity, specific capital costs)
Alkaline Electrolysis (AEL-EAF) [477]	TRL 4 (Moving to TRL 6 with support)	TRL 7 aimed by 2030 (Medium scale pilot plant)	Commercial readiness (TRL 9) expected by 2040	$75 – $152/t (Crude steel capacity, specific capital costs)

471 Ibid.
472 Ibid.
473 Ibid.
474 IEAGHG (2024). Clean Steel: An Environmental and Technoeconomic Outlook of a Disruptive Technology March 2024.
475 Agora Industry, Wuppertal Institute and Lund University (2024): Low-carbon technologies for the global steel transformation. A guide to the most effective ways to cut emissions in steelmaking
476 Ibid.
477 Ibid.

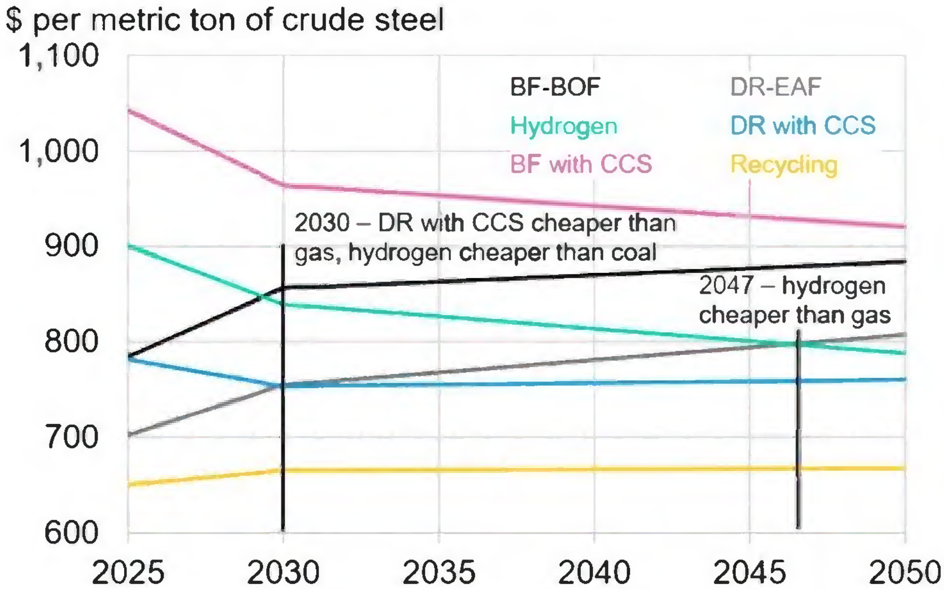

Figure 14: Levelized cost of net-zero and unabated materials in the EU, including the carbon price, 2024 Levelized Cost of Net-Zero Materials (BNEF 2024)

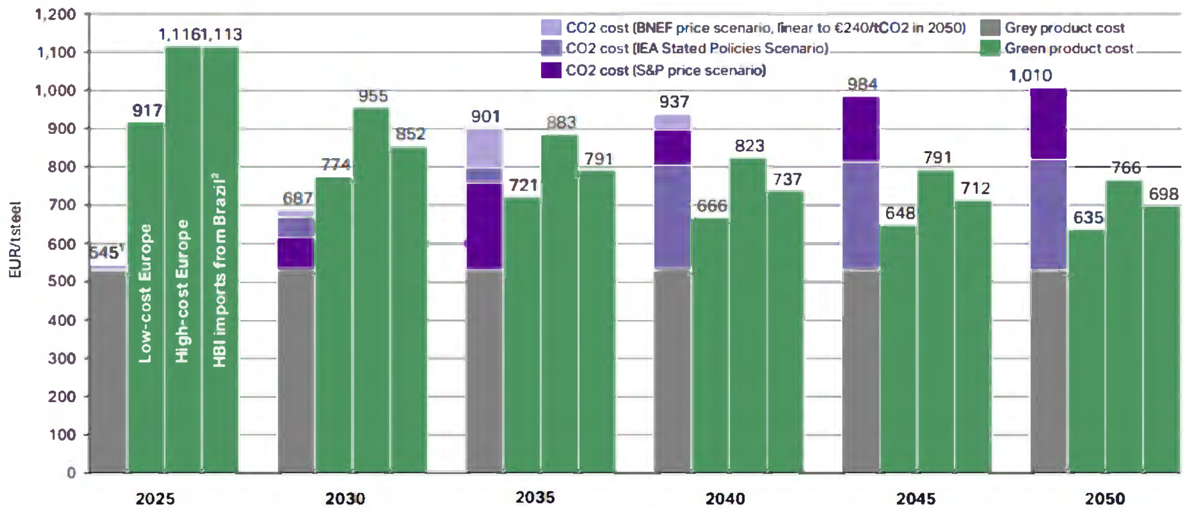

Figure 15: Evolution of green and grey steel production costs in Europe under different CO2 price scenarios[478]

Total Investment Needs (TCI) for EU Transition

Based on the analysis above as well as other projections, the total investment (TCI) for transitioning the European steel industry would require enormous scale. In order to convert 30% of listed European steelmakers' production capacity to the (H-)DRI-EAF route by 2030 it would require between EUR 12.1 billion and EUR 20.2 billion TCI, depending on whether electrolysis capacity is included.[479] By 2050, the projected cumulative TCI required to commercialise low-carbon steel technologies and replace existing plants is estimated to be between EUR 70 billion and EUR 100 billion.[480]

[478] Mission Possible Partnership (MPP), E3G and the Industrial Transition Accelerator (ITA) (2025). Building the EU's Clean Industrial Future: Unlocking Investment through Lead Markets.
[479] Huttel A, Lehner J., Revisiting investment costs for green steel: Capital expenditures, firm level impacts, and policy implications. https://www.diw.de/de/diw_01.c.901042.de/publikationen/diskussionspapiere/2024_2082/revisiting_investment_costs_for_green_steel__capital_expenditures__firm_level_impacts__and_policy_implications.html
[480] Somers, J. (JRC) (2022). Technologies to decarbonise the EU steel industry.

2. Automotive industry

Key facts

The automotive industry has traditionally been a cornerstone of the European economy. It serves as a major employer (accounting for 6.1% of total EU employment, directly impacting around 1.7 million people), and it contributes significantly to value added (accounting for 8% of the total manufacturing value added within the EU) and is a net exporter of vehicles and car parts (with a EUR 117 billion surplus in extra-EU trade).[481] Moreover, the EU automotive industry is a global leader in R&I investment, making up 36.5% of the EU's corporate investment.[482] The EU automotive supply industry has combined sales of EUR 250 billion with a manufacturing presence in most Member States, and more than EUR 50 billion exports.

Over the past years, the European automotive industry has been investing in the development of cleaner vehicles and innovative automotive components that are key to improve the environmental performance of such vehicles (through, e.g. increased range, better energy efficiency, or higher usage of sustainable material and processes).[483] These components have the potential to contribute to decarbonisation by enabling optimised routing and optimised traffic flow, reducing congestion and lowering emissions, improving energy efficiency through optimised speed, acceleration, and braking, facilitating the adoption of electric and hybrid vehicles through optimised charging strategies and energy management.

However, the transition to zero-emission vehicles and the increasing role of software and electronics also change value chain patterns and provide opportunities for new players from third countries calling into question historical industry patterns, including the appeal of supply chain regionalisation[484].

As a consequence, traditional European leadership in the global automotive market is being diminished, as shown in Figure 16. The EU's share of the global automotive market has declined from 24% in 2010-14 to 22% in 2022. Meanwhile, China has increased its influence and surpassed Europe to become the world's largest car producer and a key supplier of critical components for electric vehicles (EVs), such as batteries. China's market share grew from 20% in the 2010-14 period to 26% in 2022. The United States has also seen a slight increase in its market share. Conversely, other countries, notably Japan (included in the Rest of the World category), have experienced losses, with Japan's market share dropping from 12% to 7% during the same timeframe.

[481] Draghi, M. (2024). The future of European competitiveness: In‑depth analysis and recommendations (Part B), p. 140.

[482] European Commission, Joint Research Centre (2024) EU Industrial R&D Investment scoreboard, Publications Office of the European Union

[483] Such key components include, among others, controllers, transformers, electric motors, charge ports and chargers, AC/DC converters, power inverters, alternators, control units that are essential for the operations of the powertrain, regenerative braking systems, thermal management systems, transmission systems, fuel-cells, hydrogen storing and fuelling systems; but also connected and automated driving (CAD) systems (software and hardware) such as cameras, lidars, radars, ultrasonic sensors, vehicle-to-everything (V2X) communication systems, navigation and mapping systems, human-machine interface (HMI) systems, vehicle-to-grid (V2G) systems, advanced driver-assistance systems (ADAS).

[484] China's subsidies, price and technical advantage, and overcapacity in parts of the industry keep Chinese vehicles and components cost-competitive despite shipping costs, localization advantages, and trade barriers. China and the Future of Global Supply Chains, Rhodium Group, 4 February 2025

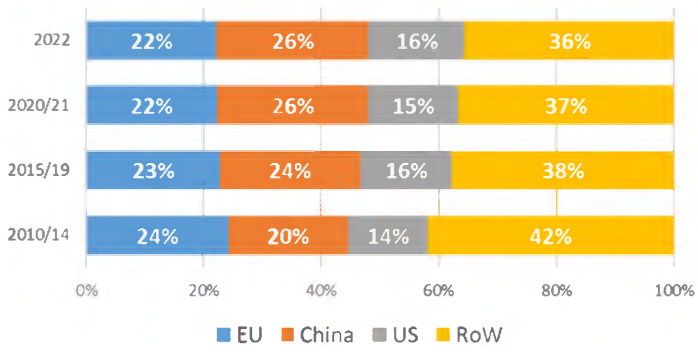

Figure 16: Global automotive market in value JRC calculations based on Eurostat's FIGARO data[485]

The JRC analysed the EU value content in the EU automotive production. The left panel of figure 17 shows the evolution of the origin of the inputs used by the industry (excluding batteries) between 2010 and 2022, broken down by country of origin. While the European automotive industry still primarily relies on EU-manufactured inputs, this proportion has decreased, reducing the EU value content of the automotive sector from 89% in 2010 to 85% in 2022. This trend indicates a growing reliance on production inputs from non-EU countries, particularly from China, where sourcing has almost doubled (increased by 1.9 times) during that period. When zooming in on the EU production of motor vehicles only, it appears that 85% of the components of an EU-made internal combustion engine (ICE) car comes from the EU, while it is only 70% for an EU-made EV (right hand side Figure 17).[486] We can note in particular the increased dependency on China (4.2 times) in EVs production compared to conventional ICE vehicles.

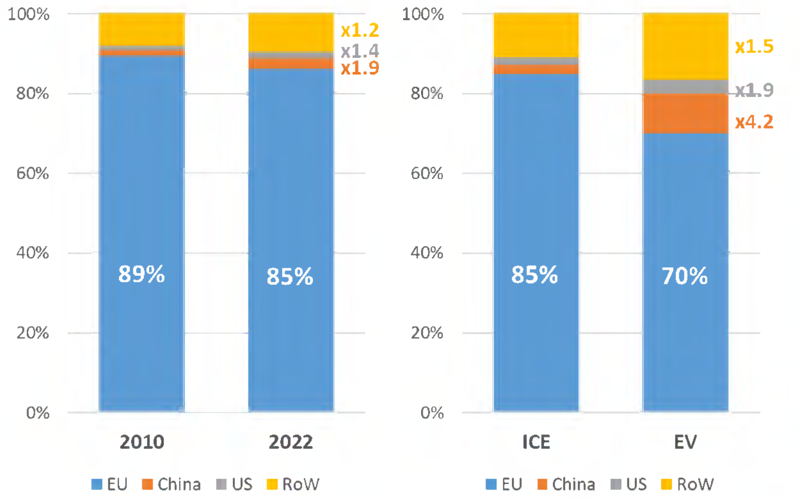

Figure 17: Origin of the EU car components used in the manufacturing industry: over time (left) and by type of vehicle (right)-JRC estimates based on Eurostat's FIGARO data[487]

EVs have a greater dependence on third countries for any segment or component (inputs) compared to ICE cars (See: Figure 18).

[485] Data refers to Industry C29 (NACE Rev. 2.1) Manufacture of motor vehicles, trailers, and semitrailers.
[486] This finding is consistent with other studies that estimate the EU's value content at approximately 85–90% for ICE vehicles and 70–75% for EVs. Source: McKinsey (2024). Europe's economic potential in the shift to electric vehicles.
[487] ICE includes mild hybrids. EV includes battery electric and plug-in hybrid electric vehicles.

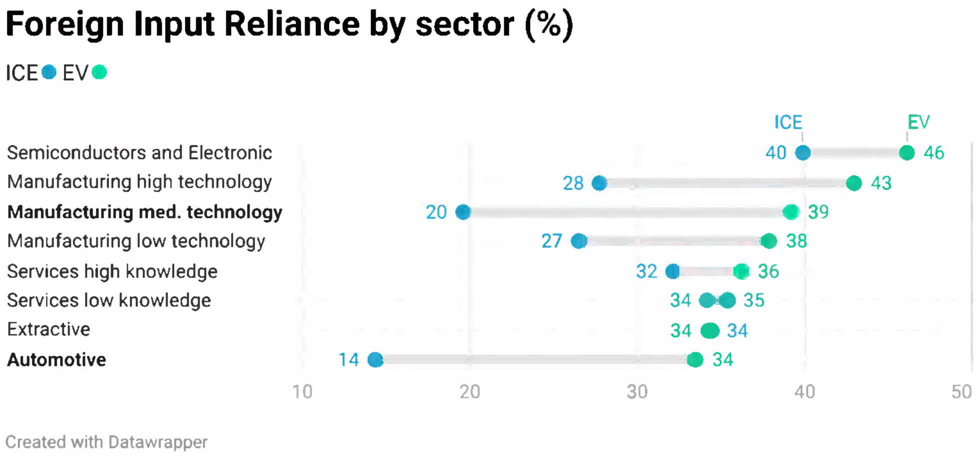

Figure 18: Foreign input reliance by sector, JRC estimates based on Eurostat's FIGARO data[488]

The increased dependence on non-EU manufactured inputs in the production of EVs may originate from two reasons:

- A technological shift as the production of EVs may depend, further than ICE vehicles, on industries or technologies where the EU has a comparative disadvantage; and
- A value chain shift as the production of EVs may have come with a shift of EU manufacturing value chain in favour of non-EU inputs. The JRC has shown through a counterfactual analysis of EU-manufactured EVs (where the EU content of the EV inputs would be the same as that of ICE inputs, except for batteries and electric components) that the primary reason for the reduction of EU content in the manufacturing of EVs inside the EU is due to a shift in the value chain in favour of vehicle components coming from outside of the EU.

These findings highlight an outsourcing trend that affects the entire EV value chain, which goes far beyond battery and electric component production.

Over the past years, import of automotive parts from China increased by around EUR 4 billion, affecting all vehicle component sub-sectors, but some are much more impacted than others (it is in these sub-sectors that most of the restructuring underway since 2024 is concentrated): +300% for gearboxes, +270% for bumpers, +195% for tyres and transmissions and +60% for shock absorbers and airbags**.** Consequently, the trade balance for automotive components is deteriorating very rapidly: from a surplus of EUR 4.6 billion in 2019 to a deficit of around EUR 4.9 billion in 2025. All sub-sectors are now in deficit.

At the same time, weaker than expected demand for EVs has created overcapacities for EV components and led to a sharp reduction in investment, hampering the long-term industrial capacities, and Chinese export restrictions on rare earths have created huge supply chain risks, while there is an increasing trend of non-EU manufacturers opening assembly plants within the EU, where they produce vehicles with an initial EU content of less than 30%.

Key challenges

EU vehicle components manufacturers face increasing cost competitiveness challenges compared to low-cost locations in the European neighbourhood or in Asia and stagnating or decreasing sales volumes in the EU. In addition, due to the pressure to reduce prices, vehicle manufacturers increasingly import cheaper components from overseas suppliers. This increasing reliance on foreign components points towards significant risks to EU technology

[488] Sectors were aggregated following the Eurostat technological intensity classification for the manufacturing segments and the Eurostat knowledge-intensive services (KIS) for the services segments. Only direct effects of the value chain are considered.

sovereignty and the urgent need for targeted policy intervention to safeguard the industry alongside decarbonisation efforts.

Vehicle components: the example of tyres

Tyres are a key automotive component, not only for vehicle control, safety and comfort, but also for (environmental) performance and efficiency. EU tyre production is recognised globally for its high standards of safety, performance, and technological advancements. As shown on Figure 19 (left hand side), which displays trade data as a percentage of production sold (in value), the EU's share of tyre imports from outside the EU is larger than its exports, and the gap between these two figures has been increasing over time. Imports from outside the EU rose significantly from EUR 881 million in 2010 to EUR 1.360 million in 2024, while the dependence on Chinese tyres notably increased from 29% in 2010 to 58% in 2024 (Figure 19, right hand side).

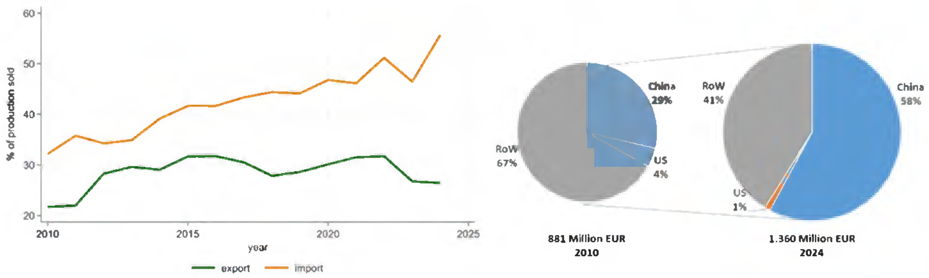

Figure 19: Tyres trade relative to production sold (left) and extra-EU imports composition in 2010 and 2024 (right), JRC estimates based on PRODCOM489 and (left) and COMEXT[490] (right) data

The rise in imports compared to the production sold can be attributed to price differences between domestic production and international trade. The increasing production price differential indicates that the cost of production in the EU has risen more quickly than the cost of imports (Figure 20). This trend has resulted in the EU losing its competitive edge. Similarly, while the cost of exports has increased at a faster rate than the cost of imports, the price difference is even more significant. These data suggest that tyres produced in the EU are more expensive than those from foreign manufacturers (in the range of 20-50% in the last decade).

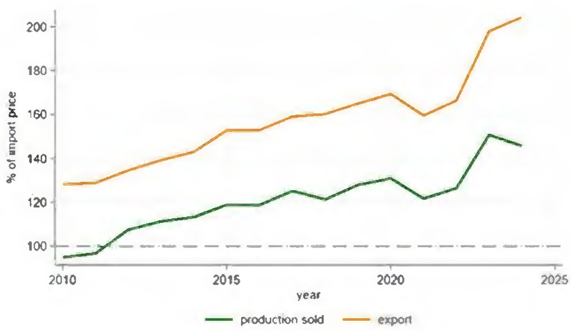

Figure 20: Tyres EU price differentials relative to imports, JRC estimates based on PRODCOM data

3. Clean energy technologies

According to the IEA, the global market for key clean energy technologies like solar PV, batteries, as well as wind and electrolyser, are projected to triple in the next decade.[491] While

[489] Data refers to Industry 22.11.11.00 (NACE Rev. 2.1) New pneumatic rubber tyres for motor cars.
[490] Data refers to Industry 40.11.10 (HS nomenclature) New pneumatic tyres, of rubber of a kind used on motor cars.
[491] IEA (2024). Energy Technology Perspectives 2024.

these technology all face similar competitiveness challenges, this assessment is focuses on solar PV and batteries because the combination of high global overcapacities, being commoditised products, and high dependencies of the EU's consumption on one single sources of supply is **unique to these technologies.** This level of concentration poses significant risks to the secure supply of PV modules and has widened the price gap between EU and Chinese producers. [492]

3.1. Batteries

Key facts

In 2024, the EU imported approximately EUR 28 billion worth of batteries, with 79% coming from China and 5% from South Korea as the second biggest battery exporter.[493] The value of European battery production was EUR 24 billion.[494] Batteries accounted for 91% of new clean tech investment in Europe in 2024[495]. The EU currently has 34 lithium-ion battery cell manufacturing projects across operational, under construction, and announced.[496] However, only 27% of the announced manufacturing capacity is considered low risk. Although the EU reached 188 GWh of installed battery cell capacity in 2024, and has over 750 GWh in the pipeline, 238 GWh worth of planned projects have been cancelled or delayed. The battery cell sector supports around 128 000 jobs, of which 66% are at medium or high risk.[497] Upstream the value chain, battery key components face the same problems.

When comparing EV and battery subsidies across the three major battery manufacturing regions (China, Europe, and the US) clear strategic differences emerge. Between 2018 and 2024, China led with an average of USD 22.4 billion annually in subsidies, followed by Europe with USD 13.8 billion, and the US with USD 6.1 billion[498]. However, while China and the US increasingly directed their support toward manufacturing by allocating over 50% of their subsidies to industrial development, the EU and its Member States have focused on demand-side measures, with 89% of its subsidies going to EV purchase incentives. In 2024, the EU spent USD 18 billion on EV purchases but only USD 2.5 billion on manufacturing, both for EVs and batteries. In contrast, China invested USD 17.5 billion in manufacturing, including USD 7.3 billion specifically for batteries, and the US allocated USD 8.6 billion to battery production alone. These targeted manufacturing subsidies have enabled Chinese and American manufacturers to attract bigger investments than the EU, scale up production, reduce costs, and strengthen their positions in global supply chains.

Meanwhile, Europe is spending significant amounts on EV and battery subsidies, but with less strategic impact on its own manufacturing base. The EU's focus on purchase subsidies inadvertently benefits non-EU manufacturers, who can offer lower prices and capture EU-funded demand, while European manufacturers struggle to compete on costs and scale. Without Made in EU requirements, public funds risk flowing abroad, undermining the EU's industrial competitiveness and long-term strategic autonomy.

Key challenges

[492] European Commission (2025). Communication from the Commission providing updated information to determine the shares of the European Union supply of final products and their main specific components originating in different third countries under Regulation (EU) 2024/1735 (C/2025/3236). Official Journal of the European Union C, 2025/C 3236. https://eur-lex.europa.eu/eli/C/2025/3236/oj/eng
[493] Bruegel. European Clean Tech Tracker.
[494] Ericher, M. et al. (2024), Les Thémas de la DGE: Deployment of electromobility: how to develop the European battery supply?
[495] BloombergNEF (2025). Energy Transition Investment Trends in Europe 2025.
[496] T&E (2024). An Industrial Blueprint for Batteries in Europe.
[497] Idem.
[498] MIT CEEPR (2025). Global Clean Investment Monitor: Government Support for Electric Vehicles and Batteries.

Europe's battery sector faces deep structural challenges. Technological development within the EU's battery ecosystem is not progressing rapidly enough to secure strategic autonomy, increasing the risk of long-term dependency on imports. Despite efforts to scale up domestic production, EU manufacturers struggle to compete with aggressive pricing from third-country producers, particularly from China, which benefit from bigger subsidies, significant manufacturing overcapacities, lower energy and material costs, and vertically integrated supply chains. China currently dominates global battery manufacturing, accounting for 85% of installed production capacity (4 534 GWh)[499], despite having an end use demand of only 850 GWh.[500]

3.2. Solar

Key facts

Between 2020 and 2022, rapid capacity expansion in the solar PV sector created severe global oversupply, with crystalline silicon module manufacturing capacity reaching over 1.4 TW in 2024, twice the forecast demand for 2025, driving module prices down by 50% in 2023. China controls over 80% of global PV manufacturing across all segments, with the top nine producers, seven of them Chinese supplying more than 60% of modules worldwide. Since 2012, US trade policy has excluded solar products made in China, prompting Chinese manufacturers to establish module and cell factories in Southeast Asia to serve the US market. However, following 2025 investigations, the US imposed duties of 70% to 700% on imports from four Southeast Asian countries. In response, Chinese firms are considering manufacturing bases in the Middle East and North Africa, though direct US investments remain limited. This dominance, combined with intense price competition, has triggered financial losses, mass layoffs, and factory closures globally, with 2025-2026 expected to remain difficult. The EU is particularly exposed, importing 94% of its PV modules and cells, 79% of wafers, and 50% of inverters from China, and faces higher energy, labour, and capital costs, smaller-scale production, and limited supply chain integration. Although the EU projects by 2030 to expand PV ingots from almost nothing today to 25 GW, PV wafer capacity from almost nothing today to 34 GW, PV cells from 2 GW to over 30 GW, and PV modules from 12 GW to more than 40 GW, achieving supply security will require accelerating this build-out, securing vertical integration, and developing large-scale factories to withstand continued Chinese price pressure. The solar energy has experienced remarkable growth in recent years, driven by technological advancements and decreasing costs, positioning solar energy as a pivotal component in the global shift towards renewable energy sources.[501] Thanks to technological improvements and falling costs, solar energy is becoming increasingly competitive, making it one of the most appealing options in the global energy landscape.[502]

Key challenges

Chinese manufacturers have sharply decreased the prices to reach unprecedented low levels of EUR 0.06/W in Europe by the end of 2024.[503] Given this is reported to be below manufacturing costs, as a result, the profit margins of the largest Chinese solar manufacturers have sharply declined, as firms compete on price to defend their market share. Willingness of consumers to carry the price difference between EU and Chinese production is lacking. Although the planned

[499] BloombergNEF.
[500] Volta Foundation (2025). 2024 Battery Report.
[501] European Commission (2025). Report from the Commission to the European Parliament and the Council: Progress on competitiveness of clean energy technologies. 26.2.2025 COM(2025) 74 final.
[502] JRC. Clean energy technology observatory.
[503] PV Magazine (2024). Solar modules now selling for less than €0.06/W in Europe.

expansion of PV manufacturing capacity in the EU is encouraging[504], it must accelerate and secure full vertical integration as well as creation of large-scale factories to withstand continued Chinese price dumping. An expansion of the supply chain will result in decreased price levels of European producers, so that a price level in the long-term can be reached which consumers would be willing to pay.

[504] PV wafer capacity planned to expand from less than 1 GW today to around 8 GW in 2030, PV ingots capacity from less than 1 GW to around 6 GW, PV cells capacity from around 2 GW to more than 20 GW, PV module capacity from around 8 GW to more than 30 GW.

Annex 8: Interplay with other legislation and policies and baseline scenario

1. Interplay with existing initiatives

The two tables below summarise the main instruments with which this initiative interplays. The detailed interactions are subsequently presented.

Table 16: Interplay with existing EU instruments

Climate	Climate Law, EU Emission Trading System, Industrial Emissions Directive, Carbon Border Adjustment Mechanism.
Energy	Electricity and gas Market Regulations and Directives, the Renewable Energy Directive, the Energy Efficiency Directive, the Energy Performance of Buildings Directive, the Gas and Hydrogen Decarbonisation Package, Electricity Market Design, Action Plan for Affordable Energy.
Permitting	Strategic Environmental Assessment Directive, Environmental Impact Assessment Directive, Industrial and Livestock Rearing Emissions Directive, Habitats and Birds Directives, Water Framework Directive, Net Zero Industry Act, Critical Raw Materials Act, Grids Package
Product	Construction Product Regulation (CPR), Energy Performance of Buildings Directive, Batteries Regulation, Ecodesign for Sustainable Products Regulation.
Competition	Clean Industrial Deal State Aid Framework, Climate, Energy and Environmental Aid Guidelines, Important Projects of Common European Interest (IPCEI), Competition rules and enforcement.
Transport	Alternative Fuels Infrastructure Regulation, ReFuelEU Aviation, FuelEU Maritime, CO_2 Standards for Cars and Light Commercial Vehicles Regulation, Cooperate Clean Fleet Regulation, Battery Booster.
Trade	Trade Defence Instruments, Steel and Metals Action Plan, Foreign Direct Investment Regulation.
Funding	Current multiannual financial framework, Industrial Decarbonisation Bank, Horizon Europe, Research Fund for Coal and Steel, Innovation Fund, Recovery and Resilience Facility, post-2027 MFF, European Competitiveness Fund.

Table 17: Interplay with ongoing and announced initiatives

Ongoing	Proposal for a Regulation on the End-of-Life Vehicles		Proposal for Ecodesign and Energy Labelling rules for PV modules	New harmonised standard on cement GHG emissions	
To be adopted in 2026	Circular Economy Act	Electrification Action Plan Strategic Roadmap for digitalisation and AI in the energy sector	Automotive Action Plan	Strategy on Heating and Cooling	Revision of the Public Procurement Framework
	Cloud and AI Development Act				

*Non-exhaustive o*verview of existing instruments

This initiative is one of the key deliverables of the Clean Industrial Deal, aiming to complement and build upon existing legislation and policy framework relevant to EIIs:

1. The European **Climate Law**[505] enshrines in legislation the EU's commitment to reach climate neutrality by 2050 and the intermediate target of at least 55% net GHG emissions reduction by 2030, compared to 1990 levels. In July 2025, the Commission

[505] Regulation (EU) 2021/1119 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law').

proposed an amendment to the European Climate Law (ECL) introducing a 2040 EU climate target of 90% reduction in GHG emissions, compared to 1990 levels. In December 2025, the Council presidency and the European Parliament's representatives reached a provisional agreement on the amendment. ➔ *IAA aims to contribute to achieving the Climate Law's commitment by supporting decarbonisation investment in industry.*

2. The **EU Emission Trading System**[506] (EU ETS) is the main climate policy instrument to reduce GHG emissions in the power sector and energy intensive industries operating in Europe. While the EU ETS remains an important cornerstone for reducing industrial emissions cost-effectively, it is not sufficient on its own to create a market for low-carbon products and address the broader structural challenges faced by EIIs, for instance due to these sectors' exposure to international competition and limited capacity to pass carbon costs through to the consumer. ➔ *IAA's measures, notably on lead markets, complement the price signal provided by the EU ETS. The EU ETS MRV system is used to verify data under the label on steel.*

3. In 2023, the **Carbon Border Adjustment Mechanism Regulation**[507] (CBAM) entered into force in its transitional phase with the aim of subjecting the import of certain carbon-intensive products from third countries to a financial adjustment equivalent to the carbon price paid under the EU ETS for the production of these products. The CBAM covers the following energy-intensive sectors: iron and steel, cement, fertilisers, aluminium, and hydrogen. It will start having financial implications in its definitive phase as of 2026. The CBAM financial adjustment for imports will be phased in gradually until 2034, in parallel to the gradual phasing out of ETS free allowances for the sectors covered. ➔ *The CBAM MRV approach is used to allow importers to comply with the label on steel.*

4. The **Industrial and Livestock Rearing Emissions Directive**[508] (IED) lays down rules on integrated prevention and control of pollution arising from industrial activities and designed to prevent or, where that is not practicable, to continuously reduce emissions into air, water and land, to prevent the generation of waste, improve resource efficiency, and to promote the circular economy and decarbonisation, in order to achieve a high level of protection of human health and the environment taken as a whole. It applies to the industrial activities giving rise to pollution referred to in its Annexes I and Ia, notably to EII. Approximately 37 000 industrial installations are subject to permitting requirements under the Directive. In a 2024 revision to the Directive a new Innovation Centre for Industrial Transformation and Emissions (INCITE) will gather information on innovative pollution control solutions and transformative technologies, helping to speed up their development. Additionally, new flexibilities in permitting will allow frontrunners to test and deploy emerging techniques and will facilitate deep industrial transformation, including EII. The IED requires Member States to make the operation of an installation subject to obtaining a permit containing conditions set in accordance with the principles and provisions of the IED. The permit conditions should take into account the environmental performance of an installation, including emissions to air, water and soil. In that regard, the permit should include emission limit values. ➔ *IAA suggests INCITE to*

[506] Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the European Union.
[507] Regulation (EU) 2023/956establishing a carbon border adjustment mechanism.
[508] Ibid.

provide assistance for innovative projects. IAA provisions on permitting could help streamline the implementation of the IED.

5. **The Strategic Environmental Assessment Directive**[509] (SEA) provides a set of procedural rules to integrate environmental considerations into their preparation, adoption and implementation of public plans and programmes by national authorities, including for land-use. For example, national authorities have to examine reasonable alternatives and take account effects on the environment including biodiversity, soil, water, air.

6. **The Environmental Impact Assessment Directive**[510] (EIA) requires Member States to make projects likely to have significant effects on the environment, because of their nature, size or location, subject to consent and an assessment by a competent national authority (i.e. a permit). To get a permit, the EIA Directive requires e.g. the preparation of an environmental impact assessment report and the carrying out of consultation of the authorities, the public and, where relevant, other Member States affected by the project. Under the EIA Directive a depending on their likely significant impact on the environment, certain projects are subject to a mandatory assessment while for others a determination by a competent authority is required to decide if the project shall be subject to an assessment. ➔ *the IEA directive is at the core of the permitting provisions IAA aims to streamline, notably through digitalisation provisions, and to be able to reuse data sets.*

7. **The Habitats**[511] **and Birds**[512] **Directives** require Member States to prevent significant negative effects on protected species and habitats in Natura 2000 sites (there are also some species protection obligations applicable also outside the sites). To that end, industrial related projects that are likely to have a significant effect on such a site, must be subject to an appropriate assessment. The competent national authorities can, based on the assessment, agree to the project it is does not adversely affect the integrity of the site concerned. In exceptional cases, developments that could have an adverse effect on a protected site can still go ahead under certain conditions, i.e., lack of alternatives, justification by imperative reasons of overriding public interest and compensatory measures; in certain cases, an opinion of the Commission prior to the authorisation by the Member State's authorities may be required. The assessment of impacts on Natura 2000 can be carried out in a coordinated procedure or jointly with the environmental assessment under the EIA Directive. ➔ *provisions on overriding public interest under IAA would put such projects under the specific requirements for the presumption of overriding public interest.*

8. The **Water Framework Directive**[513] provides that the deterioration of the ecological status of a body of water is only allowed where justified by overriding public interests or societal benefits, where no feasible environmental alternatives exist, and where mitigation measures are taken. In light of this requirement, projects potentially affecting bodies of water, including raw materials projects, need to be subject to

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[509] Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment.
[510] Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (codification).
[511] Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.
[512] Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (Codified version).
[513] Directive 2000/60/EC establishing a framework for Community action in the field of water policy.

assessment and permitting procedures (which may be integrated with the EIA procedure set out above). ➔ *relevant in IAA context for projects subject to the WFD with respect to permitting provisions.*

9. The main energy frameworks relevant for EIIs include the **Electricity and gas Market** Regulations and Directives[514], the **Renewable Energy Directive**[515], the **Energy Efficiency Directive**[516] the **Gas and Hydrogen Decarbonisation Package**.[517] The third revision of the **Renewable Energy Directive**[518] (RED III) set the EU ambitious target to achieve a share of 42.5% of renewables in final energy consumption. By 31 December 2027, the European Commission is entitled to table an amendment proposal covering the post-2030 period, taking into account the latest and relevant scientific data, and touching on National Energy and Climate Plans, the effects of the implementation of GHG and sustainability criteria on renewable fuels of non-biological origin (RFNBOs) and recycled carbon fuels, and technology developments. By virtue of art. 22a, industrial sectors are included in the scope of the RED III. Accordingly, Member States shall strive to increase the share of renewables in final industrial energy consumption by an annual average of 1.6% for the periods 2021-2025 and 2026-2030. At a more granular level, national governments will have to attain a share of RFNBOs – such as renewable hydrogen - from the total industrial hydrogen consumption of 42% in 2030 and 60% in 2035. This obligation applies to government and not to industries as such. Member States are now in the process of implementing these provisions. ➔ *IAA's provisions on regulatory sandboxes would interact with the hydrogen package and renewable energy directive, since derogation to the application of the two delegated acts on hydrogen would be envisaged.*

10. The **Electricity Market Design**[519] is the main instrument to regulate electricity market functioning. As such, it influences the price paid and conditions for access to electricity for energy intensive industries as well as for other energy users. The 2024 Electricity Market Design Reform brought new requirements setting clear deadlines for replies to a grid connection request, within 3 months, as well as on transparency regarding available grid capacities. The reform followed up on existing requirements in the legal framework guaranteeing open and non-discriminatory access to the electricity grid.

11. The **Action Plan for Affordable Energy**[520], adopted in February 2025, includes three flagship measures that are particularly relevant to industry: (1) lowering energy bills, (2) accelerating the roll-out of clean energy and electrification, with completed

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[514] Directive (EU) 2024/1788 on common rules for the internal markets for renewable gas, natural gas and hydrogen, amending Directive (EU) 2023/1791 and repealing Directive 2009/73/EC and Regulation (EU) 2024/1789 on the internal markets for renewable gas, natural gas and hydrogen, amending Regulations (EU) No 1227/2011, (EU) 2017/1938, (EU) 2019/942 and (EU) 2022/869 and Decision (EU) 2017/684 and repealing Regulation (EC) No 715/2009

[515] Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources.

[516] Directive (EU) 2023/1791 on energy efficiency and amending Regulation (EU) 2023/955 (recast).

[517] Directive (EU) 2024/1788 on common rules for the internal markets for renewable gas, natural gas and hydrogen, amending Directive (EU) 2023/1791 and repealing Directive 2009/73/EC (recast) and Regulation (EU) 2024/1789 on the internal markets for renewable gas, natural gas and hydrogen, amending Regulations (EU) No 1227/2011, (EU) 2017/1938, (EU) 2019/942 and (EU) 2022/869 and Decision (EU) 2017/684 and repealing Regulation (EC) No 715/2009 (recast).

[518] Directive (EU) 2023/2413 amending Directive (EU) 2018/2001, Regulation (EU) 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources, and repealing Council Directive (EU) 2015/652

[519] Directive (EU) 2024/1711 amending Directives (EU) 2018/2001 and (EU) 2019/944 as regards improving the Union's electricity market design and Regulation (EU) 2024/1747 amending Regulations (EU) 2019/942 and (EU) 2019/943 as regards improving the Union's electricity market design

[520] An Action Plan for Affordable Energy, COM(2025) 79 final, 26.2.2025

interconnections and grids, as well as clean manufacturing, and (3) ensuring well-functioning gas markets.

12. The **Ecodesign for Sustainable Products Regulation**[521] (ESPR) establishes a framework for setting performance and/or information requirements to improve the environmental sustainability and circularity of products placed on the EU market, with the aim, inter alia, of extending their lifetime, increasing recyclability, and recycled content. ESPR also aims at making information relevant to life cycle sustainability of products available along value chains to businesses, consumers and authorities through Digital Product Passports and/or through the introduction of labels. The ESPR facilitates consumer choice and encourages the take-up of more sustainable and energy-efficient products. Iron and steel as well as aluminium fall under the ESPR scope as 'intermediate products' and have been included in the ESPR and Energy Labelling Working Plan 2025-30, adopted in April 2025, with a tentative timeline of 2026.[522] For some of the products to be covered by a delegated act as mentioned above, implementing acts will also be adopted to set public procurement criteria to create lead markets. ➔ *IAA's provisions on the steel label risk overlapping in timeline with the development of a delegated act on steel under ESPR. However, the preferred policy option on the steel label is built so as to be an important) building block of the broader methodology underpinning the ESPR requirements on steel. As such, it is coherent to start with a label with the emission boundaries envisaged under IAA to be further developed and complemented by additional elements under the ESPR. (See par. on 'Interplay with existing initiatives' below for more details).*

13. The **Construction Product Regulation**[523] (CPR) lays down harmonised rules for the marketing of construction products in the EU. It ensures the smooth functioning of the single market of construction products. It is the regulatory tool to address the environmental sustainability of construction products with the same ambition as the ESPR. Manufacturers are obliged to declare the GHG emissions of their products and will make them available to professionals, consumers and authorities through Digital Product Passports. The GHG emissions of construction products are used for the life-cycle calculations at building level required by the Energy Performance of Buildings Directive. ➔ *Lead market provisions for construction under IAA will align with initiatives under the Construction Product Regulation, in particular the harmonised standard on GHG emissions. See below for more details.*

14. The **Energy Performance of Buildings Directive**[524] (EPBD) recognises that buildings are responsible for greenhouse gas has introduced life cycle GWP of building, indicating the building's overall contribution to emissions_before, during, and after their operational lifetime. The directive will decarbonise the building stock, going beyond that lead to climate change, including the focus on building operational greenhouse gas emissions, by introducing as well as the consideration of the life-cycle global warming potential (GWP) of buildings. Life-cycle GWP takes into account the greenhouse gas emissions embodied in construction products and

[521] European Commission (2024). Regulation (EU) 2024/1781 establishing a framework for the setting of ecodesign requirements for sustainable products, amending Directive (EU) 2020/1828 and Regulation (EU) 2023/1542 and repealing Directive 2009/125/EC.
[522] European Commission (2025). Communication from the Commission: Ecodesign for Sustainable Products and Energy Labelling Working Plan 2025-2030. COM(2025) 187 final.
[523] Regulation (EU) No 305/2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC.
[524] Directive (EU) 2024/1275 on the energy performance of buildings (recast).

encourages exemplary design options and choices of materials. The directive introduces mandatory calculation and disclosure of. The revised EPBD includes information obligation, meaning it requires the life-cycle GWP of new buildings. In addition, Member States are required to draw up national roadmaps by to be calculated and disclosed in the energy performance certificate (EPC) of the building: a) from 1 January 2027 on the introduction of limit values on the life-cycle GWP of 2028, for all new buildings from with a useful floor area larger than 1 000 m2; (b) from 1 January 2030, for all new buildings. ➔ *Achieving the limit values on the GWP will benefit from IAA's provisions on low-carbon requirements for products in construction sector. See below for more details.*

15. The **Batteries Regulation**[525] takes a comprehensive life-cycle approach addressing the entire value chain of batteries, encompassing sourcing, manufacturing, use, and recycling. It gradually introduces product requirements, including restrictions on hazardous substances, minimum recycled content, carbon footprint, performance and durability standards, and labelling. It also obliges the use of responsibly sourced raw materials. Additionally, the Regulation establishes specific collection, recovery, and recycling targets for different types of batteries. Furthermore, it ensures access to crucial data across the value chain through the Digital Battery Passport, fostering efficient and circular battery use. ➔ *The Batteries Regulation provides for the framework to set the environmental ambition for EU battery manufacturing, allowing lead market provisions under IAA to focus on Made in EU requirements, when justified.*

16. The **Critical Raw Materials Act**[526] (CRMA) ensures EU access to a secure and sustainable supply of critical raw materials, strengthening all stages of the European value chain, diversify the EU's imports to reduce strategic dependencies, improve EU capacity to monitor and mitigate risks of disruptions to the supply of critical raw materials, and improve circularity and sustainability. The CRMA includes within scope several energy-intensive sectors, namely copper, aluminium and silicon metal. It establishes simplified permitting procedures and sets selection criteria for designating strategic projects.

17. The **Alternative Fuels Infrastructure Regulation**[527] (AFIR) is aimed at expanding and standardising the infrastructure for alternative fuels across the EU. It seeks to ensure the availability of essential infrastructure, such as EV recharging pools and hydrogen refuelling points, along the main transport corridors and other strategic locations.

18. **ReFuelEU Aviation Regulation**[528] sets out mandates to increase the production and supply of sustainable aviation fuels (SAF) within the aviation sector in refineries in the EU. The Regulation mandates the blending of SAF with conventional jet fuels which will reduce the carbon footprint of aviation fuels and of air travel by more than 60% by 2050. The regulation establishes the Flight Emissions Label (FEL)[39] which

[525] Regulation (EU) 2023/1542 concerning batteries and waste batteries, amending Directive 2008/98/EC and Regulation (EU) 2019/1020 and repealing Directive 2006/66/EC.
[526] Regulation (EU) 2024/1252 establishing a framework for ensuring a secure and sustainable supply of critical raw materials and amending Regulations (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1724 and (EU) 2019/1020.
[527] Regulation (EU) 2023/1804 on the deployment of alternative fuels infrastructure.
[528] Regulation (EU) 2023/2405 on ensuring a level playing field for sustainable air transport (refuelEU aviation).

regulates the accounting and display of flight emissions and will allow airlines showcase their purchases of SAF produced in refineries and other production sites.

19. The **FuelEU Maritime Regulation**[529] targets the maritime sector, promoting the use of cleaner energy and curbing greenhouse gas emissions from ships. It sets stricter limits on the carbon intensity of the energy used by ships, encouraging the transition to alternative fuels such as biofuels, hydrogen, and ammonia. FuelEU Maritime is designed to align the shipping industry with the EU's climate goals, ensuring maritime transport contributes to reducing overall carbon emissions. ➔ *The above three legislations directly affect the EU refineries sector in terms of lead market provisions and justify why IAA does not include low-carbon obligations for refined fuels.*

20. The **current multiannual financial framework**[530] (MFF), the EU's long-term budget, leverages the financial capacity of the Union and runs until the end of 2027. The broader financial architecture of EU spending programmes includes loans, guarantees and financial instruments backed by the EU budget, mobilises co-financing from Member States and beneficiaries and unlocks private investments. With the Strategic Technologies for Europe Platform[531] (STEP) Regulation, the EU is redirecting funding from 11 different financing programmes towards industrial projects across three critical technologies: digital technologies and deep-tech innovation; clean and resource-efficient technologies; and biotechnologies.

21. The objective of the EU's **Foreign Direct Investment Regulation**[532] (FDI) is to make sure that the EU is better equipped to identify, assess and mitigate potential risks to security or public order, while remaining among the world's most open investment areas. It creates a cooperation mechanism where Member States and the Commission can change information and raise concerns to specific investments; allows the Commission to issue opinions when an investment threatens the security or public order of more than one Member State; and sets certain requirements for Member States that wish to maintain or adopt a screening mechanism at national level. It fully applies since 11 October 2020. ➔ *Under IAA, possible conditions for foreign investments are related but not overlapping with the FDI regulation, as the policy objective is significantly different: national security and public order for the FDI Regulation, and single market functioning for IAA. see below for additional elements.*

22. In July 2025, the Commission put forward comprehensive proposals for the **post-2027 MFF**[533] and for the next generation of financial programmes. As announced in President von der Leyen's Political Guidelines, the Commission has notably proposed a **European Competitiveness Fund** with a total envelope of EUR 409 billion will boost support to research, innovation, development and deployment. It will draw together EU investment to accelerate the scaling-up, manufacturing and deployment of strategic technologies in Europe. It aims to bolster the competitiveness of European companies and strengthen the EU's industrial base, by supporting Made in

[529] Regulation (EU) 2023/1805 on the use of renewable and low-carbon fuels in maritime transport, and amending Directive 2009/16/EC.
[530] Council Regulation (EU, Euratom) 2020/2093 laying down the multiannual financial framework for the years 2021 to 2027
[531] Regulation (EU) 2024/795 establishing the Strategic Technologies for Europe Platform (STEP)
[532] Regulation (EU) 2019/452 establishing a framework for the screening of foreign direct investments into the Union.
[533] Proposal for a Council Regulation COM/2025/571 final, laying down the multiannual financial framework for the years 2028 to 2034

EU technologies, products and services. The Fund, operating under one rulebook, will offer a single gateway to funding applicants, will simplify and accelerate EU funding and catalyse private and public investment.

23. The new proposal for an **Industrial Decarbonisation Bank** will be based on the Innovation Fund, additional revenues resulting from parts of the ETS as well as InvestEU. The bank will aim at supporting projects with carbon emission reduction as a metric to enable technology-neutral support across industrial sectors, including through carbon contracts for difference. As announced in the Clean Industrial Deal, it will be integrated in the governance of the ECF.

24. **Competition rules and enforcement** protect fair competition in the Single Market and incentivise companies to innovate and become more efficient. The Clean Industrial Deal State Aid Framework (CISAF) adopted on 25 June enables necessary and proportionate State aid that crowds in private investment for projects contributing to the objectives of the Clean Industrial Deal, while preserving the level playing field and European cohesion. In particular, the CISAF simplifies State aid rules in five main areas: (i) the roll-out of renewable energy and low-carbon fuels;(ii) temporary electricity price relief for energy-intensive users to ensure the transition to low-cost clean electricity; (iii) decarbonisation of existing production facilities; (iv) the development of clean tech manufacturing capacity in the EU, and; (v) the de-risking of investments in clean energy, decarbonisation, clean tech, energy infrastructure projects and projects supporting the circular economy. Furthermore, the State Aid Guidelines for Climate, Energy and Environmental protection (CEEAG) remain an important instrument to assess the compatibility of aid in the field of industrial decarbonisation.

25. **Trade defence instruments** such as anti-dumping and anti-subsidy measures as well as existing steel safeguard are primarily applied for the products produced by the energy-intensive industries such as steel, non-ferrous metals, ceramics and others. In the Steel and Metals Action Plan (SMAP)[534], the Commission committed to propose, a measure replacing the steel safeguards (which expires on 30 June 2026). The Commission has now adopted this proposal addressing the negative trade-related effects of global overcapacities on the Union steel market[535], which is under consideration by the co-legislators. It maintains tariff-rate quotas (TRQs) for a wide range of steel products, introduces a "melt and pour" information requirement and caps TRQ volumes at the average level of 2013 imports to prevent structural increases in import penetration. These provisions strengthen the safeguard's effectiveness against trade diversion and circumvention while preserving predictability for downstream users. ➔ *The IAA's lead market measures complement the safeguard by steering market demand towards low-carbon and EU-produced steel, ensuring that trade protection and decarbonisation objectives reinforce each other rather than act in isolation.*

26. Under its **free trade agreements** (FTAs), the EU generally commits to investment liberalisation in the manufacturing and energy sectors, granting foreign investors broad market access and national treatment. In manufacturing, the EU typically

[534] European Commission (2025). A European Steel and Metals Action Plan. COM(2025) 125 final, 19 March 2025.
[535] European Commission (2025). Proposal for a Regulation of the European Parliament and of the Council addressing the negative trade-related effects of global overcapacity on the Union steel market. COM(2025) 726 final.

ensures full liberalisation across virtually all subsectors, meaning foreign investors can establish and operate businesses under conditions no less favourable than domestic firms, with minimal reservations. In the energy sector, the EU's commitments are more nuanced (including a chapter on energy and raw materials) where it maintains certain reservations linked to public services, nuclear energy, and security of supply. Across both sectors, the EU's approach in FTAs is to lock in an open and predictable investment regime while retaining the right to regulate in sensitive areas, particularly regarding environmental protection, public safety, and strategic resources. Moreover, the EU is bound by its international commitments on investment under WTO law, in particular under GATS and TRIMs. In addition, most modern EU FTAs include a dedicated chapter on public procurement, granting partner countries access to public contracts at central and sub-central levels under transparent and non-discriminatory conditions, in line with the WTO Government Procurement Agreement (GPA) principles. These commitments ensure that suppliers from FTA partner countries can participate in EU public tenders on equal footing with EU operators for the covered entities and contract types, effectively opening a portion of the EU procurement market to foreign competition while maintaining the possibility to exclude non-covered sectors or apply exceptions linked to security and public policy.➔ *IAA's measures are framed so as to exclude countries with which the EU has free trade agreements (FDI provisions) or to benefit from exemptions under the EU's international obligations (Made in EU requirements)*

27. The proposal for a **Corporate Clean Fleet**[536] Regulation, adopted in December 2025, aims at supporting the decarbonisation of the road transport sector by accelerating the shift to zero-emission vehicles in corporate fleets stimulating the market uptake of zero-emission vehicles and safeguarding the competitiveness and sustainability of the European road transport sector. In this context, the introduction of a sustainability and Made in EU requirement is currently under consideration➔ *In order to be in a position to align requirements on strengthening domestic value chains in the automotive sector with the IAA, the Commission will rely on delegated acts to set up a methodology for determining the criteria for a car or van to be considered made in EU.*

28. As set out in Article 7a of the CO_2 standards for light-duty vehicles Regulation, the Commission is developing a harmonised methodology for the assessment and the consistent data reporting of the full **life-cycle CO_2 emissions of passenger cars and light commercial vehicles**[537], so that manufacturers may voluntarily report on such emissions. Furthermore Article 5 of the regulations introduces measures to booster the new car category called 'small zero-emissions vehicles' which may receive additional CO_2 credits if made in the EU. Additionally announced was the to creation of uptake for made in the EU and low-carbon steel through an additional crediting system.➔ *The Industrial Accelerator Act is also expected to develop a label on the carbon intensity of industrial products, starting with steel, as well as parameters for Made in the EU". This will be relevant to rely on these developments as appropriate,*

[536] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Decarbonise Corporate Fleets, COM(2025) 96 final, 5 March 2025.
[537] Regulation (EU) 2019/631 setting CO_2 emission performance standards for new passenger cars and for new light commercial vehicles, and repealing Regulations (EC) No 443/2009 and (EU) No 510/2011 (recast).

to ensure consistency of the methodologies. It is equally valid for the reference to Made in the EU" for small electric cars.

29. The Commission also put forward an **Action Plan for the chemical sector**[538], a **sector-specific Omnibus**, as well as a **Chemicals Industry Package** adopted end of 2025, as part of the Clean Industrial Deal, with the aim to maintain critical production capacities in Europe and boost investments for the modernisation and competitive transition to net-zero. ➔ *IAA therefore does not include targeted measures for the chemicals sector, which will be implemented more directly under the forthcoming package.*

30. In the **Automotive Action Plan**[539], the Commission announced that, in cooperation with Member States and the industry, conditions for inbound foreign investments in the automotive sector to further increase their added value for the EU. This will likely include conditions with respect to EV batteries. The Commission further announced European content requirements for batteries and other vehicles components to boost the global competitiveness of the sector. ➔ *The legislative arm of this initiative, in relation to batteries, addressed under IAA, according to the preferred policy option put forward in this impact assessment.*

31. The **Grids Package** announced as part of the Clean Industrial Deal will ensure cross-border integrated planning and delivery of projects, especially on interconnectors, and facilitate access to affordable, secure and clean energy. It proposes measures to accelerate the upgrading, digitalisation and expansion of the European grid infrastructure. It removes grid bottlenecks, accelerate permitting for grids, renewables and storage, and increases overall efficiency, while promoting more robust interconnections. With its main focus on electricity, it also covers hydrogen and other infrastructure categories included in the framework for trans-European energy networks (TEN-E). Moreover, to tackle increasing grid connection queues in several EU countries, Guidance on grid connections is part of the Grids package, to provide best practices on how to ensure accelerated grid connection for demand as well as generation and storage. To support existing legal requirements, the Commission published a guidance on anticipatory investments in grid infrastructure, addressing also access of industry in time and in capacity requested. ➔ *The European Grids Package addresses issues related to access to grid infrastructure for industrial decarbonisation projects. Interactions exist with a policy measure discussed under PO3 on permitting for IAA, since they could be better addressed under the grids package.*

32. **Simplification of administrative burdens in environmental legislation (Environmental Omnibus)**: the Commission adopted an Omnibus package in the environmental sector in December 2025, which includes provisions to simplify and accelerate environmental permitting and environmental assessments provisions.

Overview ongoing initiatives

The IAA needs to ensure consistency with upcoming related initiatives, notably:

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[538] European Commission (2025). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions - A European Chemicals Industry Action Plan. COM/2025/530 final, 8 July 2025.
[539] European Commission (2025). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions - Industrial Action Plan for the European automotive sector, COM(2025) 95 final, 5 March 2025.

- The proposal for a **Circular Economy Act**, scheduled for adoption in 2026, will create demand for secondary materials and a single market for waste, notably in relation to critical raw materials. It will address supply and demand side measures. On the demand side, it might include mandatory, targeted, impactful and implementable requirements for public procurement of circular goods, services and works that can stimulate EU demand. ➔ *The circular economy act may promote the recycling of EII products, creating synergies with the decarbonisation efforts put forward by IAA*
- As set out in Article 7a of the CO_2 standards for light-duty vehicles Regulation, the Commission is developing a harmonised methodology for the assessment and the consistent data reporting of the full **life-cycle CO_2 emissions of passenger cars and light commercial vehicles**, [540] so that manufacturers may voluntarily report on such emissions.
- The Commission plans to propose **Ecodesign**[541] **and Energy Labelling**[542] **rules for PV modules** and inverters sold in the EU. These measures would concern the efficiency, durability, reparability and recyclability of products, to ensure that the devices deployed are environmentally sustainable. Requirements on the carbon footprint of PV modules are also being prepared. However, such requirements would not look at the origin of the products, nor include any mandate to support European manufacturing. ➔ *Like for batteries, this initiative will address the environmental performance of PV modules, while IAA focuses on Made in EU aspects.*
- The Commission also put forward an **Action Plan for the chemical sector**[543], a **sector-specific Omnibus**, as well as a **Chemicals Industry Package** by the end of 2025, as part of the Clean Industrial Deal, with the aim to maintain critical production capacities in Europe and boost investments for the modernisation and competitive transition to net-zero. ➔ *IAA therefore does not include targeted measures for the chemicals sector, which will be implemented more directly under the forthcoming package.*
- Expected for Q1 2026, the **Electrification Action Plan** will address system-level challenges and focus on barriers and incentives in different sectors: industry, transport and buildings. It will put forward measures targeted at these sectors based on their electrification potential. The Plan will also set out the necessary conditions on the generation side to achieve its objective, with growing and diversified renewable electricity matching demand.
- In the **Automotive Action Plan**[544], the Commission announced it will propose, in cooperation with Member States and the industry, conditions for inbound foreign investments in the automotive sector to further increase their added value for the EU. This will likely include conditions with respect to EV batteries. The Commission further announced European content requirements for batteries and other vehicles components to boost the global competitiveness of the sector. ➔ *The legislative arm of this initiative, in relation to batteries, would be addressed under IAA, according to the preferred policy option put forward in this impact assessment.* The **Grids Package** announced as part of the Clean Industrial Deal will ensure cross-border integrated planning and delivery of projects, especially on interconnectors, and facilitate access to affordable, secure and clean energy. It will propose measures to accelerate the upgrading, digitalisation and expansion of the European grid infrastructure. It will remove grid bottlenecks, accelerate permitting

[541] Official Journal of the European Union (2024). Regulation (EU) 2024/1781 establishing a framework for the setting of ecodesign requirements for sustainable products, amending Directive (EU) 2020/1828 and Regulation (EU) 2023/1542 and repealing Directive 2009/125/EC.
[542] Official Journal of the European Union (2017). Regulation (EU) 2017/1369 setting a framework for energy labelling and repealing Directive 2010/30/EU.

for grids, renewables and storage, and increase overall efficiency, while promoting more robust interconnections. With its main focus on electricity, it will also cover hydrogen and other infrastructure categories included in the framework for trans-European energy networks (TEN-E). Moreover, to tackle increasing grid connection queues in several EU countries, Guidance on grid connections will be part of the Grids package, to provide for best practice on how to ensure accelerated grid connection for demand as well as generation and storage. To support existing legal requirements, the Commission published a guidance on anticipatory investments in grid infrastructure, addressing also access of industry in time and in capacity requested. ➔ *The European Grids Package is expected to address issues related to access to grid infrastructure for industrial decarbonisation projects. Interactions exist with a policy measure discussed under PO3 on permitting for IAA, since they could be better addressed under the grids package.*

- The upcoming **revision of the Public Procurement Framework** in 2026 will review the possibilities to use criteria for sustainability, resilience and European preference in EU public procurement for strategic sectors. The revision will assess, consolidate and clarify the interactions between public procurement provisions across different pieces of legislation, to simplify application by contracting authorities. ➔ *Consistency between the sectorial measures set out in the IAA on what to buy and the overarching framework will have to be ensured.*
- The proposed new **End-of-Life Vehicles (ELV) Regulation** will require manufacturers to use a certain percentage of recycled plastic when designing and constructing new vehicles. Minimum requirements for the use of recycled steel and aluminium may be introduced at a later date, thereby reducing the carbon footprint of new vehicles.
- By the end of 2025, the Commission will conduct a **comprehensive review of CBAM,** accompanied by an anti-circumvention strategy. It will also present a legislative proposal on extending the scope to certain downstream products in the steel and aluminium sectors that contain a significant share of at least one of the goods within the scope of the CBAM and to strengthen anti-circumvention measures. Moreover, the Commission announced in July 2025 to propose a measure by the end of the year to address the problem of carbon leakage for CBAM goods that are exported.
- The **Strategic Roadmap for digitalisation and AI in the energy sector** (announced for Q1 2026) is a key deliverable of the Action Plan for Affordable Energy. It will leverage AI-driven solutions to offer secure, clean and competitively priced energy to all consumers. Smart integration of energy storage and demand side flexibility will bring substantial system benefits and reduce consumer bills. Data-driven services and analytics will optimise energy generation, transmission and consumption, while AI-powered digital twins will be at the core of system operations and maintenance.

Interplay between IAA and the NZIA

The Net Zero Industry Act[545] (NZIA) sets out measures to stimulate investment in net-zero emissions technologies, including provisions for energy-intensive industry transformative projects – projects that deliver significant and lasting reductions in greenhouse gas emissions. It offers benefits such as accelerated permitting procedures and the designation of strategic project status. Furthermore, the NZIA sets the goal for net-zero technologies manufacturing capacity, including batteries and solar, to reach at least 40% of EU annual deployment needs by 2030.

[545] Regulation (EU) 2024/1735 on establishing a framework of measures for strengthening Europe's net-zero technology manufacturing ecosystem and amending Regulation (EU) 2018/1724.

The construction or conversion of certain energy -intensive plants in the steel, aluminium, non-ferrous metals, chemicals, cement, lime, glass, ceramics, fertilisers, pulp and paper sectors are also in the scope of the NZIA. However, they need to meet two cumulative criteria to qualify:

- The future production of the energy intensive industry decarbonisation project facility is a priori relevant for net-zero technologies (e.g. steel is used for wind towers.)
- The project needs to have significant and permanent reduction of CO_2 emissions that is technically feasible.

Amongst others, the regulation covers several permitting measures that energy-intensive industry decarbonisation projects can benefit from:

- Single Point of Contact as coordination point for all permitting processes.
- Timelines for permit-granting process depending on production volume (if GW) of the plant
- Bundling or coordination of environmental assessments whenever several assessments are required.
- Strategic project status for some projects, which in turn grants them shorter timelines, automatic consideration of highest national importance and public interest, and when relevant may be considered as well as being of Overriding public interest (OPI).
- Authorities to consider NZIA potential for zoning planning provisions.

Moreover, whenever Member States decide to do so, they can designate Net Zero Acceleration Valleys: obligation to perform a Strategic environmental assessment for the area, consideration of projects to be in the public interest and may be considered to be of overriding public interest, as well as dedicated single points of contact.

Importantly, the NZIA regulation also introduces its "Access to Markets" chapter. This chapter introduces the mandatory use of non-price criteria for the public procurement of net-zero technologies, for renewable energy auctions, and for other forms of public intervention aiming to support the purchase of net-zero technology final products. One of the non-price criteria is resilience; where there is a high dependency from a single source of supply for a certain net-zero technology or component, contributing to resilience means to diversify away from that dominant source of supply. Hence, any potential interplay with IAA provisions on sourcing components and technologies needs to be taken into account. At the same time, while NZIA provisions strengthen resilience in reducing the dependency from a single source of supply, they do not directly support manufacturing in the EU – which is needed as argued earlier in this impact assessment. Other non-price criteria include, depending on the context, cyber security, environmental sustainability, and innovation.

Interplay of the preferred policy option (PO2) with existing and upcoming initiatives

The measures that are part of the preferred policy option (PO2) fit with the existing and upcoming initiatives in the following way:

- As far as SO1 is concerned, the development of a **label on the carbon intensity of steel** will provide a first, voluntary and EU certification to disclose the carbon footprint of steel products, covering scope 1, scope 2 and other emissions (hydrogen use, heat) up until the level of the hot rolling production step, as explained in Annex12. This will send an important signal to the market, aiming at accelerating investment decisions. The methodology developed under IAA will constitute a building block of the upcoming full LCA methodology currently being developed under the ESPR, in view of the Delegated Act setting information and/or performance requirements of the environmental footprint of steel products. Once the mandatory ESPR requirements will be adopted, the voluntary steel label will feed into the ESPR criteria, becoming an integral part of the methodology, so that producers will not have to face two different carbon footprint calculation methods. Furthermore, the ESPR requirements will go beyond carbon emissions including other relevant environmental impacts (i.e. recycled content, substances of concern). allowing consumers to see the comprehensive product environmental footprint.

- For SO2, the measures introducing **low-carbon and Made in EU requirements for some energy-intensive materials** in targeted downstream sectors, as well as Made in EU requirements for **batteries, solar PV and vehicle components** in the public procurement market will anticipate the use of sustainability and resilience/ EU preference criteria that will be streamlined as part of the upcoming revision of the Public Procurement Framework. The revision will clarify the interaction between sectorial provisions across different pieces of legislation, ensuring a common approach and to simplify application by authorities. Concerning the introduction of low-carbon content requirements for the steel and cement placed on the market, these measures will be complemented by the downstream sectors specific regulations. Specifically, in the building and construction sector, the IAA measures will be complemented by the CPR obligations to disclose the environmental footprint of construction products, as well as the EPBD provisions requiring Member States to develop national roadmaps introducing limit values on the life-cycle Global Warming Potential (GWP) of buildings, which will benefit from the IAA provisions introducing lead markets on low-carbon steel and cement. Finally, the achievement of the low-carbon target will also be influenced by the effects of the ETS on the decarbonisation technologies, as well as the effective implementation of CBAM to mitigate the risk of carbon leakage.
- For SO3, the proposed investment conditionalities under IAA would apply in addition to the **existing FDI framework,** with a specific sectoral scope and Single Market considerations. Moreover, countries that the Union have existing FTAs with would be excluded from the conditionalities to comply with the provisions set therein. Compliance with further international obligations will also be considered.
- For SO4, the **simplification of permitting** provisions align with the Environmental Omnibus package which the Commission adopted in Q4 2025.
- For SO5, introducing a set of **criteria for identifying priority industrial areas** would help Member States identify relevant projects and create synergies with existing funding programmes, to facilitate access to public funding, without prejudice to the State aid regime nor to the specific eligibility criteria of each funding programme. At EU level, the Commission would consider these criteria for the revision of the Innovation Fund calls and the upcoming Decarbonisation Bank. A link would be established between the IAA criteria and the Competitiveness Seal of the **European Competitiveness Fund**, presented as part of the MFF legislative proposal.

2. What is the baseline? Detailed description

EIIs such as steel, aluminium, cement and chemicals form the backbone of the European economy. They are indispensable for the green and digital transitions and thus for Europe's long-term competitiveness and economic security. Strengthening these sectors contributes directly to the "Promote" pillar of the European Economic Security Strategy, which aims to reinforce the EU's capacity to innovate, invest, and maintain leadership in strategic value chains.

However, over the past two decades, EIIs have faced persistent competitive pressures: high energy costs, global overcapacity, and delayed investment in low-carbon technologies. These conditions have resulted in a contraction of EU industrial production, rising import dependence, and limited technological renewal. The outcome is not only a decarbonisation gap, but also an economic-security gap, a growing divergence between the EU's industrial trajectory and the level of domestic capacity needed to sustain secure, climate-compatible and competitive supply chains.

To better understand the immediate competitiveness challenges, Figure 21 zooms in on recent years (2019-2024) and compares production trends of EIIs with those of the wider manufacturing sector. While broader manufacturing has returned to its pre-crisis production levels, EIIs have declined. Since 2022, high energy prices, weaker demand and stronger global competition have driven a sharper contraction in EII output, which now stands well below its pre-pandemic level.[546]

The transition will entail higher adjustment costs for EIIs in the short term, as production processes, energy inputs and supply chains adapt to stricter carbon pricing and new regulatory standards. Yet delaying this transition would result in much higher costs in the medium term—through stranded assets, lost technological leadership, and deepened reliance on foreign clean-tech suppliers. In line with the Clean Industrial Deal, the baseline thus reflects a credible but demanding pathway in which European industry follows through on the 2040 and 2050 emission-reduction commitments, recognising that this is the only sustainable route to competitiveness and climate neutrality.

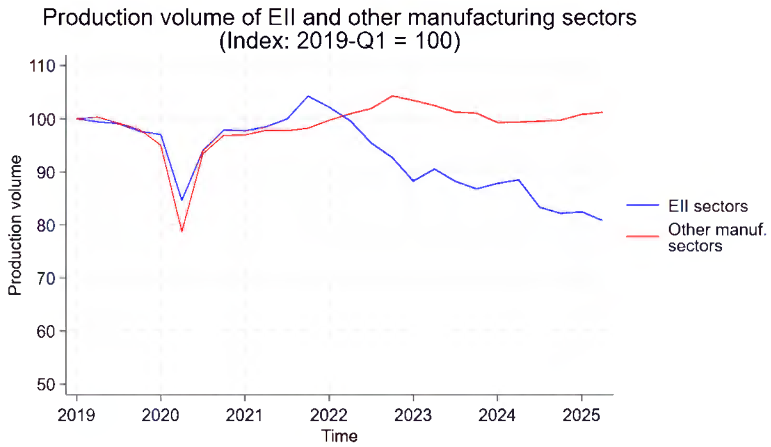

Figure 21: Production volume index for EIIs and other manufacturing, European Commission internal analysis

The main text of the impact assessment presented the dynamic baseline and decarbonisation gap for all EIIs, illustrated by the iron and steel sector[547]. Figure 22 below shows a clear slowdown since 2023[548], with the number of new final investment decisions (FIDs) and projects entering construction falling by roughly 40% compared with 2022–2023 levels. This confirms that while the decarbonisation pipeline is expanding, actual delivery of low-carbon steel capacity has stagnated.

[546] EII sectors include C171, C19, C20, C231, C233, C234, C235, C244, all other manufacturing sectors form the comparison group. For each group, the production volume index is value-added weighted: each sector's index is multiplied by its share of total group value added (average 2021–2023). The weighted sector indices are then summed and rescaled so that 2019-Q1 = 100.

[547] See Section 5.1 *What is the baseline from which options are assessed?* in the main text.

[548] BloombergNEF, Decarbonizing Steel Project Database (1.0.5), 2025. Commission analysis.

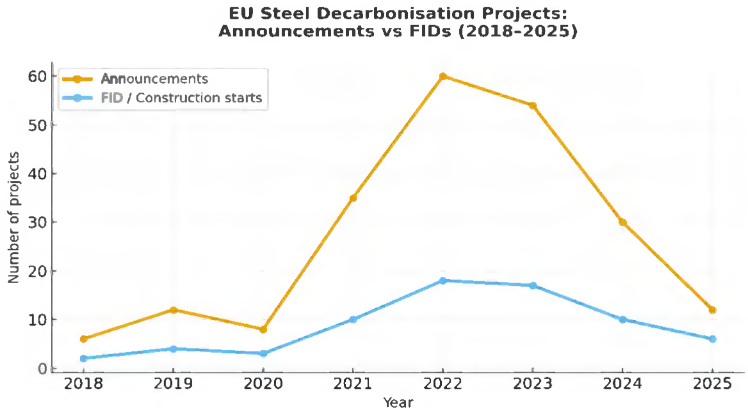

Figure 22: Annual announcements vs FIDs in EU steel projects (BNEF, 2025)

The remainder of this Annex provides the same methodology more details for aluminium, cement, and chemicals. For each sector, the historical data (2005-2023) on production and emissions were compiled. Then, a linear extrapolation was performed on production, anchored in the 2023 value, using the slope derived from the historical regression. Emissions are not extrapolated, but taken directly from JRC model projections[549], which already capture technological assumptions and EU climate-policy consistency. These are aligned with EU-wide climate-policy assumptions and the decarbonisation trajectory consistent with the EU Green Deal.

This methodology ensures analytical consistency: extrapolated production trends capture the economic reality of EU industries under current investment conditions, while JRC projections provide the climate-policy reference for emission reductions. The resulting combination highlights the gap between policy-driven decarbonisation assumptions and market-driven industrial decline.

Aluminium

As shown in Figure 23, EU primary aluminium production has fallen sharply, particularly since 2022, due to high electricity prices and limited access to affordable renewable energy. If the current trend continues at the same historical rate, marked by sustained cost pressures and no major new primary smelting capacity, Europe would lose approximately 42% of its aluminium production by 2050. The JRC emission pathway shows a more pronounced reduction, driven by assumed electrification and efficiency improvements. The resulting gap indicates that, without further support, EU aluminium may decarbonise statistically only because production declines, not because cleaner processes are deployed.

[549] Source data 2005-2023: JRC-IDEES, consistent with EUROSTAT data. Source projections 2024-2050: internal calculations and JRC CETO 2025, developed with POTENCIA.

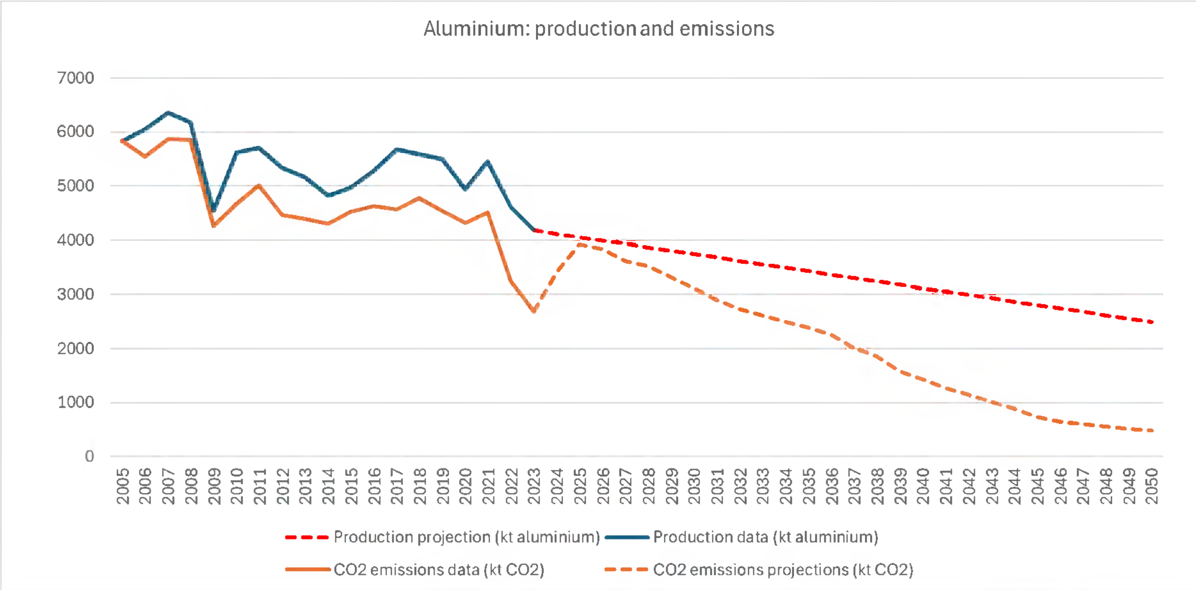

Figure 23: Aluminium: production and CO_2 emissions including projection pathways. JRC analysis, based on IDEES and JRC CETO 2025

Cement

As shown in Figure 24, cement production and emissions have historically evolved together, with modest efficiency improvements but limited process innovation. If the trend continues, the production projection, extrapolated from historical data, suggests a substantial 73% by 2050 compared to the 2023 baseline.

In contrast, the JRC emission projection assumes wider fuel substitution and gradual introduction of carbon capture, leading to a faster decline. This highlights the growing gap between modelled decarbonisation potential and the sector's limited investment reality.

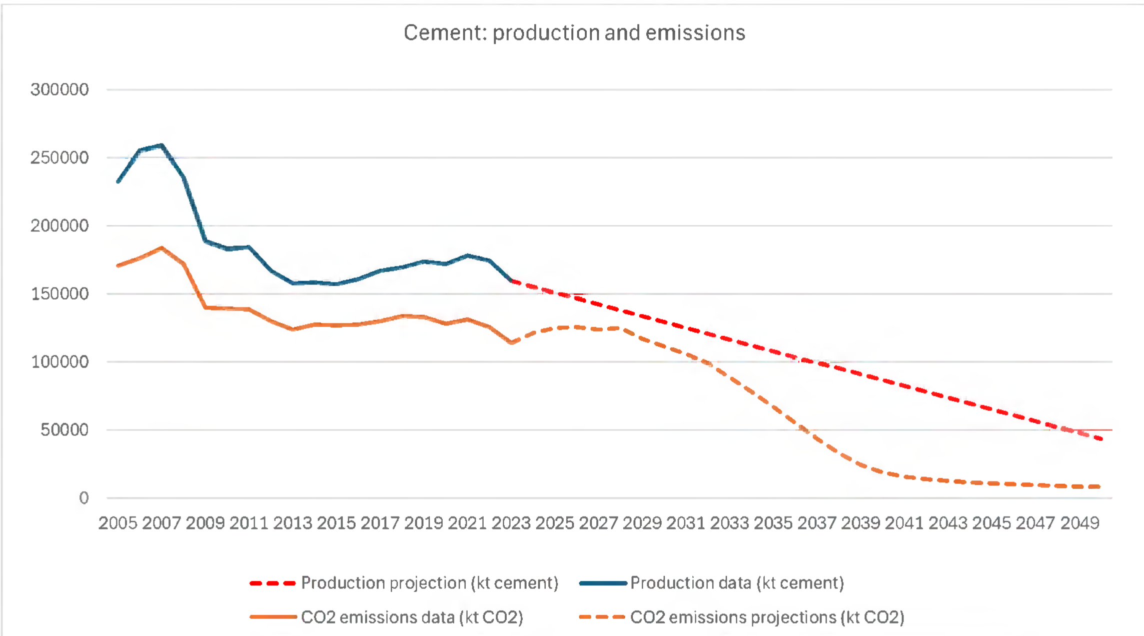

Figure 24: Cement: production and CO_2 emissions including projection pathways

Chemicals

As shown in Figure 25, the chemical sector presents a mixed picture. While aggregate output has remained broadly stable since 2005, this masks a structural shift within the sector. Production of basic chemicals has declined or relocated outside the EU, driven by high energy and gas prices, limited feedstock availability and stronger global competition. At the same time, specialty and downstream chemical segments have remained relatively resilient but account for a much smaller share of total energy use and emissions. The extrapolated projection therefore assumes a continuation of this dual trend: gradual contraction of energy-intensive base chemicals combined with modest growth in lower-emission, higher-value segments. As a result, overall industrial output decreases slowly, and aggregate emissions decline only moderately. By contrast, the JRC emission projection reflects a policy-consistent decarbonisation path, assuming large-scale electrification of process heat, adoption of alternative feedstocks (such as green hydrogen), and wider deployment of carbon-management technologies. The divergence between the extrapolated and modelled trends highlights the sector's core challenge: under current conditions, emission reductions are achieved mainly by reducing production of basic chemicals, not by transforming production technologies at scale.

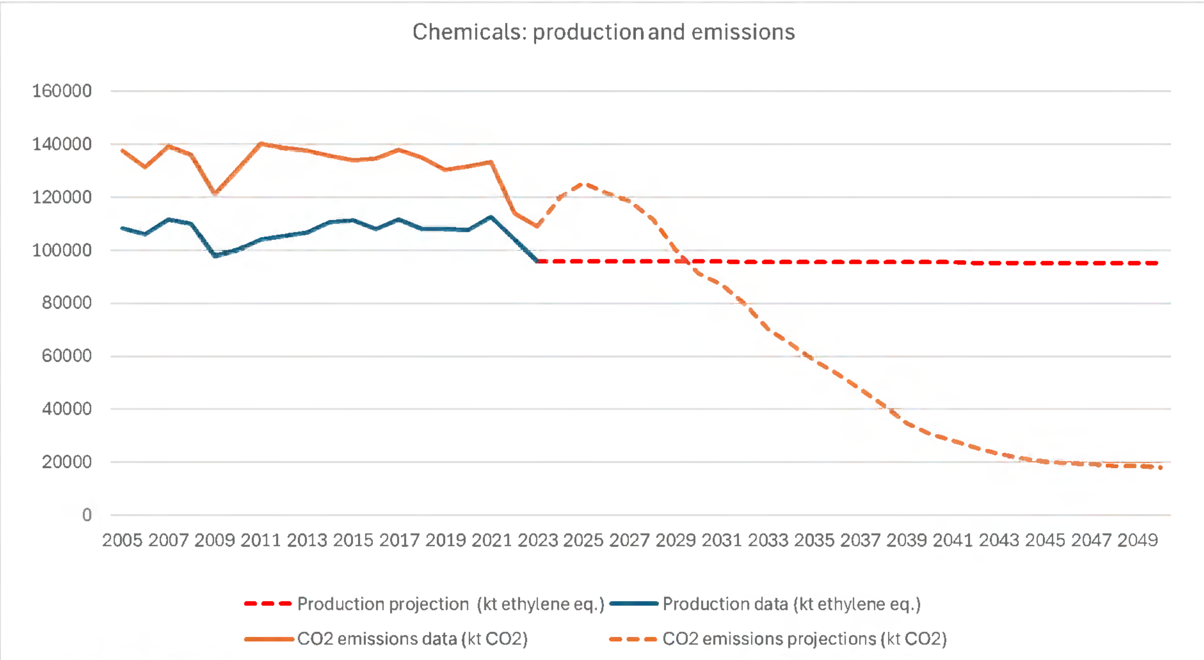

Figure 25 Chemicals production and CO□ emissions including projection pathways. JRC analysis, based on IDEES and JRC CETO 2025

Driver 1/SP1/SO1: Challenges in distinguishing low-carbon industrial products from high-carbon alternatives: The baseline scenario would result in no common definition, methodologies or minimum threshold for low-carbon industrial products. Under the ESPR, there is a mandate to set specific performance and/or information requirements e.g., on the environmental and/or carbon footprint of a product from a life-cycle perspective, as conditions to place products on the market. These mandatory requirements, when in place, will certainly help to provide comprehensive information to customers and, potentially, performance at products level, e.g. steel containing products. Regarding the specific case of cement, as announced in the Clean Industrial Deal, the CPR will introduce a label for cement in 2027 when the new – to be developed – harmonised standard will be made mandatory. However, current rules do not have specific obligation on the public procurement side, nor introduce minimum performance requirements.

Driver 2/SP1/SO2: Limited willingness to pay a premium for low-carbon industrial products: While existing public procurement rules establish *how* to buy, they fall short of addressing *what* to buy in terms of low-carbon criteria. Current green public procurement practices remain largely voluntary, fragmented, and inconsistently applied across Member States. Only a few national or local authorities systematically integrate non price low-carbon criteria into procurement processes for construction products or infrastructure projects.[550] Resilience criteria are even less considered in the current procurement procedures, as they are relatively new. Furthermore, in the NZIA, resilience criteria refer to components, not specifically to the energy-intensive materials used. As the Commission is expected to propose a revision of the Public Procurement Framework in the last quarter of 2026, consistency between the sectorial measures set out in the IAA on what to buy and the overarching framework will have to be ensured. The revised EPBD[551] has introduced an obligation to calculate and provide information on the life cycle GWP of buildings, including the emissions embodied in construction products. It will be important to ensure consistency between measures proposed for low-carbon construction materials in IAA and the obligation under the EPBD. When it comes to vehicles, the proposed End-of-Life Vehicles (ELV) Regulation includes the possibility to establish requirements for vehicle manufacturers to use recycled steel and aluminium.[552] However, due to their timing and/or voluntary nature, none of the mentioned initiatives can be expected to produce tangible effects in terms of increased demand of green steel and aluminium in the short term.

Driver 3/SP2/SO2: European industry loss of competitiveness due to fierce global competition and value chain dependencies: The viability and competitiveness of European projects across the entire upstream value chain are undermined by the economic pressures outlined above, resulting in a widened technological gap vis-à-vis non-EU manufacturers. While the Battery Regulation and the NZIA, including the Implementing Act on actions and draft Implementing Act on sustainability in public procurement, as well as the Ecodesign and Energy labelling requirements for photovoltaic modules and inverters establish important frameworks for environmental standards and for reducing strategic dependencies on single countries, they do not sufficiently address the economic pressure faced by domestic battery and solar PV producers. This is because the NZIA resilience criterion may lead to increased imports from Asian countries such as Vietnam, Malaysia, Thailand and Cambodia – whose PV projects pipeline is largely owned and controlled by Chinese manufacturers..[553]Furthermore, the NZIA framework does not cover the entire spectrum of vehicle components that can contribute to the decarbonisation of road transport not only in terms of reduced vehicle's emissions, but also in terms of optimised traffic flows.

Driver 4/SP2/SO3: A fragmented EU approach towards foreign investments: under the baseline scenario, the EU risks continued fragmentation of the Single Market due to non-harmonised investment conditions, potentially only attracting low value-added activities in sectors where the EU faces a significant technological gap. Under the current framework, Member States with an FDI screening mechanism may screen FDI[554] under the FDI Screening Regulation (EU) 2019/452, but only on grounds of security or public order. This mechanism enables the EU to block or condition transactions that raise national security concerns. In 2023,

[550] Implementing the OECD Recommendation on Public Procurement in OECD and Partner Countries.
[551] Directive (EU) 2024/1275 ("recast EPBD").
[552] In addition, the CO_2 Emission Performance Standards for Cars Regulation also empowers the Commission to develop a methodology that could allow manufacturers to voluntarily report on the life-cycle emissions of vehicles.
[553] IEA (2024). Energy Technology Perspectives 2024.
[554] Regulation (EU) 2019/452 of the European Parliament and of the Council of 19 March 2019 establishing a framework for the screening of foreign direct investments into the Union

only 18 Member States had screening mechanisms in place. France, Germany, Italy and Spain together made up nearly 70% of all cases. These larger Member States not only screen the most but are also the most active in imposing mitigating conditions where risks are identified.[555] What it does not provide for is a tool to shape the quality of FDI, among others: systemically incentivizing knowledge transfer, technology diffusion, or local value chain creation in the Single Market.

Driver 5/SP3/SO4: Lengthy, fragmented and uncertain permitting procedures for decarbonisation projects. While the efficiency of the permit granting procedures for some energy intensive industry decarbonisation projects is expected to improve following the implementation of the NZIA, most manufacturing industries are not covered under existing frameworks and can continue to face complex and lengthy permitting procedures, since no initiative has so far addressed horizontally the permitting problem at large.

Driver 6/SP3/SO5: Difficulty to access resources (e.g. inputs and funding) would remain in the baseline scenario. While several initiatives aim at identifying key projects that could benefit from EU support, introducing criteria for identifying priority industrial decarbonisation projects could help Member States identify relevant projects and focus their attention on creating better framework conditions to facilitate access to public funding, without prejudice to the State aid regime nor to the specific eligibility criteria of each funding programme.

Against this baseline, we can conclude that the competitiveness of all manufacturing industries, notably energy intensive industries and some clean energy technologies, is likely not to improve in the coming years without further actions, with significant economic, social and environmental implications. The JRC has estimated that for each 1% loss of global final demand in energy-intensive industries, the potential impacts on employment would be losing 28 000 jobs, EUR 2 billion in value added and EUR 6.4 billion in turnover.[556] Further competitiveness losses would prevent investment in decarbonisation, affecting the EU's ability to achieve its climate objectives.

[555] European Commission (2025). Report from the Commission to the European Parliament and the Council - Fifth Annual Report on the screening of foreign direct investments into the Union. COM(2025)632 final.

[556] CARMEN is a linear model, where a 10% decrease/increase in global final demand would yield a result 10 times worse/better than the baseline. To facilitate understanding, a 1% reduction is used as a reference point, providing a more manageable and comparable outcome.

Annex 9: Overview of policy measures

SO1: Enable differentiation for low-carbon industrial products to increase their value and marketability

Establishing a low-carbon product labelling system would allow for the differentiation of low-carbon industrial products from high-carbon ones to increase their value and marketability.[557] This measure would develop a labelling system that attributes GHG emissions emitted during the various stages of the manufacturing process to the industrial products, resulting in a clear GHG intensity per product, based on a harmonised and transparent methodology.

Various design elements need to be considered. In addition to this GHG-intensity metric, the assessment will include other elements, such as the categorisation of the product's GHG-intensity according to a predefined classification system (e.g. establishment of classes of performance) or the inclusion of further elements such as the share of recycled materials used in the production process.

To establish the label, the Commission will set up rules for determining the GHG-intensity, including system boundaries and calculation methodologies, as well as rules for ensuring high-data quality via verification and certification. For their development, maximum use will be made of existing detailed GHG reporting rules, such as the ones included under the ETS framework or the related CBAM methodology. To avoid any discrimination, labelling should not result in a treatment of imported products less favourable than that accorded to domestic products.

LAB 1 - Development of a low-carbon product label for all EII

Given the diversity and high complexity of the manufacturing industry, a wide range of product labels could be envisaged. This measure would establish several product-specific and reliable labels that would cater for the specificities of each of the EIIs and attribute GHG emissions from the manufacturing phase to industrial products. Given the broad scope of sectors and related products, this option would have a horizontal approach, establishing in the legislation only the broad principles of the labelling systems, including elements on GHG certification methodologies, the rules on verification and certification and, when possible, the rules for setting up the classification systems. As a next step, product specific rules and values would be developed only in a second stage, via implementing and delegated acts or a review of the basic act.

LAB 2 - Development of a low-carbon product label for steel

This measure would develop the general principles of a low-carbon labelling system and operationalise such principles to develop a low-carbon product label for the intermediate product of steel, covering production steps up to hot-rolling steel. Compared to LAB 1, this measure would have a narrower scope, but a more in-depth approach, as all elements relating to the determination of the GHG-intensity of steel products, the verification and certification rules, and the possible classification system for steel would be frontloaded and included in the legislative initiative. This initial focus on steel is justified by the fact that the steel industry is one of the most emission-intensive industrial sectors, representing almost 20% of the industrial GHG emissions in the EU. Furthermore, most of the GHG emissions of the sector (up to 60-80%) can be attributed to the industrial production stages covering up to hot-rolling steel, which most products have to go through regardless of whether the production route is based on iron

[557] See, Section 2.3.1, Driver 1.

ore input, or as steel scrap input. The table below shows the design elements that will be analysed in Annex 12 to develop a low-carbon product label for steel, based on three main aspects:

Table 18 Development of low-carbon product GHG label for steel

LAB 2.1 – Determination GHG-intensity and system boundaries	**CALC1** System boundaries and calculation methodologies in line with free allocation rules under ETS and embedded emissions under CBAM methodology **CALC2** System boundaries in line with ETS scope, limited nr. of key indirect emissions **CALC3** Wider life cycle system boundaries included in scope, in line with draft Product Carbon Footprint (PCF) method developed by JRC under ESPR
LAB 2.2 – Classification	**CLAS1** No classification **CLAS2** One classification system without (CLAS2.a) or with (CLAS2.b) a sliding scale **CLAS3** Two different classification systems per steel production route **CLAS4** Classification system based on steel quality
LAB 2.3 – Ensuring data quality	**DATA1** Label for EU steel producers only, based on self-declared emissions and production volumes **DATA2** Label for EU steel producers only, with third-party verification and certification **DATA3** Label for EU steel producers and importers, with third-party verification and certification

SO2: Boost demand for European low-carbon products and clean tech

As established in the problem section, low-carbon industrial products are not yet produced at the necessary scale to compete with conventional products. The demand and willingness to pay for such materials remain uncertain, making producers hesitant to invest in scaling up their production. Demand-side measures can break the chicken and egg problem. Lead market initiatives have been introduced around the world to incentivise cleaner alternatives by ensuring a demand, notably through green public procurement policies. See Annex 10 for more information.

It must be recalled that all measures considered under SO2 would be subject to a review clause about 5 years after entry into force of this legislation, to ensure whether such measures remain necessary to achieve the policy objectives of this initiative.

Energy intensive industries

Scope considerations for LEAD_EII 1, LEAD_EII 2 and LEAD_EII 3

The most energy- and carbon-intensive sectors include steel, non-metallic minerals and chemicals (and their derivatives such as plastics and fertilisers). Steel and cement alone account for more than 6% of the EU's annual GHG emissions, and as such are considered in priority in the development of lead markets for low-carbon products.

In addition, aluminium should also be included in the scope consideration given its recognition as a strategic material in the Critical Raw Material Act, its demand increase driven by the green transition needs, as well as its emission intensity.[558] While the chemicals industry is the third largest industrial contributor to GHG emissions, the development of robust specific low-carbon criteria for chemicals and derived products (e.g. plastics) presents significant challenges, in

[558] EU production of primary aluminium is about 6.8 kg of CO_2 per kg of primary aluminium. Source: Zore, L. (JRC) (2024). Decarbonisation Options for the Aluminium Industry.

particular due to the heterogeneity of the sector and its outputs, which may require a more tailored approach, targeted to specific market segments, such as plastic products used in construction.
Other energy intensive sectors should be considered as appropriate. For these energy intensive materials, the relevant downstream sectors should be identified to support the creation of lead markets.

Suitable lead markets to stimulate demand for low-carbon materials are generally downstream industries where the share of energy-intensive input in total production value is relatively small (thus reducing the impact of any price premium) while output volumes are sufficiently large to support the scaling-up of low-carbon production.[559]

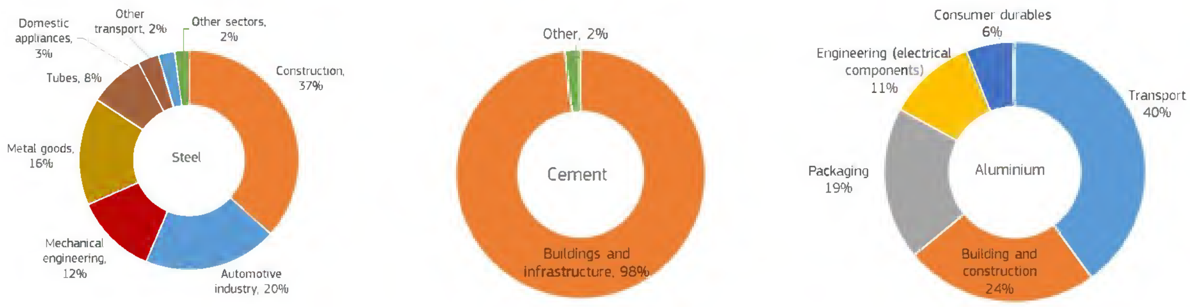

Figure 26: Breakdown of energy intensive materials (steel, cement and aluminium) use in downstream sectors[560]

Based on the figure above, **the automotive and construction sectors,** major consumers of **cement, aluminium and steel**, can play a key role in driving decarbonisation across these industries since the costs of their end products is minimally driven by the shares of the material, but rather from other value-added activities related to how these products are designed and manufactured.[561]

In the automotive and construction sectors, low-carbon requirements could be introduced through different intervention areas, depending on the level of ambition pursued:

- *Public procurement*: requiring contracting authorities to incorporate low-carbon criteria (as a technical requirement or award criteria) into public procurement procedures related to the use of energy intensive materials in certain selected downstream sectors.
- *All public support schemes* (incentives, grants, subsidies, tax benefits): requiring Member States to integrate low-carbon criteria concerning the use of a minimum share of energy intensive materials (e.g. steel) in selected downstream sectors, subject to public support schemes (e.g. tax incentives for purchasing an EV), without prejudice to State aid rules.
- *Products placed on the market* (product regulation/internal market rules): establishing minimum mandatory low-carbon requirements for energy intensive materials (e.g. steel) used in products (e.g. vehicles) placed on the EU market – which manufacturers must comply with.

Other sectors were identified due to their potential relevance, but not considered for measures at this stage:

[559] Draghi, M. (2024). The future of European competitiveness: In-depth analysis and recommendations (Part B), p. 111.
[560] JRC analysis. Source: Analysis based on data from European Aluminium (2023), CemBureau (2025), EUROFER (2025). The data used correspond to the following years: NA for aluminium, 2023 for cement, 2024 for steel.
[561] Deloitte (2025). Mobilizing consumer demand for sustainable investments.

The **wind energy** sector also emerges as a relevant downstream sector for energy intensive industries and in particular steel. The EU plans a significant expansion of wind energy capacity to meet its climate objectives and wind turbines are highly steel-intensive, with steel requirements estimated at 107-132 tonnes per MW, making it a relevant sector for decarbonisation, beyond its direct contribution as a clean energy technology. At the same time, also the impact of potential measures on the competitiveness of the sector would need to be assessed.

Similarly, the European **defence industry** is expected to grow substantially in the coming year, driven by increased government spending and a focus on strengthening defence capabilities. In the defence sector, the cost impact of using low-carbon steel and aluminium in a military tank is estimated to remain below 1% by 2030.[562]

Based on the **Open Public Consultation**, the most important downstream sectors supporting the uptake of clean energy-intensive materials were identified as construction and infrastructure (218, 70%), automotive (196, 62%), defence (92, 30%), machinery (40 respondents), electrical and electronic equipment (136, 43%), and clean energy technologies (186, 60%).

LEAD_EII 1 - Low-carbon requirements for EIIs outputs in public procurement and support schemes (no Made in EU requirements)

This policy measure introduces low-carbon requirements in public procurement and support schemes for steel, cement and aluminium used in selected downstream sectors.

Targets setting

The 2030 low-carbon (LC) target for steel is calculated as the ratio between the expected LC production capacity that is committed or under construction and the projected total production in 2030 for the relevant sector. This ensures that the target reflects the credible supply base likely to be available by 2030 and excludes projects still at the announcement or feasibility stage.

Under this measure, a specified share of materials used in publicly financed projects or supported activities must come from low-carbon production routes, as defined in LAB 2.2. The share would increase progressively over time through a review clause, in line with climate targets and the expected ramp-up of LC capacity.

The objective of this measure is to stimulate demand for low-carbon steel, providing a market signal that justifies continued investment in industrial decarbonisation while remaining manageable given current supply constraints and costs differentials.

BloombergNEF data[563] shows that 61 new European low-carbon steel projects are currently ongoing and can be classified between Label A–C, following the classification system proposed in Annex 12, with a material capacity amounting to 75.4 Mtonnes per year. However, only 23 of these projects, equivalent to 29.7 Mtonnes per year, have reached a committed or under-construction stage. These are the projects most likely to be operational by 2030. Around 41.4 Mtonnes of potential capacity remain in earlier planning or feasibility stages and are at risk of delay or non-realisation.

Targets

[562] Analysis by Industrial Transition Accelerator (ITA) and Third Generation Environmentalism (E3G).
[563] BloombergNEF (BNEF), Decarbonised Steel Projects Database, Version 1.0.5 (2025). Commission analysis.

Regarding **steel**, the target is calculated by dividing the committed low-carbon capacity of 29.7 Mtonnes by the projected total EU-27 steel production of 134 Mtonnes in 2030 (based on the OECD Steel Outlook 2025[564], excluding the United Kingdom's 4 Mtonnes of output reported in World Steel in Figures 2025[565], and not taking into account possible effects from the proposal for a Regulation addressing the negative trade-related effects of global overcapacity on the Union steel market[566]). This results in an estimated low-carbon share of about 22% of total EU production in 2030. On this basis, a **low-carbon requirement of 25%** by 2030 is proposed for public procurement and support schemes, ensuring an ambitious yet achievable target that reflects expected industrial deployment while stimulating early market demand.

Regarding **cement**, FID projects for low-carbon cement are estimated to produce 2.3 Mtonnes in 2030[567], which is equivalent to a 1% of EU overall production. A more ambitious target, also considering the size of the construction market, could make some of the announced capacity materialise earlier. Therefore, a **low-carbon requirement of 5% cement target in 2030** seems opportune. Such target will be subject to review overtime, based on the pace at which low-carbon capacity comes online.

Regarding **aluminium**, the target is based on primary production and derived from the following assumptions. First, European primary aluminium supply in 2030, including production in the UK, Norway, and Iceland, is assumed to remain constant[568] at current capacity levels of approximately 3.6 Mt[569]. Furthermore, a recent industry analysis of decarbonisation pathways for European primary aluminium production estimates total emissions reduction for primary aluminium by approximately 36.9% in 2030 compared with baseline 2021.[570] This corresponds to around 11 $MtCO_2e$ emissions in 2030. On this basis, the average CO_2 emission intensity of European primary aluminium in 2030 is assumed to be 3.27 tCO_2e. per tonne of primary aluminium.

While European primary aluminium supply is considered to remain stable, aluminium demand in Europe is projected to increase to around 16 Mt by 2030, with some of the predicted growth to be generated by aluminium replacing other materials[571]. Under these assumptions, low-carbon aluminium produced via the primary route could supply approximately 22.5% of total European demand in 2030[572]. Accordingly, **a target of 25% in 2030** is considered both appropriate and achievable, as it is closely aligned with the projected availability of low-carbon primary aluminium.

Proposed measure under EII_1

This measure proposes a low-carbon content target of 25% for steel publicly procured in the selected downstream sectors in 2030, where low-carbon steel is considered compliant with classes A to C of the voluntary label designed in LAB.2. A review clause will be included for after 2030, based on projected supply of low-carbon steel, projects that have reached final investment decisions, and the general imports share. Participants in public tenders would be

[564] OECD (2025). OECD Steel Outlook 2025.
[565] World Steel Association (2025). World Steel in Figures 2025.
[566] European Commission (2025). Proposal for a Regulation of the European Parliament and of the Council addressing the negative trade-related effects of global overcapacity on the Union steel market. COM(2025) 726 final.
[567] Mission Possible Partnership (MPP), E3G and the Industrial Transition Accelerator (ITA) (2025). Building the EU's Clean Industrial Future: Unlocking Investment through Lead Markets.
[568] Eurometaux and KU Leuven (2022). Metals for Clean Energy: Pathways to solving Europe's raw materials challenge.
[569] European Aluminium (2023). Net-Zero By 2050: Science-Based Decarbonisation Pathways for The European Aluminium Industry.
[570] Ibid.
[571] European Aluminium (2022). Circular Aluminium Action Plan - A Strategy for Achieving Aluminium's Full Potential for Circular Economy by 2030.
[572] Where 22.5% is calculated by dividing the projected increase in EU aluminium demand in 2030 (16 Mtonnes) with the projected supply low-carbon capacity (3.6 Mtonnes) by 2030.

asked to demonstrate compliance with the low-carbon requirement by using the steel label (or, potentially, an equivalent certification).

For cement, this measure proposes a low-carbon content target of 5% for cement/concrete publicly procured in construction in 2030. As for steel, a review clause will be introduced to review the target level after 2030, depending on market developments. This target is based on current final investment decision projects for low-carbon cement, estimated to produce 2.3 Mtonnes in 2030, which is equivalent to 1% of EU overall production. The specific design of the ambition level will reflect the methodological approach followed under the CPR.

For aluminium, the measure proposes a low-carbon content target of 25% for aluminium publicly procured in construction and selected downstream sectors in 2030. Similarly to cement, a review of the post-2030 target level will be conducted, based on market developments. This target is based on the 2030 availability of EU supply of low-carbon primary produced aluminium. The underlying design of the ambition level will reflect the methodological approach followed under the ESPR.

Table 19: *Overview of LEAD_EII 1*

Requirement	Market segments	Energy intensive material	Targets
Low-carbon requirement	Public procurement Public support schemes	Steel	25% in 2030
		Cement (concrete[573])	5% in 2030
		Aluminium	25% in 2030

LEAD_EII 2 – Low-carbon requirements for EII outputs and minimum Made in EU requirement for EIIs in public procurement and support schemes

Scope considerations for LEAD_EII 2

Based on sectoral analysis described in Annex 7, steel, **aluminium** and **cement** are considered high-potential sectors for this measure as the market share of EU producers has been declining substantially in the past 10 years, making them particularly at risk of de-industrialisation.

To address these challenges, the measure couples the low-carbon requirements with minimum Made in EU requirements in public procurement and support schemes.

Targets

Under this option, the **low-carbon and made in EU requirement** would apply to steel products in public procurement and public support scheme ensuring that at least 25% of the steel used in the automotive and construction sectors as part of public procurement and support schemes in 2030 is of European origin and is compliant with the classes A to C as defined under LAB.2. This corresponds to the domestic supply of approximately 35.1 Mtonnes per year (29.7 Mtonnes from EU production). Given the potential for uptake of low-carbon steel is different in these two market segments, there is higher potential to use low-carbon EAF steel in construction, versus low-carbo primary route-based steel in automotive. A **minimum Made in EU requirement** ensuring that the low-carbon steel used in publicly financed projects originates from EU or EEA producers.

To introduce minimum Made in EU requirements in public procurement in line with international commitments for EIIs but with maximum use of exemptions from those

[573] For the objective of lead markets in the construction sector, the requirement may be established at the level of concrete, as the carbon impact of energy intensive materials depends heavily on the specific design and material mix.

international commitments, the following design elements on how to define "EU content" will be considered:

- Minimum percentage of the value creation (i.e. value of the final product compared to initial input) to take place in the EU
- Minimum share of specific materials used in a product to be manufactured in the EU
- Specific production steps or final assembly must take place in within EU

Analysis on the target for EU low-carbon requirements for cement and steel is carried out under LEAD_EII 1.

Overview of LEAD_EII 2

Table 20: Proposed targets under LEAD_EII 2

Requirement	Market segments	Energy intensive material	Targets
Low-carbon + Made in EU requirement	Public procurement Public support schemes (in selected downstream sectors)	Steel	25% in 2030
		Cement (concrete)	5% in 2030
		Aluminium	25% in 2030

LEAD_EII 3 –Low-carbon and EU content for EIIs in products placed on the market (in selected downstream sectors)

This policy measure extends the scope of low-carbon and Made in EU requirement beyond public procurement and support schemes to include selected downstream sectors placing products on the market. It combines the low-carbon requirement within that low-carbon share, thereby incentivising both the use of decarbonised materials and their European production across industrial value chains.

The targets are determined based on projected EU production capacity and demand and have been set at a level that is intended to be both ambitious and achievable. The measure would be implemented up to 2030, with a review clause allowing the targets and coverage to be adjusted based on realised production capacity and market developments.

Table 21 Projected European production and demand in million tonnes for selected EII products, Commission internal analysis

Material	Steel	Aluminium	Cement
	2030		
Expected production	134	9	197
Expected demand	176.52	16	160.7
% of EU production that can cover demand	75.9%	68.75%	122.6%

Table 22: proposed targets under LEAD_EII 3

Requirement	Market segments	Energy intensive material	Targets
Low-carbon + Made in EU requirement	All products placed on the market (in selected downstream sectors)	Steel	25% in 2030
		Cement (concrete)	5% in 2030
		Aluminium	25% in 2030
		Steel	85% from entry into force

Made in EU requirement	All products placed on the market (in selected downstream sectors)	Cement (concrete)	95% from entry into force
		Aluminium	70% in 2030;

Clean technologies

LEAD_BAT 1 - Made in EU requirements in batteries for public procurement, auctions, and public support schemes

Driver 3 under Sub-problem 1 is particularly relevant to the batteries industry, which is why Made in EU requirements are the only policy option assessed. As outlined in the baseline, low-carbon requirements for batteries are already addressed under existing legislation, namely the Battery Regulation.

This measure would introduce Made in EU requirements, in line with international commitments, for batteries in public procurement, auctions and public support schemes with a particular focus on EVs and BESS. Under this measure, 'Made in EU requirement' refers exclusively to content originating within the EU and potentially EEA.

Scope considerations

The battery value chain is complex, and the final product consists of key components and materials, each of which constitutes a distinct finished product originating from upstream sectors which are often located in different countries. The final battery product is composed of the following 10 components, as listed in the Commission Implementing Regulation 2025/1178: battery pack, battery module, battery cell, cathode active material (CAM), anode active material (AAM), separator, electrolyte, battery management system (BMS), battery thermal management system (BTMS), and current collectors. **Therefore, LEAD_BAT 1 considers which product step would most benefit from the introduction of an Made in EU requirement.**

First, the requirement will be assessed at the level of the battery final product using a component-based approach. This means that a specified number of the battery's components must be manufactured within the EU and possibly EEA, including certain mandatory components. An additional list of components ranging from precursor active materials to critical raw materials could be introduced through a delegated act to ensure coverage of the entire battery value chain. At this stage, there is insufficient data and cost analysis to justify the inclusion of upstream segments or to establish reliable EU content targets. Importantly, this extended list could not apply exclusively to EU-based production but could also include EU plus other regions' sourcing, depending on local manufacturing capacities and global supply dependencies.

Second, the requirement should follow a phased implementation. Given that the maturity of the battery value chain varies significantly across its different segments, Made in EU requirements should be phased in progressively, with an initial focus on the most developed segments of the value chain: the production of battery cells. As upstream manufacturing capabilities (e.g. active materials, separators, electrolytes) develop within the EU, content requirements could gradually extend to these components. This time phased approach ensures that requirements are realistic, enforceable, and aligned with industrial development of the battery sector.

EVs: Mandatory Made in EU requirements of at least 4 components at one year after entry into force, including the battery cell, increasing to 6 components after three years of entry into force, including the BMS and the CAM.

BESS: Mandatory Made in EU requirements of at least three components at one year after entry into force, including the BMS; increasing to 6 components after three years of entry into force, including the battery cell and the CAM.

Targets

The targets set are based on projected installed capacity for battery components, derived from industry announcements[574], and compared against total European demand EVs and BESS batteries. This approach is conservative, as Made in EU requirements will not apply to the entire demand of EV and BESS batteries. Additionally, all projects currently on-hold have not been accounted for.

Midstream value chain

Battery cells will become a mandatory requirement for EVs one year after entry into force. For BESS, the mandatory requirement for battery cells will apply once a robust EU-based battery cell manufacturing capacity for stationary storage is established for which further investments will be needed. In 2027 and 2028, projected installed battery cell capacity is expected to reach 379 GWh and 504 GWh, respectively. This would be sufficient to meet 93% and 98% of the combined internal demand for EVs and BESS. Specifically, EV battery demand is projected to reach 353 GWh in 2027 and 453 GWh in 2028, meaning that installed capacity alone could fully meet EV demand in both years. These figures include operational, under-construction, and announced projects. Even if announced projects are excluded, the remaining operational, including expansions, and under-construction capacity would still cover 93% and 98% in 2027 and 2028 of EV demand. The installed production capacity of the EU plus the EEA countries could already cover 97% of EV demand in 2027 and 103% in 2028. Looking ahead, battery cell capacity including announced projects is expected to meet 108% of total EV and BESS demand by 2029. If announced projects are excluded, this threshold would be reached by 2030, with installed capacity covering 103% of total demand.[575] Although the EU is approaching self-sufficiency in this segment, it is still reliant on imports and additional investments will still be necessary to keep up with demand increases and the development of next-gen batteries.

Upstream value chain

Unlike battery cells, many CAM and AAM projects are still at the announcement stage. In 2027 and 2028, total **CAM** capacity is expected to reach 587 GWh and 797 GWh, covering 144% and 154% of demand. However, when considering only operational, including expansions, and under-construction projects, coverage drops to 99% and 89%. By 2030, total CAM capacity would cover 119% of demand, but only 77% if announced projects are excluded. For **AAM**, total projected capacity reaches 255 GWh and 411 GWh in 2027 and 2028, covering 62% and 80% of demand. Yet, operational and under-construction capacity only covers 12% and 14%, respectively. By 2030, total capacity would cover 60% of demand, while operational and under-construction projects would only reach 9%.[576]

Separator and electrolyte capacity is concentrated in a few large-scale projects. Separator capacity is expected to meet 102% of demand by 2030, while electrolyte capacity covers 100% of demand in 2025 and 57% by 2030, indicating a lack of long-term investments.[577]

[574] European Battery Alliance, BloombergNEF and European Commission internal analysis.
[575] BloombergNEF and European Battery Alliance
[576] Ibid.
[577] BloombergNEF

Downstream value chain

Battery pack and battery module capacity in the EU battery module is distributed and developed across Europe, with many automotive OEM manufacturers handling these processes locally. The EU's capacity for pack assembly currently stands over 102 GWh[578], which includes approximately 54.8 GWh dedicated to EV-only applications, 11 GWh for BESS-only systems, and 37 GWh for mixed-use applications (both EV and stationery). In addition, another 316 GWh are currently in the pipeline, comprising 268.45 GWh for EV-only applications, 8 GWh for BESS-only systems, and 40 GWh for mixed-use applications.[579] Any Made in EU requirement on cells will most likely lead to modules and packs also being manufactured within the EU, since they have to include the EU-made cells in the final product. Additionally, the EU counts with a significant number of companies producing **BMS**, at least 32[580], and **BTMS,** with two EU-based firms ranked among the five largest globally[581], spanning over 10 Member States and providing solutions both for EVs and BESS.

In terms of production costs, the EU battery industry reflects a mix of start-ups still refining their manufacturing processes and well-established companies with existing overseas operations. Production costs between these companies vary depending on their level of maturity and stage in their ramp up phase. Currently, battery manufacturing in the EU is generally more expensive than in markets like China or the United States. This is primarily due to lower levels of manufacturing subsidies[582], elevated material prices for which the EU is dependent on third countries, which account for 55% of the production costs, and higher energy and labour costs, which account for 15% and 13% of production costs, respectively.[583]

In 2023, on average, European battery production costs[584], were almost 50% higher than in China for the same chemistry. However, there is potential for innovation in the battery manufacturing sector in the EU which could cut the cost gap with China by 40%.[585] Additionally, economies of scale are essential for producing batteries competitively, as battery production, driven by fierce cost competition and global overcapacities, is often a low margin business that requires extreme precision and efficiency, and therefore high yields and automation.[586] This underscores the strategic importance of rapidly scaling up European production to be able to reduce the cost gap with overseas markets. It is estimated that an EU based battery cell manufacturer could reach a 26% cost difference when producing the same battery chemistry under the same conditions and using localised CAM and AAM.[587] Battery cells, and its components, remain the most expensive part of a battery, amounting to around 68% of the total costs in 2024. These estimates do not account for additional factors such as higher logistics costs from China, import tariffs, and higher profit margins outside the EU. In fact, import costs represent around 10% of the total costs of imported batteries.[588]

[578] Up to six operational projects do not have available information on their installed capacities. Current installed capacity for modules and packs must absorb both EU made and imported cells.
[579] Battery Pack Manufacturing Assets, BloombergNEF
[580] BMS Manufacturers, Battery News
[581] Top Companies in Battery Thermal Management System Industry, Markets and Markets
[582] MIT CEEPR. Global Clean Investment Monitor: Government Support for Electric Vehicles and Batteries. In 2024, Europe allocated approximately EUR 2.15 billion in subsidies for both electric vehicles and battery manufacturing. By comparison, China and the United States allocated EUR 6.32 billion and EUR 7.4 billion, respectively, for battery manufacturing alone.
[583] IEA (2024). Energy Technology Perspectives 2024.
[584] Battery manufacturing cost differentials are assessed at battery cell level and include battery cells as well as cathode and anode active materials. These components account for the largest share of total battery costs and also due to their energy-intensive nature and the importance of manufacturing efficiency, they are where cost disparities between China and other regions are most pronounced. Costs for separators, electrolytes, current collectors, and other upstream materials are based on global average estimates.
[585] IEA (2024), Energy Technology Perspectives 2024.
[586] Intercalaction Station, 2023
[587] Battery Report 2024, Volta Foundation. Model parameters: same yields, factory automation, material margins; no import tariffs or local premiums on materials and region-average energy prices.
[588] IEA (2024). Energy Technology Perspectives 2024.

While certain steps of the battery value chain are more developed, the EU battery ecosystem already has production capacity across the entire value chain, and this capacity is expected to grow significantly in the coming years. The targets are designed to allow for flexibility while ensuring that critical components are manufactured within the EU. These targets will help ensure that current industry announcements materialize, while also attracting additional investment into the sector, particularly in battery technologies and chemistries that require greater development within the EU.

LEAD_BAT 2 - Made in EU requirements in batteries placed on the market

Scope considerations

In addition to the measure described in LEAD_BAT 1, this measure would introduce Made in EU requirements for batteries used in EVs and energy storage systems in in batteries placed in the market. It would establish a market entry requirement for all EVs, and BESS placed on the EU market.

LEAD_SOL 1 - Made in EU requirements in solar for public procurement, auctions, and public support schemes

This measure proposes to cover the entire solar PV value chain, addressing not only the final product but also the key components that comprise it. The provisions are to kick in with entry into force of IAA. The solar PV final products and their key components are defined in the NZIA Implementing Act on main specific components.[589]

The measure introduces a requirement that solar PV systems and their main components are manufactured in the EU and is designed in alignment with the access to markets provisions as per the NZIA.

Considering the dependencies related to solar PV technologies[590], the inclusion of countries which are part of the GPA[591] or with which the EU has entered an FTA[592] (including GPA and FTA countries in the content requirement would significantly reduce the measure's added value compared to relevant provisions under NZIA. Consequently, this alterative will not be further assessed, and the requirements will focus exclusively on EU content only.

Choice of measure

The EU solar PV market is divided into utility-scale, commercial & industrial (C&I) rooftops, and residential rooftops, with emerging specialty products (agrivoltaics, vehicle-integrated PV, space PV) remaining niche.[593]

- Utility-scale PV: around 40-45% of annual additions 2025–2030
- C&I Rooftops: around 30-40% of additions, varying by country
- Residential Rooftops: 10-20% of additions mid-2020s, recovering towards 2030

Share of PV deployment covered by public procurement, auctions and public schemes based on industry estimates provided during the NZIA drafting.

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[589] C(2025) 9033 final ANNEX

[590] Highlighted in the Commission Communication on shares of the Union supply under NZIA; Communication of the Commission of 23 May 2025 providing updated information to determine the shares of the European Union supply of final products and their main specific components originating in different third countries under Regulation (EU) 2024/1735 on establishing a framework of measures for strengthening Europe's net-zero technology manufacturing ecosystem (Net-Zero Industry Act).

[591] Parties to the GPA include Armenia, Australia, Canada, Chinese Taipei, EU, Hong Kong SAR, Iceland, Israel, Japan, Liechtenstein, Moldova, Montenegro, New Zealand, North Macedonia, Norway, Singapore, South Korea, Switzerland, Ukraine, United Kingdom, and the United States.

[592] An mapping of the EU's trade agreements is available at 0e05d6f3-64f5-4661-ae0c-aefb68094d19. More information is available at https://policy.trade.ec.europa.eu/eu-trade-relationships-country-and-region/negotiations-and-agreements_en.

[593] SolarPower Europe (2025). Reshoring Solar Manufacturing to Europe.

- Across Member States, public procurement is assumed to account for 3% of the PV capacity deployed.
- Across Member States, renewable energy auctions are assumed to account for 19% of the PV capacity deployed.
- Across Member States, public support schemes are assumed to account for 12% of the PV capacity deployed.

Relevance of public procurement: Public procurement is emerging as a crucial tool to shape demand for EU-made solar products. Whilst the overall market share of public procurement in solar is limited, with growing deployment of solar on public buildings and infrastructure, aligning procurement practices with industrial policy objectives can provide predictable, large-scale demand for European manufacturing.

Relevance of public support schemes: Public support schemes, such as subsidies, grants, and tax rebates for solar PV, can play a vital role in promoting EU-made technologies. Authorities designing these schemes must incentivise the purchase of solar products that meet the Made in EU requirements as set out in the table. This can be done by offering additional financial bonuses or making EU content a condition for eligibility.

Relevance of auctions: Auctions represent a critical market segment for solar PV as they provide a structured and predictable pathway for large-scale deployment. They offer developers clear visibility on future demand and long-term offtake certainty, which is essential for mobilising investment in capital-intensive infrastructure.

Trade aspects

The EU is a net importer of all key components across the solar PV value chain. At present, the majority of PV modules deployed in the EU are imported, and domestic production of modules remains limited. As a result, imports of PV cells and upstream components remain correspondingly low. Given the sequential nature of the PV value chain, meaningful imports of PV cells will only materialise once EU module production has been scaled up. Likewise, significant imports of PV wafers will only occur once PV cell production has been reshored to Europe. According to the Commission Communication on shares of Union supply, in 2023 the EU supply of PV technologies was extremely reliant on Chinese imports. For the following components, the share of Union supply from China was the following one:

- PV modules and PV cells: 94%
- PV inverters: 50%
- PV wafers: 79%

Targets proposed under IAA

Following considerations apply:

- Component based approach, i.e. requiring a certain number of components to be manufactured in the EU instead of a percentage
- Phased in approach: first step with entry into force, second step for 2030
- The targets are not limited in time but subject to the general review clause.
- Gigawatt scale production and innovation should be encouraged as well as products and components using EU equipment for the production.
- The mandatory components have been chosen to keep cost increase limited and focus on steps with most added value and with most job creation.

Public procurement, auctions and support schemes: • One year after entry into force: 3 main specific components to be made in EU, out of which inverter mandatory • Three years after entry into force: 4 main specific components should be made in EU of which cell, inverter mandatory.

Manufacturing capacity targets in view of expected deployment

In 2024, 65 GW on new solar PV was installed in the EU, a 4% growth rate from 2023.[594] Reaching the objective of 700 GW of deployed solar capacity by 2030, set out in the EU solar energy strategy[595] under REPowerEU, requires maintaining a pace of 60 GW per year until then.

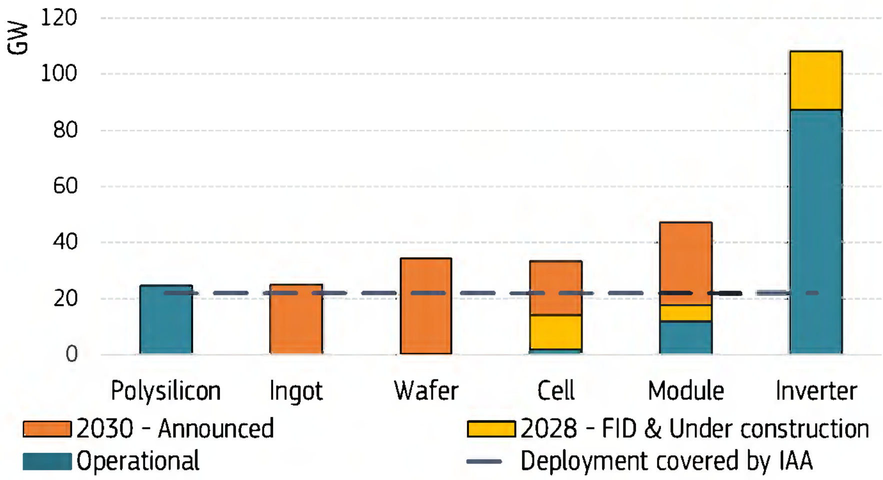

Figure 27: Manufacturing capacity of solar PV components vis a vis PV deployment covered by the Industrial Accelerator Act, today-2030, Net-Zero Technology Manufacturing Dashboard
Notes: Deployment covered by Industrial Accelerator Act IAA) includes public procurement, renewable energy auctions and public support schemes. FID = Final Investment Decision.

The line referring to "Deployment covered by IAA" in the graph above represents the amount equivalent to the share of the annual deployment market covered by the market segments to which the Made in the EU requirements would apply to (public procurement, auctions and support schemes).

- Ramping up manufacturing capacity of PV modules is fast, therefore a Made in EU requirement to be introduced one year after entry into force of the Act would be feasible.
- By 2030, the EU has sufficient manufacturing capacity to fulfil the deployment covered by IAA through the whole value chain, provided that the right measures (like Made in EU requirements) are put in place.

Operational capacity can fulfil the following percentages of current PV deployment covered by IAA:

- Polysilicon: >100%
- Ingot: 0%
- Wafer: 0%
- Cell: 10%

[594] PV Magazine (2024). EU solar installations hit 65.5 GW in 2024, says SolarPower Europe.
[595] European Commission (2022). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions - EU Solar Energy Strategy, COM/2022/221 final.

- Module: >50%
- Inverter: >100%

Capacity expected to be operational one year after the entry into force of IAA (i.e. 2028, operational + FID + under construction capacity) could fulfil the following percentage of PV deployment covered by IAA:

- Polysilicon: >100%
- Ingot: 0%
- Wafer: 1%
- Cell: >60%
- Module: 80%
- Inverter: >100%

Further components from the list in the Communication on main specific components under the Net-Zero Industry Act can be used to meet the targets of LEAD_SOL 1.[596]

Capacity expected to be operational in 2030 (operational + FID + under construction + announced capacity) could fulfil the following percentage of PV deployment covered by IAA:

- Polysilicon: >100%
- Ingot: >100%
- Wafer: >100%
- Cell: >100%
- Module: >100%
- Inverter: >100%

Further components from the list in the Communication on main specific components under the Net-Zero Industry Act can be used to meet the targets of LEAD_SOL 1.[597]

In public procurement procedures, contracting authorities must limit reliance on overconcentrated supply chains and impose contractual obligations if more than 50% of a main specific component originates from a single third country. Public procurement is emerging as a crucial tool to shape demand for EU-made solar products.

LEAD_SOL 2 - Made in EU requirements in solar PVs placed on the market

In addition to the measure described in LEAD_SOL 1, this measure introduces Made in EU requirements for solar PV also in private procurement, in addition to public procurement and support schemes - to further strengthen EU manufacturing.

To ensure effective implementation, manufacturers would be required to document the EU content of their products, including sourcing, production, and assembly data. Compliance could be verified through regular reporting and independent audits, with a clear methodology for calculating EU value added. Enforcement could include penalties for non-compliance, ensuring transparency and consistency across both public and private procurement markets.

Phased in approach

To mitigate potential supply chain disruptions, Made in EU requirements can be phased in gradually, aligning with the feasible expansion of manufacturing capacity within the EU. This

[596] European Commission (2025), Communication from the Commission providing updated information to determine the shares of the European Union supply of final products and their main specific components originating in different third countries under Regulation (EU) 2024/1735 on establishing a framework of measures for strengthening Europe's net-zero technology manufacturing ecosystem (Net-Zero Industry Act), C(2025) 3236, 18 June 2025.

[597] European Commission (2025), Communication from the Commission providing updated information to determine the shares of the European Union supply of final products and their main specific components originating in different third countries under Regulation (EU) 2024/1735 on establishing a framework of measures for strengthening Europe's net-zero technology manufacturing ecosystem (Net-Zero Industry Act), C(2025) 3236, 18 June 2025.

staggered approach would help ensure that the requirements are not only realistic and enforceable but also in sync with the actual industrial development of the EU solar PV sector. Made in EU requirements could be phased in gradually, starting with low thresholds and less complex value chain segments, then expanding and rising over time as EU production capacity develops. Alternatively, rules could apply only once minimum capacity is in place, with voluntary commitments from large buyers encouraged in the meantime.

LEAD_VC 1 – Made in EU requirements in vehicle components for public procurements and support schemes

Driver 3 under Sub-problem 2 is relevant for automotive components, which is why Made in EU requirements are the only policy option assessed. As explained in the baseline, resilience criteria laid down by the NZIA framework do not cover the entire spectrum of vehicle components that have the potential to contribute to the decarbonisation of road transport, nor do they address sufficiently the economic pressure (cost disadvantage) faced by domestic automotive component suppliers. In line with this driver, this measure would introduce Made in EU requirements for automotive components, as the minimum share (%) of EU-made components over total components in value, excluding batteries. in public procurement and public support schemes.

Scope considerations

The EU content in a passenger car sold on the EU market may differ significantly depending on the model and type of vehicle considered and where it has been produced. Estimates from the JRC indicate that the EU content in passenger cars produced in the EU has been gradually decreasing over time and represented in 2022 on average 70% of the car's value in the case of an EV (excluding the battery) while it was totalling 85% of the car's value for an internal combustion engine (ICE) car.[598] It should be noted that passenger cars not produced in the EU have lower shares of EU content compared to the ones produced in the EU[599], however the battery is assessed in a different provision (LEAD_BAT). Implementing a 70% Made in EU requirement for EVs sold in the EU upon the introduction of the measure could help reverse the erosion of EU content of EVs observed over the last decade, bringing it closer to that of ICEs. The requirement could then be gradually increased to 75% by 2030.

A crucial aspect of vehicle components production regarding its complex value chain must be taken into consideration: the final vehicle component product is often composed of key sub-components and materials (or software), each of which constitutes a distinct finished product originating from upstream sectors (tier 2 or 3 suppliers), sometimes located in different countries. If we take, for instance, the example of an electric motor, the final product may include a stator and rotor, a shaft, bearings, bracket, terminal box (T-box) seat and its cover, washer, pre-load spring, external fan and its cover.

At the same time, the proposed measure has to be based on criteria that are relatively simple to implement and limit the administrative burden of each player of the value chain. The Made in EU requirement on vehicle components should offer sufficient freedom to OEMs regarding their sourcing strategy (make or buy and choice of suppliers) and provide sufficient freedom to Tier-1 suppliers regarding their own sourcing strategy (make or buy and choice of tier 2+ suppliers).

[598] These estimates are in line with the ones provided by McKinsey: 85-90% and 70-75% of EU content for an ICE and a battery electric vehicle, respectively, produced in Europe in 2023. https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/europes-economic-potential-in-the-shift-to-electric-vehicles

[599] For instance, McKinsey estimated 20% of EU content for a battery electric vehicle imported in Europe in 2023: https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/europes-economic-potential-in-the-shift-to-electric-vehicles

The metrics used to assess the EU content threshold should be defined as the minimum share (%) of EU-made components over total components, in value, excluding batteries. The EU content definition should remain as close as possible to the existing rule of origin methodology referring to "last substantial transformation" to limit additional administrative activities to both OEMs and suppliers.

EVs[600]: at least 70% EU-made components over total components, in value, excluding batteries one year after entry into force and 75% by 2030.

LEAD_VC 2 - Introduce Made in EU requirements in automotive components for public procurements, public support schemes and all vehicles placing on the market.

Scope considerations

In addition to the measure described in LEAD_VC 1, this measure would introduce Made in EU requirements for automotive components not only in public procurement and public support schemes, but also to placing on the market.

EVs[601]: at least 70% of the total value of a vehicle one year after entry into force and 75% by 2030.

<u>SO3: Maximise the quality and benefits of foreign investment in the EU</u>

INV 1 – Guidance on voluntary FDI conditionalities

This measure would entail issuing a non-binding, soft law instrument (e.g. guidelines) calling upon Member States to impose conditionalities on FDI for industries falling into scope (e.g. batteries and potentially certain energy intensive industries), provided these are compatible with provisions of EU law governing, for instance, free movement of capital and mergers.). The guidelines would urge that Member States impose conditionalities in their national regimes covering FDI, including sectoral rules (for the sectors covered).

INV 2 – Mandatory FDI conditionalities EU-wide

Moving from "policy-by-project" to "policy-by-principle" is essential to retain as much added value from foreign investments as possible. Instead of negotiating conditionalities case by case, the EU will define clear, horizontal criteria for FDI in strategic sectors to align investor incentives with EU resilience targets while providing predictability for companies.

This measure will impose mandatory rules on FDIs for the industries in scope, namely battery supply chain (especially batteries for EVs) and other critical technologies in strategic sectors. Determining which sectors fall under mandatory FDI conditionalities is anchored in the established framework for identifying technologies critical to economic security.[602] The Recommendation on critical technologies[603] requires an assessment based on three narrowly defined criteria: 1) the enabling and transformative nature of the technology, 2) the risk of civil–military fusion, and 3) the risk of misuse for human-rights violations. This is complemented by a systemic vulnerability analysis examining chokepoints, EU comparative position, supply-chain concentration, threat actors and global interdependencies. Applying this

[600] This category includes BEVs and PHEVs. The target reflects on the aggregated value and the weighted average of both BEVs and PHEVs.
[601] This category includes BEVs and PHEVs. The target reflects on the aggregated value and the weighted average of both BEVs and PHEVs.
[602] European Commission (2023). Joint Communication to the European Parliament, the European Council and the Council on "European Economic Security Strategy", JOIN(2023) 20 Final.
[603] Commission Recommendation C(2023) 6689 on critical technology areas for the EU's economic security for further risk assessment with Member States.

methodology, we can define a list of sectors for which it is justified that they are included in the scope of mandatory FDI conditionalities.

Safeguards and proportionality are ensured through the design of the conditionalities themselves. In line with the Commission's requirement that protective measures be precisely targeted and proportionate to the risks identified, the legal provision applies a coherent, uniform set of conditions that applies to inbound investors in these designated strategic sectors. However, the Act differentiates the degree of obligation between two groups of technologies to align proportionality with the intensity of risks identified. For strategic reinforcement technologies, vulnerabilities are acute, structurally embedded and linked to highly concentrated global supply chains. In these sectors, inbound investors must comply with all conditions, as flexibility would weaken the EU's capacity to retain critical technology, secure supply chains and reduce exposure to foreign leverage.

By contrast, for other emerging key strategic sectors, risks remain significant but more heterogeneous or forward-looking. To avoid hampering scale-up and innovation in areas where Europe still needs to deepen its capabilities, investors must meet with a subset of the conditions. This calibrated flexibility preserves a meaningful economic security baseline while maintaining openness to investment essential for technological development.

Through this two-tier structure, the Act applies strict conditionality where the Union cannot tolerate vulnerabilities, and targeted flexibility where it strengthens competitiveness without undermining economic security.

The scope of the conditions would exclude FTA countries.

These rules would either:

- Directly apply to FDIs covered in the measure OR
- Create an obligation for Member States to scrutinise FDIs above a certain threshold in the above-mentioned scope and prescribe conditionalities for that investment.

Under both options, such conditionalities are:

a. Ownership and Structural requirements

This option group of conditionalities includes measures that control the ownership structure and relations of foreign investments within the EU to maintain local interests.

Ownership control requirements would introduce limits on non-European ownership/control for industries in scope (e.g. maximum 49% of the JV or EU firm can be owned by a non-EU based company or person). In addition, joint venture requirements could oblige FDI to partner with an EU firm, including a cap on their ownership control.

The legal provisions would have to consider control relations from third countries. Applicable foreign investments would either have to obtain prior approval from Member States or Member States would implement compliance measures horizontally.

b. Value added production

This group of conditionalities concern requirements to ensure that foreign investments lead to value added production, including R&I, engineering activities, domestic processing and manufacturing while incentivizing local sourcing and production of intermediate goods.

Such requirements may include using (a certain percentage) of EU-produced equipment and consumable inputs, aimed at boosting domestic industries in the upstream value stages, as well as to ensure independence of the investment from the origin country (and the investor's other operations) to increase supply resilience. The quality of value chains should also be considered to avoid foreign investments extracting value with minimal contribution to the internal market, for instance by only assembling readymade components imported from abroad.

Further to the above, staffing requirement, job creation and social protection conditionality could also be prescribed in IAA, as long as this does not to discrimination within the Single Market. This entails a requirement to actively recruit, hire, and train local workers and to ensure the creation of quality jobs in the EU, including via at least a certain percentage of the total workforce being composed of EU- residents. For acquisitions, this would include the protection of existing jobs. Moreover, conditions may consider specifying that key managerial positions, such as executive roles and board are filled with EU nationals or residents.

c. Technological advancements

These conditions should ensure that foreign investors contribute to the technological advancement in the EU by making their proprietary technologies or IP available to local firms, institutions, or joint ventures. Agreements facilitating such technology and know-how sharing with EU entities may be considered as market entry conditionalities. Licensing terms could also include co-development or training to maximise the domestic innovation capacity and promote value retention in the internal market.

Moreover, further conditions could be added on securing EU value chains by requiring foreign investors to sell to EU-based costumers, with the aim of ensuring availability of the products in the EU. This is only/most relevant if there is a structural or temporary shortage of these outputs (e.g. a foreign mining operation in the EU for a critical raw material should sell the mine output to EU customers).

SO4: Speed-up and simplify permits for industrial decarbonisation

PERM 1 – One project-one digital procedure

a. *Introduction of permitting provisions for all manufacturing industry projects on:*

To streamline permitting processes in the Union, Member States would be required to take the following concrete measures for any new (or reconverted) industrial manufacturing projects (NACE Section C) under the scope. No additional requirements would be requested from these manufacturing projects to benefit from measures below, since they would be considered as standard measures to improve the competitiveness of European manufacturing companies.

The potential measures include:

- Applying a ***joint procedure*** combining all relevant permits like building or construction permits, including potential environmental assessments (i.e. those required by the EIA, Habitats, Birds, Water Framework, Seveso and Industrial Emissions Directives) for a given project;
- Make permitting procedures ***fully digitalised***, including submission of evidence by expanding the scope of the Single Digital Gateway Regulation; additionally, national authorities would need to ***standardise data sets in environmental permits*** to increase interoperability and the storage/depository and the re-use of data in electronic forms;
- Mandate minimum data interoperability sets for storage and reuse in other reporting or permitting activities;
- European Commission to provide ***technical assistance for innovative technologies*** in decarbonised projects.

PERM 2 – One project –one digital procedure, and special focus on EIIs

This includes the measures outlined in PERM 1 above, and additionally, the measures explained below.

EIIs should demonstrate a specific level of decarbonisation effort, (e.g. "significant and permanent GHG emissions reductions") to qualify for these additional, cumulative benefits:

b. *Mirroring basic NZIA permitting provisions for the EII decarbonisation projects*

that do not fall under the NZIA scope, including:

- Designation of an authority to fulfil the role of 'one-stop shop' and be the sole point of contact for project promoter.
- Time limits of 18 months: adhering to specific time limits for different stages of the permit granting procedure, and other measures linked to basic permitting provisions.

To benefit from the NZIA provisions, an energy-intensive industrial decarbonisation project needs to fulfil two conditions: (i) the project has to manufacture a product or component that is *a priori* relevant to the supply chain of a net-zero technology and (ii) has to reduce emission rates of CO_2-eq of industrial processes significantly and permanently to an extent which is technically feasible. The evaluation and final decision, however, remain a prerogative of the national authorities. Therefore, industries that do not fulfil these conditions can continue to face complex and lengthy permit-granting processes.

c. *Presumption of "Overriding Public Interest" principle*:

To achieve the decarbonisation of the energy intensive industries in Europe, while enabling a security of supply of essential materials and avoiding dependencies from other regions of the world, energy intensive decarbonisation projects would be presumed to be of overriding public interest. As such, they should qualify for the most favourable procedure available in their planning and permit-granting procedures. For example, under Article 6(4) of the Habitats Directive this concept implies that the competent national authorities have to make their approval of the plans and projects in question subject to the condition that the balance of interests between the conservation objectives of the Natura 2000 site affected by those initiatives and the imperative reasons weighs in favour of the latter.

d. *Regulatory sandboxes for energy intensive industries*:

Regulatory sandboxes enable the competent authorities to exercise a degree of flexibility to allow participant/innovators to test innovative technologies or products in real world environment and conditions for a limited period of time under appropriate supervision of one or more competent authorities. The outcomes of these regulatory sandboxes should be established to enable experiences and regulatory learnings to be collected and shared across the EU. This would allow a limited derogation from specific legislation, such as: Delegated Regulation (EU) 2023/1185 and 2023/1184 (RFNBO DAs).

e. *Tacit approval*:

The lack of an administrative reply of the relevant administrative bodies within a certain time limit or specific intermediary steps could be considered as approved for relevant EII decarbonisation projects. This provision would be accompanied by safeguards to ensure that such measures have minimal to no unintended impacts to the environment, safety or health of the population. Such a provision would not apply to decisions/permits required under relevant EU environmental law. Similarly, it would not apply to final decisions/permits on the outcome of the permit-granting procedure, which shall be explicit.

PERM 3 – Dedicated measures for industrial clusters

This option includes all measures from PERM 1 and 2 above, and additionally, the measures explained below.

EIIs must demonstrate a specific level of decarbonisation effort, (e.g. "significant and permanent GHG emissions reductions") to benefit from these additional measures.

This measure opens the possibility for Member States to designate "Industrial Decarbonisation clusters" as geographical areas of industrial presence where projects can access several benefits. They are "***go***-to areas" which are particularly suitable areas for the installation of newly decarbonised industrial manufacturing facilities or reconversion of the existing ones already operating in the perimeter. These areas of industrial symbiosis can foster the exchange of raw materials, waste, and energy flows to improve their resource efficiency, and environmental performance.

f. Tacit approval

The lack of an administrative reply of the relevant administrative bodies within a certain time limit or specific intermediary steps could be considered as approved for projects within the industrial cluster. Such a provision would noy apply to decisions/permits required under relevant EU environmental law. It should not apply to final decisions/permits on the outcome of the permit-granting procedure, which shall be explicit.

g. ***Priority assessment by Distribution System Operator (DSO) for connection requests to energy infrastructure (i.e. electricity and /or hydrogen) located in industrial clusters.***

Member States would notify the distribution system operator whenever industrial clusters are established, providing that the estimated industrial activity justifies an energy infrastructure connection (electricity grid, hydrogen pipeline or others). Secondly, the assessment of the cluster connection would be evaluated as a matter of priority by the DSO, considering the decarbonisation needs of the industrial sector as one of the largest CO_2 emitters of the Union.

h. ***Derogation from Environmental Impact Assessment provisions for projects in industrial clusters***

In this context, they shall be exempted, when relevant, from the requirement to carry out a dedicated environmental impact assessment under Directive 2011/92/EU, provided that these projects comply with certain safeguards. There is however an obligation to perform a Strategic environmental assessment for plans dedicated to the designation of such clusters.

i. ***Exemptions for construction phase***

First stages of environmental assessments like Natura 2000 examines the likelihood of a plan or project having significant effects on the environment. In this context, the project's examination involves the construction works. Targeted amendments to Art. 2(1) of Directive 2011/92/EU and Art. 6(3) of the Directive 92/43/EEC could be introduced to exempt the temporary emissions taking place during construction phase of projects with CCS in their design.

SO5: Increase investment projects in industrial areas

This specific objective defines criteria for identifying industrial decarbonisation projects in areas, to facilitate access to public funding. The objective criteria would be set horizontally and take into account: a) the project's economic security potential for the EU, b) its decarbonisation potential, c) its contribution to the EU's strategic autonomy and d) its deployment potential. The economic security potential for the EU would take into account the project's value added, including in other EU Member States, and its contribution to an entry-level transition plan as well as to strategic value chains. The deployment potential should take into account the label being developed under SO1, for the carbon intensity of the sectors covered, primarily steel, insofar the industrial project can demonstrate the low-carbon production meet the classification set by the label, and could also reflect wider social aspects, such as skills.

The majority of respondents to the **Open Public Consultation**, 197 (63%) out of 314, support the introduction of a category of priority industrial decarbonisation projects, supported by targeted benefits, with the goal of accelerating the EU's industrial decarbonisation efforts. The preferred criteria for identifying priority projects were: contribution to industrial decarbonisation (100 (32%) out of 314 respondents), contribution to strategic value chains (64, 20%), contribution to industrial electrification (9, 16%),) economic importance (43, 14%) and expected increased demand for outputs (28, 9%).

AREA 1 – Recommend Member States to facilitate public funding for projects in industrial areas

This measure would recommend Member States to apply criteria defined IAA for public support measures for decarbonisation projects, without prejudice to State aid guidelines. This means Member States, if they follow the recommendation, would apply the criteria to select priority projects, for example, with regard to national funds supporting decarbonisation. To support consistent implementation and reduce administrative burden, the Commission could provide technical assistance or a dedicated toolkit to help Member States apply the criteria effectively, also covering the carbon intensity criteria of SO1. In addition, peer learning and the exchange of best practices would be encouraged - through mechanisms such as annual forums, workshops, or the creation of a knowledge hub - fostering a shared approach and greater coherence across national funding programmes.

AREA 2 – Member States to designate industrial areas to facilitate access to public funding

Under this second measure, in addition to what is described in AREA 1, the criteria defined under IAA for industrial areas would be used to identify synergies with existing and future public funding opportunities, with the aim of facilitating access to finance for industrial decarbonisation projects in relevant industrial areas. Under this measure, Member States would be required to apply these criteria to identify relevant priority industrial areas under IAA, with the designation verified by the Commission. The Commission will issue guidance on how to apply these criteria. Furthermore, Member States would be required to take these priority projects into account when programming their EU shared-managed funds at national and regional level, ensuring stronger alignment between EU and national funding strategies.

At EU level, the Commission would take into account these criteria and the areas/projects selected under them, for the revision of existing funds and programmes, most notably the Innovation Fund calls and the upcoming Decarbonisation Bank. To the extent possible, a link would be established between the IAA criteria for the designation of the priority projects and the Competitiveness Seal of the European Competitiveness Fund, presented by the Commission as part of the next MFF legislative proposal.

AREA 3 – Commission to designate industrial areas according to the selection criteria and giving the projects priority access to funds

Under this third measure, the Commission would establish a process to use these criteria to designate priority projects according to the selection criteria. These projects would then receive an automatic preferential access (via e.g. a fast-track procedure, or a ring-fenced envelope, or preferred status in scoring) to existing and future EU funds. [*Option discarded early on*]

Annex 10: Extended information on the problem section

This annex further describes and brings additional evidence to the overarching problem that this initiative seeks to address, namely the need for the EU industry, and in particular EIIs, to decarbonise their processes and products while addressing the global competitiveness challenge.

1. An industrial fabric at risk

The different challenges described in Section 2 and below, from high energy price to regulatory burdens, contribute to undermining the EU industrial fabric and affect multiple energy-intensive sectors.

Overall, European industrial slowdown is confirmed by data showing that over 50% of the electricity demand reduction that occurred between 2021 and 2023, at the peak of energy crisis, was due to industrial decline, following several production curtailments and plant closures, in some cases temporary, in others permanent.[604]

The Commission's JRC has tracked the general announcements of EIIs on plant developments. In the steel industry, a clear negative trend is evident with 33% more plant closures and layoffs announced than new plant constructions or reopening, indicating significant challenges. Similar trends can be observed in the recycling industry, as no new plants are being announced but one project has been cancelled. In other EII industries like glass, ceramics and refractory, and pulp & paper the analysis shows a more even split between the announcements. Out of roughly 250 European decarbonisation projects since 2018, about 68% are still at the announcement or concept stage, with no final investment decision yet taken. Only around 28% have reached construction or operation, while 4% have been cancelled or suspended.[605] This is consistent with Figure 28 focusing on aluminium, cement and steel sectors, which show that while Europe hosts a significant share of the global clean industrial project pipeline, only a limited proportion has reached final investment decision.[606]

[604] Eurelectric (2025). Power Barometer.
[605] European Commission, JRC internal analysis based on Europe Media Monitor.
[606] Mission Possible Partnership (MPP), E3G and the Industrial Transition Accelerator (ITA) (2025). Building the EU's Clean Industrial Future: Unlocking Investment through Lead Markets.

Comparison of the European and Global clean project pipeline, and global production capacity by commodity[D].

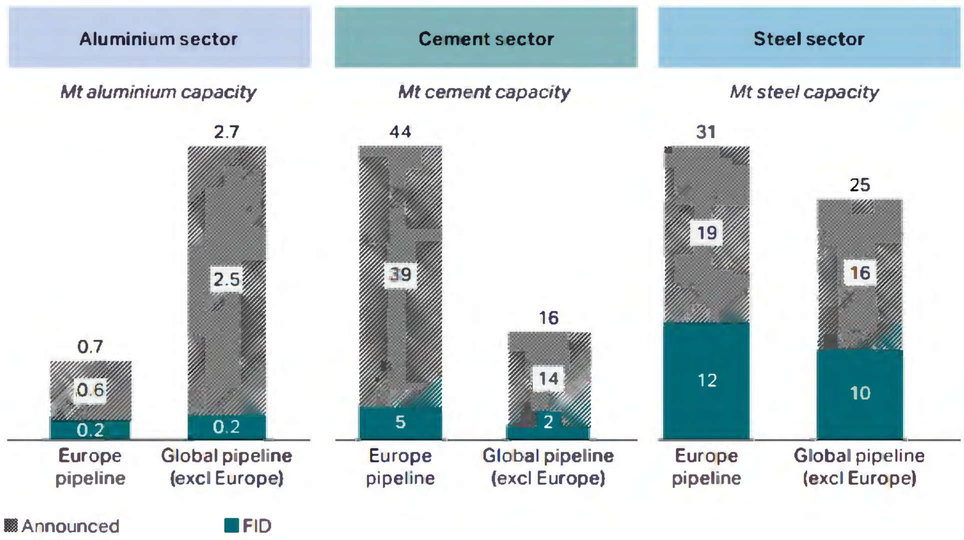

Figure 28:Comparison of the European and global clean project pipeline

Regarding **steel**, Hydrogen-based Direct Reduced Iron – Electric Arc Furnace (DRI–EAF) routes dominate the technological pipeline, accounting for more than 70% of total planned capacity, yet less than a quarter of that capacity is under construction.

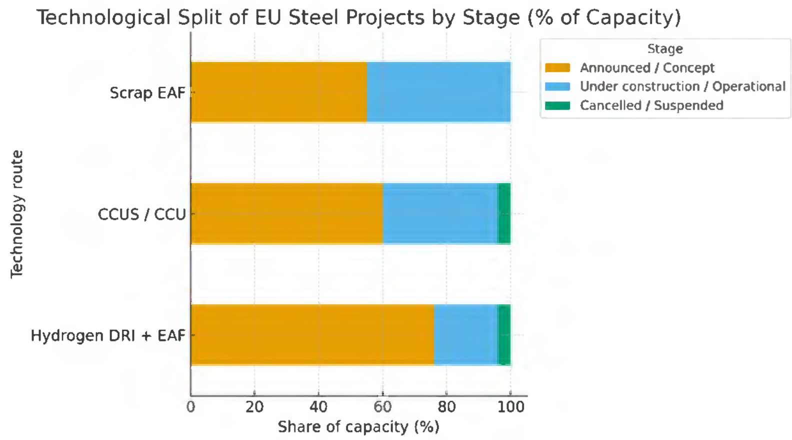

Figure 29: Technological split of EU low-carbon steel projects by stage (% of capacity), Commission elaboration on BNEF data

For instance, ThyssenKrupp announced plans for 11 000 lay-offs in Germany in December 2024. In November 2024, ArcelorMittal postponed its decarbonisation investments across Europe, and in April 2025, it informed unions of the elimination of 630 jobs at its seven sites in northern France, representing just under 10% of the workforce.[607] Additionally, Liberty Ostrava announced bankruptcy in the Czech Republic in June 2024.

The European aluminium sector presents warning signs of a de-industrialisation, having permanently lost a significant part of its production capacity. More than 50% of primary

[607] RTL Today - Steel sector crisis: ArcelorMittal says to cut some 600 jobs in France.

aluminium production capacity has been idled since 2021 and, since 2020, twenty European aluminium, silicon and zinc facilities have been shut down.[608]

Meanwhile, the European chemical industry faces an unprecedented crisis and structural disadvantages compared to its international competitors. These include both cost and no-cost factors. Due to these competitive pressures, production utilisation rates have stagnated at an unprofitable 74-75% range, significantly below the historical averages of 81.5%. This has led to an unprecedented wave of closures with 11 Mtonnes of capacity announced for shutdown over the past two years, ten times higher than the average annual variation of the past decade.[609]

The glass sector is also struggling as it faces declining demand, stalled investment and shrinking European capacity, with several plant closures reported since the start of 2025.[610] For example, O-I Glass announced the closure of a facility in Europe, affecting 170 workers.[611]

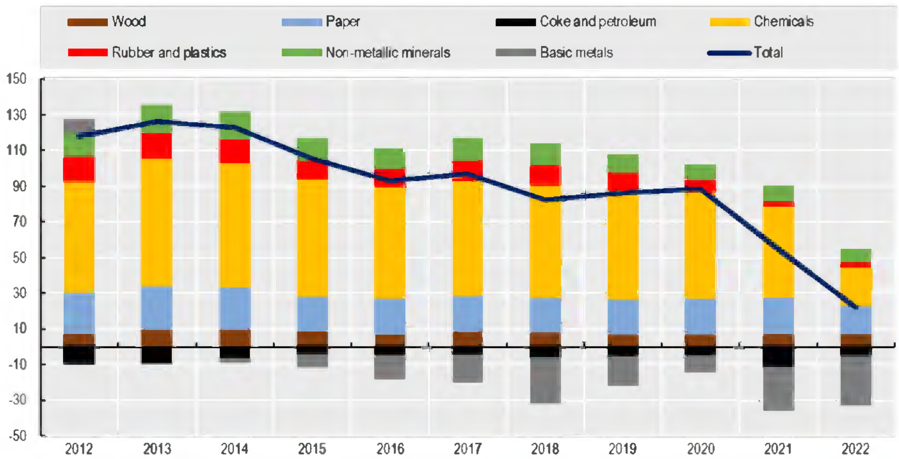

Figure 30: Extra-EU trade balance for energy intensive industries, in constant 2015 billion USD, 2012-2022, A comprehensive overview of the Energy Intensive Industries ecosystem, OECD 2025.

When zooming into the projects marked as cancelled, closed or postponed, ten high-level cases can be identified across the chemicals, refining, lime and fertilisers sectors. These include BP's H□-Fifty electrolyser in Rotterdam (NL), which was put on hold until the Dutch government transposes the Renewable Energy Directive; SGL Carbon's Lavradio carbon-fibre site in Portugal, closed in 2024; and Solvay Chemicals Finland's hydrogen-peroxide project in Voikka, postponed despite Innovation Fund support. Three Carmeuse "Columbus" pilot projects in Belgium were cancelled in 2024, and UPM's biorefinery in Leuna (DE) was postponed from its planned 2024 start-up. Achema's 213 MW green-hydrogen project in Lithuania was postponed and its EUR 122 million Just Transition Fund grant withdrawn, while Raffinerie Heide's 30 MW Westküste 100 electrolyser and Dow Böhlen's 120 kt advanced-recycling plant were both cancelled. Finally, Uniper's Chemelot syngas facility in the Netherlands was cancelled in May 2025.

Competitiveness challenges are also visible further down the value chain. According to a report by CLEPA, at least 600 000 jobs will be lost on the 2.4 million directly employed by the European automotive sector during the next 5-10 years.[612]

2. What are the sub-problems and their drivers?

[608] European Commission (2025). A European Steel and Metals Action Plan, COM(2025) 125 final, 19 March 2025.
[609] Cefic, Advancy (2025). The Competitiveness of the European Chemical Industry.
[610] Glass for Europe (2025). Glass for Europe Board Directors discuss the EU's lack of competitiveness and circularity at first 2025 meeting.
[611] O-I Glass to Close European Facility, Approves Severance Plan - MarketWatch.
[612] CLEPA, Strategy& (2022). Electric Vehicle Impact Assessment Report 2020-2040.

The Section 2 analyses the three different sub-problems related to the EU's limited business case for EU EIIs to decarbonise; each sub-problem and their drivers are further supported by evidence in the sections below.

Sub-problem 1: Limited demand for European low-carbon industrial products at current prices

Driver 1 (market failure): Challenges in distinguishing low-carbon industrial products from high-carbon alternatives

Section 2 addresses the lack of harmonised carbon accounting methodology, with a plurality of ongoing initiatives seeking to define what constitutes a "low-carbon" industrial product by establishing methodologies and performance criteria.

For certain products, such as hydrogen, EU legislation already provides legal definitions for what can be considered renewable or low-carbon, along with associated certification systems. However, for most industrial semi-finished and finished products (i.e. cement and steel), there is no consensus yet on what qualifies as low-carbon, nor is there EU legislation providing a legal definition for it nor how to label it. This lack of agreement reflects a fragmented approach to distinguishing low-carbon industrial products from high-carbon alternatives.

This difficulty in differentiation at the manufacturing level carries over into the consumer market. Low-carbon industrial products are often very similar to their conventional counterparts in terms of chemical composition and material properties. Generally, there is no easy tangible way for customers to distinguish between low-carbon and conventional products. For example, rod steel produced through low-carbon processes typically has the same strength and fracture resistance as steel made using conventional methods. Similarly, many chemicals from low-carbon processes and non-fossil feedstocks—including those derived from recycled waste, biomass, and Carbon Capture Utilisation "CCU" technologies—are identical to those produced through established fossil-based routes. While this may not hold true for all products/materials—for instance, low-carbon cement might be produced without clinker or with clinker substitutes— there is generally no easy visual or tangible way for customers to distinguish between low-carbon and conventional products.

Existing methodologies to assess the carbon footprint embedded in product, in particular the LCA Environmental Footprint methods, are not widely used as a regulatory basis for environmental declarations, but they are increasingly applied by industry. As a result, while these methods are well known and used within companies, t. he reliability and comparability carbon content claims still depend on the consistency and verification of data across all steps of the supply chain.

Driver 2: Limited willingness to pay a premium for low-carbon industrial products

Section 2 addresses the higher costs for producing low-carbon products often faced by EIIs, using the example of steel and cement. For instance, low-carbon cement, costs approximately EUR 30 more per tonne than high-carbon cement, representing an average 20% premium that is often unaffordable for small-scale buyers such as individual homebuilders.[613] In the steel sector, some large customers, particularly in the automotive industry, have demonstrated a willingness to pay green premiums of EUR 300–400 per tonne when traceability and compliance with sustainability criteria can be ensured. However, outside of these early adopters, price sensitivity remains high, limiting demand for cleaner materials.

[613] ERT (2024). Competitiveness of European Energy-Intensive Industries.

This price difference is also evidenced for other sectors such as chemicals, for which the use of decarbonisation technologies is expected to significantly increase operational expenditures (discounted OPEX estimated at EUR 1.86 trillion for the 2019–2050 period).[614] This would result in significant cost differentials between low-carbon and conventional chemical products. For example, chemically recycled PET[615] via solvolysis[616] is estimated at EUR 2 100–2 200 per tonne, compared to approximately EUR 1 500 per tonne for food-grade virgin PET.[617]

This weak market response is further exacerbated by low consumer awareness, the absence of mandatory climate performance standards, and a lack of effective incentives. Currently, there are no binding rules at EU level requiring the use of low-carbon materials in most industrial sectors, nor is there a systematic approach to offset green premiums through public procurement or targeted support.

EU practice

Across the EU, several Member States have introduced national or regional initiatives to stimulate demand for low-carbon industrial products through public procurement and targeted incentives, yet these approaches remain fragmented and call for greater harmonisation.

France provides an additional EUR 1 000 ecological bonus for EVs assembled in Europe and equipped with a European battery, directly linking green incentives to local production.[618] **Germany** has integrated strict carbon-intensity thresholds for steel and cement in major infrastructure projects such as the U5 metro line in Hamburg[619], achieving substantial emission reductions while signalling clear demand for low-carbon materials. Overall, the use of low-carbon steel is a requirement in all tenders, with a maximum carbon intensity of 500 kg CO_2/tonne. For cement, the strategy focuses on using concrete with low-clinker cement, anticipating the further development of low-carbon cement (including CCS). [620] The project plans to use 100% green concrete and 75% green steel and will require approximately 4 million cubic meters of concrete and 600 000 tonnes of steel.[621] It is thereby sending a strong signal to the industry regarding the demand for low-carbon industrial products. Berlin's procurement regulation further mandates environmental criteria for public tenders above EUR 50 000, leading to both emission cuts and significant cost savings. Studies have shown that the State of Berlin has managed to reduce its GHG emissions by 47% and that green public procurement has led to an annual cost reduction of 3.8% (approximately EUR 38 million annually),[622] mostly coming from the use of recycled materials such as concrete or road surface materials.[623]

In the **Netherlands**, green and circular procurement has been applied to large infrastructure projects[624] such as the Cruquius Bridge renewal, using lifecycle assessment tools[625] and environmental cost indicators to drive sustainability and lower long-term maintenance costs.[626]

[614] CEFIC webpage. The Carbon Managers – iC2050 model.
[615] Polyethylene terephthalate "PET".
[616] Chemical process where polymers are broken down into oligomer or monomer building blocks, by means of a solvent.
[617] Internal Commission estimates based on the upcoming JRC study on the "Economic viability of chemical recycling", due for publication by the end of the year.
[618] Increase in the subsidy for the purchase of an electric vehicle that meets European production criteria from 1 October – Press – Ministry of Finance.
[619] Hochbahn webpage. May we introduce? Germany's largest underground railway project!
[620] Strabag webpage. Factsheet: Großprojekt U5 Hamburg.
[621] Ibid.
[622] SEI (2023). Green Public Procurement: a key to decarbonizing construction and road transport in the EU.
[623] Senatsverwaltung für Wirtschaft, Energie und Betriebe, 2017.
[624] The Environmental Cost Indicator is defined through a life cycle assessment (LCA) expressed in euros; it analyses the environmental impact of a supply, work or contract over different life stages and expresses the expected social costs of reversing these environmental impacts. The lower the ECI value, the more durable. Source: PIANO (2024). Purchasing with the Environmental Cost Indicator.
[625] SEI (2023). Green Public Procurement: a key to decarbonizing construction and road transport in the EU.
[626] European Commission webpage. Competitive dialogue for a circular and sustainable bridge.

Spain's Catalonia region[627] and **Italy**[628] have introduced broad green public procurement frameworks, embedding environmental clauses in a growing share of contracts.

While these measures demonstrate growing national efforts to reward low-carbon production, their varying criteria and scope risk creating fragmentation across the Single Market, underlining the need for greater coherence and harmonisation.

Third countries

Several major third country economies have taken targeted action to overcome the limited market willingness to pay a premium for low-carbon industrial products. The **United States** has implemented the Federal Buy Clean Initiative, requiring the use of low-carbon steel, concrete, asphalt, and flat glass in federal procurement, which together represent nearly all materials used in public construction. The initiative has already driven the development of over 17 000 new Environmental Product Declarations and is estimated to reduce emissions in the relevant sectors by up to 10% annually, with even greater reductions expected once private-sector spillovers are included.[629]

Canada has followed a similar path, progressively linking access to public contracts to the use of domestic and low-carbon materials. Its 2025 Interim Reciprocal Procurement and Buy Canadian policies[630] prioritise Canadian-produced steel, aluminium, and softwood lumber in federally funded projects, using public procurement as a driver of clean and resilient industrial capacity.[631]

In **India**, the government strengthened its Domestically Manufactured Iron & Steel Products Policy in 2025 to introduce mandatory local-content requirements in public procurement above a set value threshold[632]. This complements the broader Public Procurement Order and the Production Linked Incentive (PLI) Scheme aimed at encouraging localisation, technology development, and decarbonisation in strategic sectors such as automotive and steel.[633]

In May 2024, **Indonesia** adopted Presidential Regulation No. 46 of 2025 mandating that all government entities and state-owned enterprises prioritise domestic products with at least 25% local content in procurement and infrastructure projects. The measure seeks to strengthen the country's manufacturing base, reduce reliance on imports, and leverage public spending to build industrial resilience, addressing the subproblem of weak alignment of public procurement with strategic autonomy and industrial competitiveness objectives under the driver Public demand and procurement.[634]

Finally, **China's** subsidies, price and technical advantage, and overcapacity in parts of the industry keep Chinese vehicles and components cost-competitive despite shipping costs, localisation advantages, and trade barriers.[635] In September 2025, the Chinese State Council released a notice outlining the implementation of domestic product standards and related

[627] Ibid.
[628] Ibid.
[629] ITA (2024). Green Demand Policy Playbook.
[630] Government of Canada webpage. Interim Policy on Reciprocal Procurement.
[631] Government of Canada webpage. Buy Canadian Policy.
[632] Government of India, Ministry of Steel webpage. Policy for providing preference to domestically manufactured iron and steel products in government procurement (DMI&SP).
[633] Government of India, Ministry of Finance (2018). Department of Expenditures; Government of India, Ministry of Heavy Industries webpage. Product Linked Incentive (PLI) Scheme for Automobile and Auto Components Industry.
[634] Petromindo.com (2025). New regulation requires minimum 25% local input in public projects.
[635] Rhodium Group (2025). China and the Future of Global Supply Chains; Pardi, T. et al. (2025). Made in Europe. Local Content Policy for the European Automotive Industry. Actes du Gerpisa, Volume 44. Gif-sur-Yvette: Gerpisa – The International Network of Automobile.

policies in government procurement. This notice grants a 20% price evaluation preference to domestic products over non-domestic ones.[636]

Taken together, these examples show that major trading partners are actively using public procurement and localisation policies to stimulate demand for low-carbon and domestically produced industrial goods, ensuring that producers are rewarded for cleaner and more resilient production even when consumers or markets are unwilling to pay a premium.

Sub-problem 2: Supply chain vulnerabilities in strategic sectors

Driver 3: European industry loss of competitiveness due to fierce global competition and value chain dependencies

Clean tech products, such as batteries, as well as certain automotive key components (e.g. clean vehicle's powertrain or connected and flexibility automated driving systems), play a crucial role in advancing decarbonisation efforts, significantly mitigating GHG emissions linked to industrial processes[637] by supporting the widespread adoption of EVs, while also enabling the integration of renewable energy sources into the grid, benefitting from low electricity price periods and lowering peak demand at high price periods.

Section 2 analyses the EU battery ecosystem's struggle to ramp up production as it remains largely dependent on critical components from these third countries, which have already vertically integrated their value chains. Although the EU has reached a battery cell installed capacity of around 188 GWh in 2024, several planned projects totalling 238 GWh have already been cancelled or put on hold with no confirmed timeline for resumption.[638] Europe's technological capacities in the battery value chain are not emerging fast enough, increasing the risks of becoming fully dependent on imports, putting at risk the strategic objectives of a net-zero-emission emissions, strategic autonomy in the energy sector and a competitive automotive sector.

EU ambitions to rebuild its domestic PV manufacturing capacity are undermined by the Chinese oversupply and continuously falling prices, exacerbated by higher energy, labour and capital costs, smaller factory scales, and limited supply chain integration in the EU.

Comparing the cost structure, a fully EU-made PV module component production from Polysilicon to is estimated at around 30.8€c/Watt peak. The costs can be reduced by 25% throughout all component manufacturing stages if the production is at scale (i.e. Gigawatt-scale), reaching a level of 25.5€c/Watt peak and showing that producing at Giga-watt scale in Europe is key to reduce the production costs. At the same time, the production costs for fully Chinese PV modules are estimated to be at 15.9 €c/Watt peak. This cost difference is driven by higher expenses in equipment (+40%), building and facilities (+110%), labour (+280%), and materials (+50%). However, the profit margins of the largest Chinese solar manufacturers have sharply declined, as firms aggressively compete on price to defend their market share. The EU's reliance on China for supply of solar components leaves the EU vulnerable to disruption and price shocks. The profit margins of the largest Chinese solar manufacturers have sharply declined, as firms aggressively compete on price to defend their market share. The

[636] State Council General Office, China (2025). Notice of the General Office of the State Council on the Implementation of Domestic Product Standards. https://www.gov.cn/zhengce/content/202509/content_7042999.html
[637] Batteries can play a significant role by allowing a constant and reliable clean power supply. Additionally, it can support the electrification of industrial logistics and transport.
[638] Similarly, for key battery components such as cathode active materials (CAM) and anode active materials (AAM), a total of 513 GWh and 110 GWh of planned capacity have been cancelled, compared to an estimated current installed capacity of just 88 GWh and 6 GWh respectively. Source: European Battery Alliance.

EU's reliance on China for supply of solar components leaves the EU vulnerable to disruption and price shocks.

Overall, when examining the levelized cost of production (LCOP) for some selected energy intensive materials and clean technologies across countries and regions (below Figure 31), China has the lowest production costs for all clean energy technologies and most materials considered. Regional cost differences are generally more pronounced for materials than for clean energy technologies, with the LCOP being among the lowest in China for steel and aluminium. Regional variations in the LCOPs, excluding any explicit financial support, result mainly from differences in operational costs, notably energy and labour, which generally constitute the largest share of the total costs.[639]

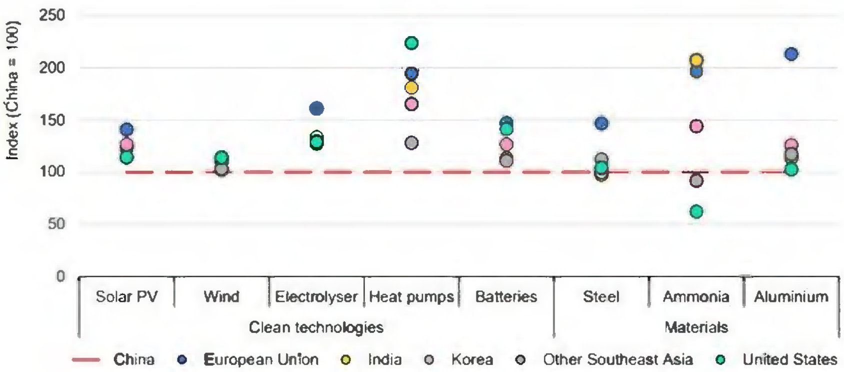

Figure 31: Levelized cost of production for selected clean energy technologies and materials by county/region, 2023 (IEA, Energy Technology Perspectives2024)

Figure 32 on "Demand for EU made PV components stimulated by NZIA and IAA vs manufacturing capacity, 2030" below shows how much demand is likely to be created by the NZIA Access to Markets provisions vs. the proposed IAA provisions in relation to the project pipeline for 2030. The introduction of EU content criteria through IAA would mean that a stronger market signal would be sent which would facilitate the EU project pipeline to realise and project promoters to reach FID. EU should be able to develop sufficient capacity for all components according to the current state of the project pipeline, apart from solar glass. Here however, the introduction of such criteria would send a strong market signal for new projects to develop.

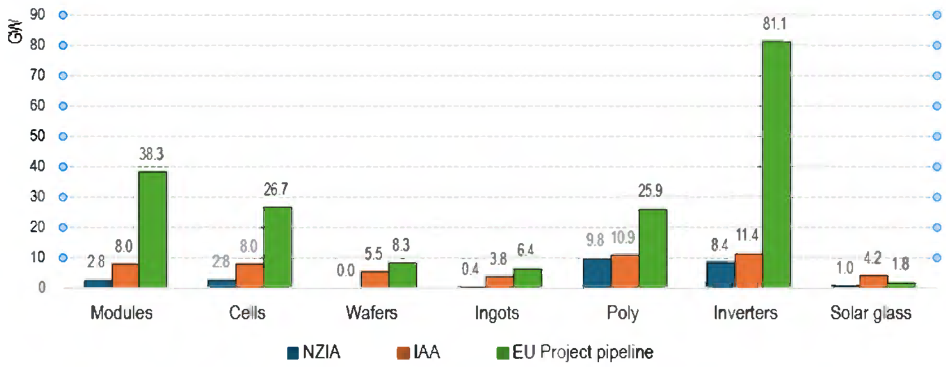

Figure 32: Demand for EU made PV stimulated by NZIA and IAA vs. manufacturing capacity, 2030

[639] IEA (2024). Energy Technology Perspectives 2024, p.75.

The NZIA is expected to contribute to the expansion of manufacturing capacity in Europe, with the aim of reaching at least 40% of the annual deployment needs for net-zero technologies through manufacturing capacity in the Union by 2030. However, there is a risk that for certain steps of the battery and PV value chains, the current NZIA provisions are insufficient to fully address the scale of the challenges described in Section 2.2.1. and meet the strategic objective of building a resilient and competitive domestic value chain. This is because, for certain stages of PV and battery manufacturing, the NZIA resilience criterion, which emphasizes diversification, may not lead to a significant increase in domestic production. Instead, it is expected that imports from Asian countries such as Vietnam, Malaysia, Thailand and Cambodia – whose PV projects pipeline is largely owned and controlled by Chinese manufacturers and whose price competitiveness is second only to China. - will rise to offset the reduction in solar PV imports to the EU from mainland China.[640] While Vietnam, Thailand, and Malaysia together account for close to 8% of global manufacturing capacity, most of these facilities are Chinese-owned and were developed to serve the US market in response to its restrictions on imports from China. This indicates that apparent diversification in production locations does little to reduce strategic dependence on China and thus, dependence on Chinese manufacturers is likely to persist.

Regarding batteries, Asian manufacturers are already shifting their strategies to capture overseas markets, where profit margins are higher. By 2030, China is projected to maintain a dominant position across the entire battery value chain, accounting for 75% of global installed battery cell capacity. Additionally, Chinese companies are actively diversifying their midstream battery production by expanding into low-risk, cost-competitive countries such as Morocco, South Korea, and Indonesia. These three countries are projected to surpass the EU in production capacity. Additionally, due to the nature of batteries as components integrated into downstream final goods, primarily EVs and BESS, they often fall outside the scope or are only marginally impacted by certain resilience measures under the NZIA, such as in auctions or public procurement.

Furthermore, the NZIA framework does not cover the entire spectrum of vehicle components that can contribute to the decarbonisation of road transport not only in terms of reduced vehicle's emissions, but also in terms of optimised traffic flows.[641] Besides, the NZIA does not sufficiently address the economic pressure faced by domestic automotive component suppliers and the economic security issues attached to it.

Driver 4: A fragmented EU approach towards foreign investments

The existing toolbox on inbound foreign investments includes instruments concerning security aspects FDI (e.g. FDI Screening Regulation) and other instruments that target specific risks (e.g. the Foreign Subsidies Regulation to combat foreign subsidies that distort the EU internal market, and the Merger Control Regulation ensuring effective competition for concentrations), as well as other policy instruments that may be used to affect foreign investments (e.g. EU Funding instruments and the State Aid framework).

However, the FDI Screening Regulation (EU) 2019/452 does not address the impact of foreign investment on the Single Market or allow the EU to impose conditions that maximise economic and strategic value—such as commitments to local R&I, technology transfer, or skills development. Over 60% of foreign-led industrial decarbonisation projects in the EU lack such commitments. Despite the EU's attractiveness for FDI, it lacks tools to ensure that investments

[640] IEA (2024). Energy Technology Perspectives 2024.
[641] NZIA does not cover, for instance, brakes with drag reduction technologies, or thermal management systems), nor either essential connected and automated driving (CAD) systems.

support industrial, technological, and environmental goals, particularly given the growing role of state-controlled investors.

By 2024, 24 Member States had national screening mechanisms (up from 14 in 2021), yet screening practices remain uneven, with only 9% of cases subject to conditions and 1% blocked. This leaves vulnerabilities across the Single Market. The gap is most acute in strategic sectors such as batteries and EIIs, where the EU risks losing technological and intellectual property control and becoming a "low-value assembly location" in clean tech value chains.

The FDI inflow to Europe, compared to the total global FDI inflow, has seen a decrease in the past decade from 23% of all global FDI in 2011 ($408 billion) to only 10% ($168 billion) in 2021.The year 2022 even witnessed negative FDI inflow to Europe, which means that foreign investors divested more FDI from Europe than they invested in Europe during this period. When comparing FDI inflows in 2022 against 2017, it becomes apparent that Europe is the only region with major decreases in FDI inflow (-31pp), while China (+4pp) and the US (+10pp) were able to increase FDI inflow.[642]

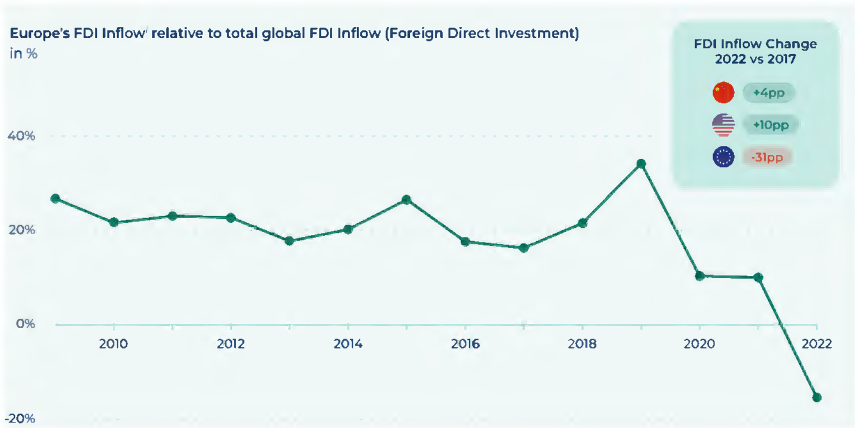

Figure 33: Overview Europe's FDI inflow from 2017-2022, ERT Competitiveness of European Energy-Intensive Industries (2024)

While foreign investment is entering the Single Market, the conditions attached to these investments differ significantly among Member States. The absence of a harmonised approach and standardised conditions allows large investments to "forum-shop" and exploit the specific circumstances of individual Member States, ultimately undermining the interests of the Single Market. This results in a "race to the bottom," where public funds are used to attract investors without ensuring adequate returns in the form of local economic development, skills, or innovation. Other limitations arise under the Foreign Subsidy Regulation, as the Commission can only set conditions to the investment to remedy the actual or potential distortion in the internal market stemming from a foreign subsidy and ensure a level playing field. Other purposes and policy objectives can only be taken into account in the balancing test, as the Commission can assess whether the negative distortive effects of the foreign subsidy are outweighed by positive effects in relation to policy objective of the Union. Section 2 explained that a large part of the leverage resulting from the EU's attractiveness as an investment destination cannot be effectively exercised by individual Member States acting on their own.

As evidence to this challenge, Table 2523[643] can be seen as an illustration of the more benefits secured to investment in the US vs. the EU battery value chains.

[642] ERT (2024). Competitiveness of European Energy-Intensive Industries.
[643] T&E (2025). Assembly plant or battery powerhouse? Analysis of foreign battery investments in EU.

Table 2523: T&E Briefing (February 2025) – Assembly plant or battery powerhouse? Analysis of foreign battery investments in EU.

	VW + Gotion Partnership	**Gotion + Inobat JV**	**Stellantis + CATL JV**	**Tesla + CATL (US)**
Ownership structure	VW holds 26.47% in Gotion	Gotion: 80% Inobat: 20%	Stellantis: 50% CATL: 50%	100% owned by Tesla (including equipment)
IP or technology transfer provisions	"Limited"	Some	✕	✓
Local supply chain	✕	✕	✕	✕
Local workforce	Local R&I centre	Some, including local schools	No known provisions	✓
Equal decision-making on battery side	✕	✕	✕	✓

Sub-problem 3: Industrial decarbonisation technologies are not deployed at scale

Decarbonisation requires large upfront capital costs (CAPEX) due to the need for new equipment, new or upgraded technologies, including electrification and flexible demand, hybrid technologies and process changes. The operational costs (OPEX) of producing with greener technologies for early adopters are uncertain when technologies are not mature and are higher than those of traditional technologies[644], as long as electricity and low-carbon fuel prices remain high in Europe and higher in comparison with fossil fuels prices.

For instance, estimates suggest that green steel production would be approximately 17% more expensive in Europe compared to the US and Saudi Arabia in 2030.[645] The competitive disadvantage that certain EIIs, like steel, suffer from would therefore remain even after decarbonising.

Furthermore, these technologies have very long payback times and are often unavailable at large scale[646]. The unfavourable price ratio between electricity and fossil fuels and the uncertainty about future evolution of the price ratio, risk delaying investments in electrification and energy efficiency technologies including for industrial processes. See more in Annex 7

Driver 5: Lengthy, fragmented and uncertain permitting procedures for decarbonisation projects

Section 2 assesses the issues revolving around the permit-granting process for industrial manufacturing activities.

The evidence on permitting brought forward by the public consultation can be completed by a survey by BusinessEurope, which found that 83% of companies claimed that the complexity and duration of permitting is an obstacle to investing in Europe, and 53% consider it as a "serious problem". Companies have reported waiting periods of over a year for permit

[644] 'First-mover disadvantage', which generally refers to higher costs and uncertainties for early adopters, due e.g. to technology and performance risks, higher technology costs, smaller production scale, less developed infrastructure (electricity supply, hydrogen, CCS), evolving methodologies (including definitions of low-carbon production and low-carbon products), and unrewarded knowledge externalities (learning) that benefit later adopters. Source: Draghi, M. (2024). The future of European competitiveness: In‑depth analysis and recommendations (Part B), p. 99.
[645] ERT (2024). Competitiveness of European Energy-Intensive Industries.
[646] For additional background on decarbonisation technologies, see Annex 7.

approvals, with some delays extending up to six years, for more complex projects like carbon capture and storage (CCS).[647]

Permitting procedures for new or modernised manufacturing facilities were highlighted as time-consuming, costly and requiring the interaction with numerous public administrations[648]

More concretely, permitting is one of the challenges for projects deploying innovative solutions, and on occasion identified as a risk of not meeting financial closure within the four-year deadline. Often, the permitting process is highlighted as very demanding and time-consuming. It is an issue for many projects in the Fund portfolio, with 68% identifying it among the top challenges and more than 10% of the projects identifying it as their primary challenge. About half of the projects report a concrete risk of being delayed because of difficulties obtaining the required permits or challenging permitting procedures.[649]

Addressing these procedural inefficiencies will be essential to meet Europe's climate and industrial goals.

Best practices
• *EasyPermits is a web-based digital permitting solution built on AWS cloud. It digitalizes the administrative permitting process end-to-end and functions as a digital one-stop-shop by automating workflows, improving and standardizing the collection and management of information and fosters collaboration and transparency across the permitting agents, the project developers and the local community. At its core, it is a workflow management solution as it can be customised to match the regulatory requirements of the permitting process. It is also a document management solution with the possibility to define templates for specific documents and the possibility to have version control making it easier to navigate through various versions of specific documents. Estimates include a 50% reduction in manual effort in repeated low-value tasks such as finding the latest version of the document without having to go through emails and paper-based folders, keeping all documents for one application organised in one place, sharing review comments on specific parts of specific documents. Ability to process as many as 3x as many applications concurrently.* • *In the context of the Single Market Enforcement Taskforce (SMET), Member States reported on the progress of introducing five permitting solutions (One stop shops, clear deadlines and information, tacit approvals and digital permitting) to improve permitting for renewable energy power generation (wind, solar). The report confirmed that the permit-granting process had become more efficient in most EU countries, to various extents depending on the Member State. Similar positive consequences are shown through the implementation of the Critical Raw Materials Act permitting provisions (Single Points of Contact, timelines). Similarly, a good example of digitalised and unified permitting comes from the Environment and Planning Portal in the Netherlands, where promoters can see if and what environment and planning permits are required. Additionally, the Environment and Planning Portal can be used to apply online for an environment and planning permit or submit a notification. All these elements will be better highlighted to more clearly justify the choice of the preferred policy measures in the impact assessment.*

[647] Business Europe (2024). Licence to transform – SWOT analysis of industrial permitting in Europe.
[648] European Commission (2025). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions - The 2025 Annual Single Market and Competitiveness Report. SWD(2025) 11 final and SWD(2025) 12 final.
[649] European Commission (2025). 2025 Annual Knowledge Sharing Report of the Innovation Fund – Derisking Innovative Low-Carbon Technologies.

Driver 6: Difficulty to access resources (e.g. inputs and funding)

Clean industrial technologies face substantial economic barriers to deployment, primarily due to long payback periods driven by high capital expenditure (CAPEX) and elevated operating costs (OPEX). These cost burdens are compounded by market uncertainties making large-scale industrial decarbonisation investments high-risk.

The scale of investment required is significant. Decarbonising Europe's energy-intensive industries (EIIs) will require approximately EUR 1.7 trillion by 2050. In the cement sector alone, achieving net-zero targets calls for EUR 94.4 billion in investment, which equates to EUR 4.70 for every EUR 1 in annual revenue. More broadly, the decarbonisation of the EU's four largest EIIs (chemicals, basic metals, non-metallic minerals, and pulp & paper) is estimated to cost EUR 500 billion over the next 15 years.[650]

Despite this urgent need, the financial environment in Europe remains less favourable than in competing regions.

Section 2 demonstrates the limited amount of public funding available to decarbonisation under directly managed EU funds notably, expect for the Innovation Fund. Beyond the direct decarbonisation prioritisation of the latter, funding for decarbonisation is also available in the RRF, InvestEU and cohesion policy funds. Under the Recovery and Resilience Facility (RRF), EUR 97 billion are targeted to the decarbonisation of industry and clean tech (incl. EUR 23 billion for R&I initiatives) and more than EUR 2 billion for developing green skills and jobs for the clean economy. The Just Transition Fund (JTF) focuses EUR 19 billion of investment specifically for the transformation of the regions with coal and carbon intensive industry most affected by the green transition. Nevertheless, the funding from these sources is linked to different criteria and eligibility requirements.

Additionally, EU support for clean technologies is often fragmented and limited in scope, particularly lacking in OPEX assistance, which is crucial for addressing ongoing cost differentials between green and conventional technologies. In comparison, the U.S. Inflation Reduction Act (IRA) has already catalysed $129 billion in private clean tech investments since 2023, offering significantly more generous and streamlined support. EU clean tech financing is estimated to be five to ten times smaller than the U.S. effort. Global competition further intensifies these challenges. Chinese clean tech manufacturers benefit from state subsidies up to four times greater than those available in the EU, enabling them to offer battery cells 20–35% cheaper and solar panels 35–65% cheaper than their European counterparts...Some Member States have begun piloting Carbon Contracts for Difference (CCfDs), which provide 15-year subsidies to cover the cost gap for green technologies achieving at least 90% GHG reduction. However, these initiatives remain limited in scale and administratively complex, slowing their rollout.[651]

Results from the **Open Public Consultation** conducted a part of this initiative show that only a few public funds are considered relevant in supporting industrial decarbonisation projects, particularly the Innovation Fund (226, 72%) and Member States funding (238, 76%), with only a minority considering other funding instruments such as Horizon Europe, InvestEU, RRF or Cohesion Funds relevant.

Furthermore, access to funding remains a key concern, with 78% (245 out of 314) citing lack of public funding and 62% (196) pointing to difficulty accessing transition

[650] ERT (2024). Competitiveness of European Energy-Intensive Industries.
[651] Deloitte (2024). Carbon Contracts for Difference (CCfDs) as an instrument of choice.

finance. Additionally, 77% (243) identified financial risk as a significant factor when considering investment in industrial decarbonisation.

Annex 11: Extended information on the impacts (Section 6)

POLICY OPTION 1

Economic impacts

See Section 6 of the Impact Assessment: In addition:

Impact on companies

LEAD_EII 1 - Given the significant number of vehicle registrations supported by public support schemes, introducing low-carbon steel and aluminium requirements as an eligibility condition would likely create a significant market signal - providing a strong incentive to vehicle manufacturers to source these materials at scale.

Figure 34 shows estimates of how much the adoption of 100% green steel affects end-product pricing across various industries. [652] The targets proposed for low-carbon steel in automotive and construction have followed an adjustment for a lower share of low- carbon steel. For more information on the calculations for the cost calculation based on the target, see Annex 4 Section 2.

Source: Transforming the steel industry may be the ultimate climate change (BCG, 2022)

Figure 34: Product cost increase after switching to 100% green steel.

Respondents from the **targeted stakeholder consultation** have provided estimates of the impacts of low-carbon requirements on cost of products: (i) less than a 1% increase in the price of an average car, while enabling CO□ savings of up to 1.5 tonnes per vehicle; (ii) cost increases of 0.1–0.2% for buildings, 0.6–1.2% for industrial sites, and 1.6–5.5% for steel-intensive sectors such as household appliances and offshore wind infrastructure; (ii) in the defence sector, the reported cost impact for military vehicles ranged from 0.15% to 0.5%.

LEAD_BAT 1 - Based on the **Public Consultation**, all 4 respondents from the batteries and storage sector strongly support measures to stimulate demand for clean industrial products and consider public procurement a significant driver for low-carbon products.

Similarly, all 4 respondents agree that the introduction of an EU voluntary label on carbon intensity will support the creation of lead markets for sustainable industrial products. RECHARGE, the Advanced rechargeable & Lithium Batteries Association - in its submitted position paper - also supports the introduction of Made in EU requirements as a "a powerful

[652] JRC (2024). Draft preparatory study on iron and steel – ecodesign measures under the ESPR.

industrial policy instrument" that can "incentivise production, sourcing, and value creation of key technologies within the EU (...) while reducing dependence on imported battery components and raw materials, helping mitigate supply chain vulnerabilities". Furthermore, the respondents to the consultation are in favour of public procurement as a driver for lead markets, with RECHARGE supporting "non-price award criteria in public tenders, such as sustainability, resilience, and supply chain security".

LEAD_SOL 1 would boost EU local production, strengthen energy security, and decrease reliance on imports, especially from China. Consequently, it would help preserve existing EU production capacity and strengthen the business case for new manufacturing projects. Chinese players are also considering establishing themselves in Europe under the condition that there is a favourable policy framework in place to support EU manufacturing and ensure offtake for EU made products, for example through Made in EU requirements. This could further support bringing advanced capabilities and scaled production systems to Europe. Moreover, it would send a strong investment signal, helping to secure financing and accelerate additional capacity development. Made in EU requirements can stimulate the growth of domestic PV manufacturing by linking market deployment incentives to domestic production. E.g. in Türkiye, a local content premium introduced in 2013 and subsequent tenders for full value-chain capacity led to a rapid expansion of domestic manufacturing, reaching over 9 GW by 2023. Similarly, South Africa uses local content requirements (LCRs) in government procurement to promote domestic production of PV components, helping to structure an emerging local PV industry and integrate it into regional and global value chains. In both cases, LCRs serve as a strategic tool to scale up manufacturing capacity while fostering industrial development.[653]

INV 1 - As regards indirect costs of deterring certain FDI transactions by applying restrictive criteria for investments, the Commission Evaluation on FDI Screening Regulation[654] considered these to be negligible, despite the theoretical possibility of conditions deterring certain investments. Accordingly, it can be assumed that the indirect impacts for voluntary conditions established under PO1 would also be negligible.

Conditionalities which might restrict supply or demand under value added production or securing critical value chains, could entail raising the price of certain products.

LEAD_VC 1 (In the case of LEAD_VC, the section on companies refer to the vehicle suppliers)

EU suppliers in the "Internal market reaction" scenario[655]		
in EUR billion	**2027**	**2030**
Passenger cars		
sales increase	5.9	6.0
LCVs		
sales increase	0.5	0.8
HDVs		
sales increase	0.192	0.131

[653] PV Magazine (2024). PV Manufacturing in Europe: Ensuring Resilience through Industrial Policy.
[654] COMMISSION STAFF WORKING DOCUMENT EVALUATION of Regulation (EU) 2019/452 of the European Parliament and of the Council of 19 March 2019 establishing a framework for the screening of foreign direct investments into the Union Accompanying the document Proposal for a Regulation of the European Parliament and of the Council on the screening of foreign investments in the Union and repealing Regulation (EU) 2019/452 of the European Parliament and of the Council - Publications Office of the EU.
[655] The JRC analysis presented an alternative scenario. For comparative analysis, see: Annex 14

As a result of the measure, the introduction of Made in EU requirement for vehicle components of EVs sold in the EU will lead to higher sales of EU components suppliers in all vehicle segments.

In quantitative terms, this means that:

- For passenger cars: the sales of EU suppliers to EV manufacturers are expected to rise by EUR 5.9 billion in 2027 and by EUR 6 billion in 2030. This sales increase for EU suppliers come from the sales increase of EU made vehicles and the increase of EU content in those vehicles.
- For the *LCV segment*: the measure would lead to an increase in the sales of EU suppliers to EV car manufacturers would be expected to rise by EUR 0.5 billion in 2027 and by EUR 0.8 billion in 2030.
- For *HDV*s: the sales of EU suppliers to EV HDV vehicle manufacturers are expected to rise by EUR 192.4 million in 2027 and by EUR 131.1 million in 2030.

PERM 1 – Periodical technical assistance from the Commission to national authorities is expected to support the permit-granting process for first of a kind and innovative projects, with training on emerging decarbonisation technologies helping to clarify procedures and reduce uncertainty in permitting. In this context, the Innovation Centre on Industrial Transformation and Emissions (INCITE) will identify and evaluate innovative techniques, giving scientific and independent information.[656]

Moreover, support for further measures to improve the permitting process was high in the **Targeted Consultation**, with 67% (42) advocating for the digitalisation of the permitting process.

AREA 1 - Regarding the definition of criteria for projects in relevant areas, the measures would recommend Member States to make use of the criteria defined in the IAA to decide which decarbonisation projects to support under their national support programmes. In the **Open Public Consultation**, 76% of respondents regarded Member States funds as relevant for industrial decarbonisation projects, making it the most relevant category of public funding.

As it is only a recommendation to Member States, it can be assumed that they use the priority criteria lightly. Where they apply them, it is likely to lead to an increase in support for projects with strategic importance for the entire EU (which are sometimes underrepresented in current support schemes by Member States). However, due to the non-binding nature, the effect on companies is likely to be limited and potentially fragmented across the Single Market.

Impact on downstream sectors

LEAD_EII 1- The automotive sector is expected to play a significant role in driving demand for low-carbon steel. However, public procurement is not a huge market for the automotive sector, compared to buildings and infrastructure. Of the approximately 15 million passenger cars registered in the EU in 2018, only 0.5% to 3.5% were procured for public sector fleets.[657] Therefore, measures targeting the public sector alone are likely to have limited impact on driving low-carbon demand for steel. The situation is different regarding public incentives and support schemes in the Member States. Corporate vehicles registrations make up around 60%

[656] The revised Industrial Emissions Directive contributes to de-risk investments as it sets up a new Innovation Centre on Industrial Transformation and Emissions (INCITE). The most effective and viable innovative techniques could be incorporated in the Sevilla process for the development of environmental norms.
[657] European Commission (2022). Revision of the EU green public procurement criteria for road transport.

of car registrations in the EU.[658] Regarding EVs, there is public support to buy EVs for corporate purchases in all Member States and for consumers in 19 Member States.[659] Regarding internal combustion engine vehicles, a recent study estimated that subsidies for corporate vehicles alone amounted to EUR 42 billion in 2023.[660] Introducing low-carbon steel requirements in a non-discriminatory State-aid compliant manner as an eligibility condition would send a strong market signal, incentivising vehicle manufacturers to source these materials at scale. There is, however, a risk of material substitution, where procurement requirements or support schemes could shift demand from one material to another. In the automotive sector, low-carbon requirements applied to steel may indirectly increase demand for aluminium, and vice versa. While low-carbon requirements for aluminium are not being considered as part of this assessment, due to the lack of an existing low-carbon definition, they could be defined at a later stage, or as part of other ongoing policy initiatives.

LEAD_VC 1 (in the case of LEAD_VC, downstream sector refers to automotive manufacturers)

EU EV manufacturers in the "Internal market reaction" scenario		
in EUR billion	**2027**	**2030**
Passenger cars		
cost increase	0.0	1.6
sales increase	12.3	7.7
LCVs		
cost increase	0.0	0.2
sales increase	1.2	1.3
HDVs		
cost increase	0.0	0.13
sales increase	0.41	-0.0002

Given the current 70% made in EU content, the measure would not lead to any further costs for EU EV manufacturers in 2027 in either of the vehicle segments, while it would lead to an overall increase in sales for these companies.

In quantitative terms, this means that:

- For passenger cars: as an effect of the measure, EU EV manufacturers will benefit from an increase in sales of EUR 12.3 billion in 2027. To comply with the 75% target proposed for 2030, EU EV manufacturers are expected face a relative cost increase of EUR 1.6 billion, however this would be offset by the EUR 7.7 billion increase in sales.
- For LCVs: EU manufacturers of EV light commercial vehicles would benefit from an increase in sales of EUR 1.2 billion in 2027. In 2030, EU manufacturers would face a relative cost increase of EUR 0.2 billion, however this is expected to be offset by the EUR 1.3 billion increase in sales.
- For HDVs: EU EV HDV manufacturers would benefit from an increase in sales of EUR 414.9 million in 2027. However, in 2030, EU EV HDV manufacturers are projected to face a cost increase of EUR 131.4 million. This cost increase may be accompanied by a minor sales reduction (-0.2 million euro). The relative price advantage of EU EV

[658] European Commission (2025). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of Regions, Decarbonise Corporate Fleets, COM(2025)96 final, 5 March 2025.
[659] ACEA (2025). Electric cars: Tax benefits and incentives (2025).
[660] ERM (for T&E) (2024). Company car fossil fuel subsidies in Europe.

HDVs (as opposed to non-EU EV HDVs) determined by the measure in the initial years after its introduction, leads to increased sales in the period between 2027 and 2029, and these increased sales are larger than (and could potentially offset) the assumed increased cost.[661]

Global Added Value:

Value Added in EUR billion		
Internal market reaction scenario	**2027**	**2030**
automotive	3.0	1.9
intermediate	2.5	2.6
Global value added - Only first round of Value Chain	5.5	4.5
Global value added - Estimated all Value Chain	10.5	9.7

Furthermore, the measure is projected to lead to the generation of EUR 5.5 billion Global Value Added in 2027 and EUR 4.5 billion in 2030 when assessing the impact, taking into account only the first tier of the value chain.[662] When considering the entire value chain, the value added generated notably from the necessary intermediate inputs for EVs can reach EUR 10.5 billion in 2027 and EUR 9.7 billion in 2030.

Impact on consumers and citizens

INV 1 would have limited effects on citizens and consumers as it would target investments above a certain threshold. Nevertheless, condition (b) could affect citizens by securing investments with a value-added production, including R&I, engineering activities, domestic processing and manufacturing. This, together with potential staffing requirements prescribed under the same condition, could lead to the creation of quality jobs in the EU. Despite PO1's potential to harmonise staffing requirements on the single market, its voluntary nature poses implementation challenges and may lead to further fragmentation and a race to the bottom in staffing conditions across Member States concerning FDI.

LEAD_VC 1

EU consumers in the "Internal market reaction" scenario		
	2027	**2030**
Passenger cars		
EVs price changes (%)	0.4%	1.2%
EVs sold change (thousand)	-71.0	-76.3
LCVs		
EVs price changes (%)	-0.7%	0.4%
EVs sold change (thousand)	14.3	2.1
HDVs		
EVs price changes (%)	0.5%	1.2%
EVs sold change (thousand)	1.0	-1.7

[661] It is important to note that for the calculation, it is assumed that the allocated subsidy is kept constant over time, but as projected sales keep increasing, over time, the subsidy may become insufficient to compensate for the cost increase.
[662] Global Value Added (GVA) refers to the total economic value generated by the projected production of EU EV manufacturers and the EU suppliers, as well as further intermediate inputs necessary to increase the Made in EU requirement of the measure and increase production of EU EVs

As EV passenger cars produced by EU manufacturers will benefit from a relative price advantage following the reduction of price stemming from the reallocated subsidies, this will lead consumers to prefer EV passenger cars produced by EU manufacturers (which increase their sales) over non-EU EV passenger cars (which reduces their sales).

In quantitative terms, this means:

- For passenger cars: As average prices[663] of EVs passenger cars are going to increase by 0.4% in 2027 and by 1.2% in 2030, this is expected to lead to a reduction in EV passenger cars purchases by 71 000 vehicles in 2027, and 76 300 vehicles in 2030 if no mitigation measures put in place. The described phenomenon will have two different effects:
- As EV passenger cars become more expensive for non-EU manufacturers, and ICE vehicles, being not affected by the measure, could benefit from a relative price advantage (prior application of the bonus schemes or subsidies) over EVs, and this could result in partial product substitution of EVs with ICEs.[664]
- For LCVs, the impact is similar: prices of EVs light commercial vehicles are going to decrease by 0.7% in 2027 and then slightly increase by 0.4% in 2030, and this is expected to lead to an increase in EV light commercial vehicles purchases by 14 300 vehicles in 2027, and 2 100 vehicles in 2030.
- For HDVs: Prices of electric HDVs are going to slightly increase by 0.5% in 2027 and then increase by 1.2% in 2030. These prices variations are going to have a minor effect on EV HDV purchases in 2027, when sales will still slightly increase by 1 000 units, and lead to a decrease in purchases of EV HDVs by 1 700 units in 2030.

The impact crucially depends on the bonus schemes and the assumption that only half of the total subsidies received by non-EU EV makers will be reallocated. Hence, a counterfactual analysis has been performed:

If all subsidies were reallocated from non-EU to EU EV manufacturers, the average price of EVs for consumers would decrease:

- For passenger cars: by 0.8% in 2027, and the increase in 2030 would be more muted at 0.4%.
- For LCVs: by 2.4% in 2027 and 0.8% by 2030, with a corresponding larger increase in the number of EV LCVs sold.
- For HDVs: by 0.3% in 2027 and only increase by 0.8% by 2030, with a corresponding larger increase of EV HDVs sold in 2027 and a smaller reduction of sales in 2030.

Impact on competitiveness

LEAD_EII 1 - While low-carbon requirements in public procurement and support programmes may help lower the green premium overtime - thereby improving the business case for industrial decarbonisation investments - for certain products where imports penetration is already high, this demand is likely to be partially met by non-EU producers whom, by having large overcapacities, will be able to redirect their low-carbon production to the EU market, limiting the benefits for EU industry.

[663] As a result of the reallocation of subsidies, EU manufacturers reduce the price of their vehicles, but they do not compensate for the high price increase that the non-EU manufacturers would face as a result – further incentivising compliance to this measure.

[664] This effect could disappear if ICE vehicles were also made subject to the EU content requirement under LEAD_VC 1

Impact on competition

LEAD_EII 1 - Regarding the creation of lead markets, low-carbon requirements would apply uniformly to all participants in public procurement procedures and beneficiaries of public support schemes, ensuring that manufacturers of energy-intensive materials and downstream producers who bid in public procurement and will have to comply with the target compete on equal terms. In some sectors, however, there might be competition between companies that are subject to public procurement rules and companies that are not. An example are offshore wind auctions, where publicly owned utilities subject to Directive 2014/25/EU compete with private developers and investors. In such cases, measure LEAD_EII 1 that targets public procurement, but not private procurement, would distort competition between those types of bidders.

LEAD_SOL 1 - As regards solar PV, applying Made in EU requirements in public tenders would provide a strategic incentive for investment in EU-based solar manufacturing while offering greater supply chain security and alignment with broader industrial policy objectives. Without such measures, the lack of willingness among consumers and offtakers to pay a premium for EU-made panels will continue to hinder market uptake, leaving the EU exposed to strategic vulnerabilities from over-reliance on a single supplier country.

A fully EU-made module amounts to manufacturing costs at around 25.5 ct/Wp, whilst a minimum sustainable PV module price for modules from China is estimated at 15.9 ct/Wp and from Southeast Asia at 16.5 ct/Wp[665]. However, PV modules from China and SE Asia are currently sold at half the minimum sustainable price, at 8-10 €ct/Wp, below manufacturing costs. China is able to maintain a cost advantage due to lower labour, land, and energy costs, state subsidies, and rapid efficiency gains.[666] Nevertheless, a 30-40% reduction in EU module costs by 2030 is considered achievable under favourable conditions, potentially bringing prices down to 15–19 ct/Wp, depending on the number of components manufactured in Europe. With the right support and enabling conditions, much of the cost gap with China could be closed. Key drivers include gigawatt-scale production, vertical integration, automation, access to low-cost energy, and strong policy backing through instruments such as the NZIA, Innovation Fund, CCfDs, and resilience auctions. If realised, these measures could make EU solar manufacturing cost-competitive by 2030, strengthening the sector's resilience and strategic autonomy.

However, since LCOE calculations exclude taxes, grid tariffs, and retail mark-ups, the final cost increase for the consumer would likely be much smaller, estimated at around 1–2%.

Impact on Member States

Financial implications

LEAD_EII 1 - In financial terms, Member States spent an estimated 13.4 billion EUR on steel and cement for public construction projects in 2019.[667] This represented about 3% of the total investment in construction procurement for that year. In the broader context of public spending, the cost of steel and cement accounted for less than 1% of total public procurement expenditures across the EU in 2019 - indicating that, on average, the cost of basic materials remains relatively limited in public budgets. Steel accounts for only about 1.8% of total construction procurement spending, indicating a modest cost share. As for cement, Member

[665] SolarPower Europe (2025). New study reveals path to reshore solar manufacturing in Europe.
[666]Fraunhofer ISI (2025). Photovoltaics Report; SolarPower webpage. Rebuilding European solar manufacturing; ESMC (2020). ESMC Policy Proposals for the EU Strategy for Solar Energy.
[667] VUB Brussels School of Governance (2024). Public procurement of steel and cement for construction, assessing the potential of lead markets for green steel and cement in the EU.

States spent around EUR 5 billion on procurement of cement as part of the overall public procurement of construction in 2019. This represents only 1.1% of total construction cost.[668]

LEAD_VC 1 – The effects of the policy on total sales and consumer welfare depend on the level of market competition on both the supplier and final producer sides. Regarding the EU suppliers for EV car manufacturers, if their market is highly competitive, companies will likely reduce their prices to capitalise on the increased demand and sales. However, the policy could reduce foreign competition for EU suppliers of EVs, as the made in EU- content requirements for EVs come into effect.

Under LEAD_VC 1, as observed above, public support schemes currently used in the automotive industry will mitigate the adverse effects of LEAD_VC. (See assumptions in Annex 4 Section 2) To reach this positive objective, as laid down in the assumptions, it is important that Member States re-distribute (at least, partially) the public subsidies that are no longer accessible to non-compliant, meaning that the Member States would keep the volumes allocated to finance the strengthening of the EU industrial value chain. Since the assumptions are based on already existing schemes, the cost of public subsidies used for this Impact Assessment will not represent an increase in cost for Member States. Indeed, estimates indicate a saving budget for Member States of EUR 2.7 billion per year from 2027 to 2030, with a net present value of EUR 10.3 billion.[669]

Administrative burden

LEAD_SOL 1 - To reduce administrative burden for Member States and ensure policy coherence, relevant NZIA requirements, particularly those relating to non-price criteria such as sustainability and resilience in wind energy auctions and public procurement, would need to be gradually superseded by corresponding IAA provisions. This transition should account for the time required to adapt administrative procedures, in addition to the adaptation time necessary for industry.

Social impacts

See Section 6 of the Impact Assessment.

LEAD_EII 1 - The **targeted stakeholder consultation** found that, across industrial sectors, 75% of respondents acknowledge long term social benefits. However, 27% warn of short-term economic risks, i.e. rising production costs and investment pressures, leading to potential inflation, job losses or delocalisation.

- Cement: all 7 respondents expect positive social impacts, such as job creation.
- Steel: 13 out of 14 responses expect positive impact such as gains in skilled employment.

LEAD_BAT 1 / LEAD_SOL 1 send a market signal that stabilises demand giving employers and vocational training providers the certainty they need to develop targeted curricula, launch apprenticeships and upskilling programmes, and build advanced manufacturing competencies across the region.

INV 1 - Conditions requiring that investments generate value-added activities, such as R&I, engineering, domestic processing, and manufacturing, could significantly increase EU skill

668 Ibid.
669 Ibid.

capacities and create high-quality jobs. Staffing requirements and social protection conditionalities would ensure that FDIs actively recruit, hire, and train local workers, enabling local communities to benefit directly from employment opportunities. However, making these conditionalities voluntary under PO1 could reduce their potential impact as it still allows competition among Member States based on weaker employment conditions, despite offering some harmonisation compared to the baseline.

Environmental impacts

See Section 6 of the Impact Assessment.

LEAD_BAT 1 - In Producing cells locally in Europe, compared to China, can reduce carbon emissions by 20–40% on average. Additionally, onshoring cathode production could deliver a further emissions reduction of up to 20%.[670] Increasing EU-based production is therefore expected to deliver additional indirect climate and environmental benefits.

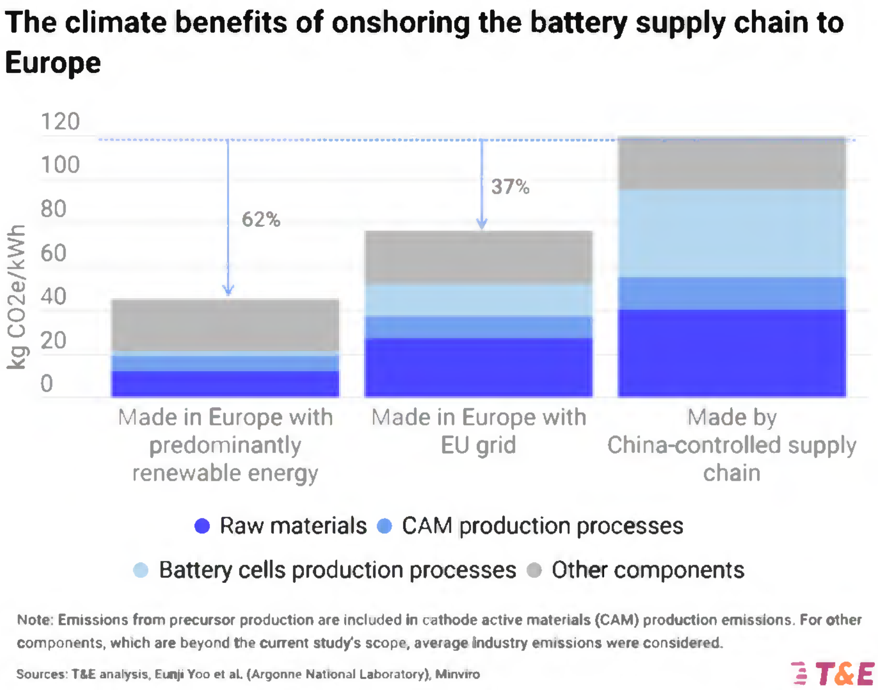

Figure 35 Climate benefits of onshoring the battery value chain

LEAD_VC 1 – In the *Internal market reaction* scenario, global greenhouse gas emissions from vehicle manufacturing decrease by 0.5 Mtonnes CO2e in 2027 and by 0.6 Mtonnes in 2030 due to shifts in production; they further decline by 0.1 Mtonnes due to reductions in international transport associated with EU imports. In 2027, substitution from EVs to ICEs could lead to higher emissions from the fuel use of new passenger cars (1 Mt) this effect almost disappears in 2030.

POLICY OPTION 2

Economic impacts

See Section 6 of the Impact Assessment.

[670] Ibid.

Impact on downstream sectors

INV 2 would have limited short-term impact on the downstream sectors, however in a medium to long-term perspective, the faster and more meaningful transfer of know-how, technologies and skills would result in stronger EU based value chains. This in turn would provide downstream sectors with additional supply options and overall higher resilience of the whole value chains improving their competitiveness. This is particularly true for condition (c) ensuring that foreign investors contribute to technological advancement in the EU by making their proprietary technologies or IP available to local firms, institutions, or joint ventures. On the other hand, it would lead to administrative costs for businesses. By analogy, the Commission Evaluation on FDI Screening Regulation[671] analysing the functioning and effectiveness of thereof identified limited costs for businesses.

Impact on SMEs

INV 2 - The analysis under PO1 remains valid, with no substantial costs for SMEs as investments not achieving a minimum threshold will be excluded from FDI conditionalities, though the indirect benefits listed in PO1 are likely to be more substantial and more predictable if mandatory measures are applied. Moreover, establishing a mandatory threshold for Member States to apply would likely to promote a more homogenous Internal Market investment framework *vis-á-vis* SME effects.

Impact on Member States

PERM 2 - Additionally, a One Stop shop as a sole point of contact for decarbonised energy intensive industrial projects does not necessarily introduce an additional burden, since similar structures already exist in the context of the implementation of other legislation for some energy-intensive industrial projects (namely, the NZIA). The most efficient decision would be to use the same designated authority, which would not entail any additional costs and reduce uncertainty over who the designated authority is.

Impact on international trade

INV 2 – In addition to what is described in Section 6 of the Impact Assessment, mandatory conditionalities would have to consider the international trade obligations undertaken by the Union, such as the WTO framework and FTAs. Therefore, any investment conditionality would have to be targeted, proportionate and justified on legitimate grounds to comply with these obligations, while FTA countries would be exempted from the scope of the conditionalities.
The impact of conditionalities on FDI inflow can be inferred from an example of Chinese investments in the EU. The analysis shows that, although there was an initial reliance on imports from China during the early stages of Chinese greenfield investments, sourcing from European suppliers has gradually increased over time. For example, at the BYD electric bus factory, local supplier sourcing grew from an initial 20% in 2017 (the year the factory opened) to between 30% and 50% by 2019. BYD has also signed supply agreements with other European firms, indicating a willingness to integrate local supply chains into its strategy. Similarly, staffing has gradually shifted towards more local employment. Therefore, FDI conditionalities around Made in EU requirements and staff requirements may be effective or

[671] European Commission (2024). COMMISSION STAFF WORKING DOCUMENT EVALUATION of Regulation (EU) 2019/452 of the European Parliament and of the Council of 19 March 2019 establishing a framework for the screening of foreign direct investments into the Union Accompanying the document Proposal for a Regulation of the European Parliament and of the Council on the screening of foreign investments in the Union and repealing Regulation (EU) 2019/452 of the European Parliament and of the Council - Publications Office of the EU.

acceptable for foreign investors, such as Chinese firms, as they are already being partially implemented.[672]

Social impacts

See Section 6 of the Impact Assessment.

Environmental impacts

See Section 6 of the Impact Assessment. In addition:

Positive impacts on CO2 emissions for **steel and aluminium** are most notably seen in residential buildings, primarily due to differing design and construction approaches between residential and non-residential sectors. In non-residential construction, a steel-concrete skeleton structure is commonly employed for load-bearing functions, featuring reinforced concrete ceilings and steel beams, complemented by prefabricated façade elements that enhance energy efficiency but do not contribute structurally. In contrast, residential buildings tend to use bricks or wood for load-bearing walls, which also enhance energy efficiency, with less frequent use of façade elements. As a result, transitioning to more low-carbon and bio-based solutions is likely to be more appealing and feasible in the residential sector, where these materials and methods are already more familiar.

INV 2 - The environmental effects of **mandatory FDI conditions** are expected to be similar to those described under PO1, but likely greater due to the mandatory implementation by Member States.

POLICY OPTION 3

Economic impacts

See Section 6 of the Impact Assessment. In addition:

Impact on companies

LEAD_VC 2 (EU vehicle component suppliers)

Table 24 Benefits for EU suppliers from LEAD_VC 2 measures

EU suppliers in the "Internal market reaction" scenario		
In EUR billion	**2027**	**2030**
Passenger cars		
sales increase	7.0	7.1
LCVs		
sales increase	0.6	1.0
HDVs		
sales increase	0. 23	0.16

[672] MERICS (2025). Chinese investment rebounds despite growing frictions – Chinese FDI in Europe: 2024 Update; Bruegel (2025). A smart European strategy for electric vehicle investment from China.

Similarly to LEAD_VC 1, the introduction of made in EU requirement for vehicle components of EVs sold in the EU will lead to higher sales of EU components suppliers in the EV manufacturers across all vehicle segments.

The sales of EU suppliers to EV car manufacturers are expected to rise:

- For passenger cars: by EUR 7 billion in 2027 and by EUR 7.1 billion in 2030.
- For LCVs: by EUR 0.6 billion in 2027 and by EUR 1 billion in 2030.
- For HDVs: by EUR 229.8 million in 2027 and by EUR 156.6 million in 2030.

The sales increase for EU suppliers come from the sales increase of EU made vehicles and the increase of EU content in those vehicles.

PERM 3 - Support for further measures to improve the permitting process was high in the Targeted Consultation, with 72% (45 respondents) of industry respondents in support of facilitating access to grid and relevant energy infrastructure. The creation of these clusters would promote and facilitate integrated energy planning for industrial areas as well as the promotion of partnerships and exchanges of best practices supporting the transition of industrial areas.

Meanwhile, 64%, 40 respondents to the targeted consultation, expressed the need for targeted environmental derogations for industrial clusters and projects.

AREA 2 - As part of the **Open Public Consultation**, 63% (197 out of 314 respondents) think that support the introduction of a category of priority industrial decarbonisation projects, supported by targeted benefits, will have a positive effect on their decarbonisation efforts. Priority projects are supported by SMEs (61%) and EII sectors such as steel (66%), cement (56%), chemicals (79%) and fertilisers (100%). The preferred criteria for identifying priority projects were: contribution to industrial decarbonisation (32%, 100 out of 314 respondents), contribution to strategic value chains (64, 20%), contribution to industrial electrification (9, 16%), economic importance (43, 14%) and expected increased demand for outputs (28, 9%). Benefits most preferred by the participants were better access to funding (65% - 117 out of 175), faster permit-granting procedures (113, 67%) and priority status for administrative procedures (113, 65%). Amongst SMEs, 96% (90 out of 94) referred to better access to funding.

Impact on downstream sectors

LEAD_VC 2

EU EV manufacturers in the “Internal market reaction” scenario		
In EUR billion	**2027**	**2030**
Passenger cars		
cost increase	0.0	2.0
sales increase	14.7	9.2
LCVs		
cost increase	0.0	0.2
sales increase	1.5	1.5
HDVs		
cost increase	0.0	0.16
sales increase	0.49	-0.0003

Similarly to LEAD_VC 1, given the current 70% EU content, the measure would not lead to any further costs for EU EV manufacturers in 2027 across all segments.

As an effect of the measure, EU EV manufacturers would benefit from an increase in sales of:

- For passenger cars: EUR 14.7 billion in 2027.
- For LCVs: EUR 1.5 billion in 2027.
- For HDVs: EUR 495.7 million in 2027.

However, to comply with the 75% target proposed for 2030, EU EV manufacturers will face a relative cost increase of:

- For passenger cars: In order to comply with the 75% target proposed for 2030, EU EV manufacturers will face a relative cost increase of 2 billion, projected to be offset by the EUR 9.2 billion increase in sales.
- For LCVs: 0.2 billion, expected to be offset by the EUR 1.5 billion increase in sales.
- For HDVs: 157 million euro. This cost increase is going to be accompanied by a minor sales reduction (-0.3 million euro).

The relative price advantage of EU EV HDVs (as opposed to non-EU EV HDVs) determined by the measure in the initial years after its introduction, leads to increased sales in the period between 2027 and 2029, and these increased sales are larger than (and could potentially offset) the assumed increased cost.

Global Added Value:

Value Added in EUR billion		
Internal market reaction	**2027**	**2030**
automotive	3.6	2.2
intermediate	3.0	3.1
Global value added - Only first round of Value Chain	6.6	5.4
Global value added - Estimated all Value Chain	12.6	11.5

The measure is projected to lead to the generation of EUR 6.6 billion Global Value Added in 2027 and EUR 5.4 billion in 2030 when assessing the impact, taking into account only the first tier of the value chain. Similarly to the first policy option, in LEAD_VC 2 the positive impacts can also be perceived throughout the value chain for intermediate inputs, reaching this time higher benefits, EUR 12.6 billion in 2027, and EUR 11.5 billion in 2030 in value added.

Impact on consumers and citizens

LEAD_VC 2

EU consumers in the “Internal market reaction” scenario		
	2027	**2030**
Passenger cars		
EVs price changes (%)	0.5%	1.4%
EVs sold change (thousand)	-84.8	-91.2
LCVs		
EVs price changes (%)	-0.8%	0.5%
EVs sold change (thousand)	17.1	2.6

HDVs		
EVs price changes (%)	0.6%	1.4%
EVs sold change (thousand)	1.2	-2.0

Similarly to LEAD_VC 1, described phenomenon will also have the above indicated two different effects.

As average prices[673] of EVs passenger cars are going to:

- For passenger cars: increase by 0.5% in 2027 and by 1.4% in 2030. This is expected to lead to a reduction in EV passenger cars purchases by 84 800 vehicles in 2027, and 91 200 vehicles in 2030 if no mitigation measures put in place.
- For LCVs: decrease by 0.8% in 2027 and then slightly increase by 0.5% in 2030, and this is expected to lead to an increase in EV light commercial vehicles purchases by 17 100 vehicles in 2027, and 2 600 vehicles in 2030.
- For HDVs: slightly increase by 0.6% in 2027 and then increase by 1.4% in 2030. These prices variations are going to have a minor effect on EV HDV purchases in 2027, when sales will still slightly increase by 1 200 units, and lead to a decrease in purchases of EV HDVs by 2 000 units in 2030.

If all subsidies were reallocated from non-EU to EU EV manufacturers, the average price of EVs for consumers would decrease:

- For passenger cars: by 0.8% in 2027, and the increase in 2030 is more muted at 0.4%.
- For LCVs: by 2.4% in 2027 and 0.8% by 2030, with a corresponding larger increase in the number of EV LCVs sold.
- For HDVs: by 0.3% in 2027 and only increase 0.8% by 2030, with a corresponding larger increase of EV HDVs sold in 2027 and a smaller reduction of sales in 2030.

LCV and HDV sections of the cost on consumers may be considered impact on the downstream sector, as most of LCVs and HDVs are purchased by downstream economic operators.

Social impacts

See Section 6 of the Impact Assessment.

Environmental impacts

See Section 6 of the Impact Assessment.

LEAD_VC 2

Global greenhouse gas emissions from vehicle manufacturing decrease by 0.9 Mtonnes CO2e in 2027 and by 0.7 Mtonnes in 2030 due to shifts in production; they further decline by 0.1 - 0.2 Mtonnes due to reductions in international transport associated with EU imports.

In sum, the environmental effects remain very similar across LEAD_VC 1 and LEAD_VC 2.

[673] As a result of the reallocation of subsidies, EU manufacturers reduce the price of their vehicles, but they do not compensate for the high price increase that the non-EU manufacturers would face as a result – further incentivising compliance to this measure.

Annex 12: Development of a low-carbon product label for steel

1. Description of the design elements

Overview of policy options and policy scenarios used for the analysis

The following table provides an overview of the policy options for the low-carbon product GHG label for steel presented under LAB 2. This annex further describes the policy options in this section and retained for assessment in Section 2.

Table 25: Overview of policy options assessed

	Development of low-carbon product GHG label for steel
Baseline	Existence of private GHG product labels, published ETS-installation emissions, planned work under the ESPR
Determination GHG-intensity	**CALC1** System boundaries and calculation methodologies in line with free allocation rules under ETS/CBAM methodology **CALC2** System boundaries in line with ETS scope, limited nr. of key indirect GHG emissions included **CALC3** Comprehensive life cycle system boundaries, including upstream and downstream GHG emissions, via the Product Environmental Footprint (PEF) method
Classification	**CLAS1** No classification / carbon footprint information only **CLAS2** One classification system without (CLAS2.a) or with (CLAS2.b) a sliding scale **CLAS3** Differentiated classification systems per production route (CLAS3.a) or according to the shape of the final product (flat/long) (CLAS3.b)
Ensuring data quality	**DATA1** Label for EU steel producers only, based on self-declared emissions and production volumes **DATA2** Label for EU steel producers only, with third-party verification and certification **DATA3** Label for EU steel producers and importers, with third-party verification and certification

Determination of the greenhouse gas intensity

The determination of the greenhouse gas intensity of a product – here defined as t CO_2eq/ tonne of steel - is the crucial element of any carbon footprint label, as it provides the quantitative base upon which the label is built on. For a low-carbon steel product label, this entails the following interrelated elements:

1. Product in scope of the label: Steel is sold in a wide variety of products forms, ranging from flat products like hot rolled coil to long products such as bars and wire rods. The chemical composition of these products may vary, by factors such as the inclusion of alloys and the electromagnetic properties of the steel. Theoretically, a steel label can therefore be applied to different products, leading to different label units (e.g. to of coil, flat steel). After feedback from stakeholders and comparison with existing initiatives, hot rolled carbon steel was chosen for the current proposal of label. This will ensure most of the steel production is covered. High alloy steel would not be covered for now as their carbon footprint are significantly impacted by the emissions linked to alloys which are mostly imported, and little data is available.
2. Covered processes and associated emissions under the label: Emissions from steel production occur at various stages in the value chain. In addition to the direct GHG emissions from production facilities, there are also indirect emissions linked to, for example, electricity consumption and to mining of raw material inputs, transport of

intermediates and pre-processing (e.g. coal, alloys, scraps) and the end-of-life phase of steel products.

3. Calculation methodology: The actual calculation of the covered GHG emissions and production volumes needed to determine the GHG intensities can be done using different methodologies. The Monitoring, Reporting and Verification (MRV) rules developed in the context of free allocation under the EU ETS provide a detailed description of the emission calculation method. CBAM emission calculation methods for extra-EU countries are also based on the methodology of the ETS.
4. Relevant baseline period: the relevant temporal unit for the determination of the greenhouse gas intensity need to be chosen, outlining the period used to measure and assess the greenhouse gas intensity.

Different approaches can be used to determine the greenhouse gas intensity. The following options are assessed:

Option 1: ETS/CBAM aligned scope and calculation methods, baseline based on annual data **(CALC1)**

The covered processes and associated emissions are aligned with the product benchmarks being developed under the EU ETS free allocation rules for the steel sector. They would typically cover the direct emissions associated with the reported emissions under the EU ETS, notably related to the relevant steel product benchmarks (coke, agglomerated iron ore, hot metal production, EAF carbon steel and EAF high alloy steel.) as included in the table in annex 12.a to this document. The total GHG emissions per steel product are determined as the sum of the relevant production steps covered by product benchmarks. Since the CBAM methodology is also largely based on these product benchmarks, this method also ensures alignment with the CBAM rules.

Option 2: ETS/CBAM scope and methods, complemented by a limited number of additional key indirect emissions. Limited flexibility for baseline determination would also be included. **(CALC2)**

As in Option 1, the covered processes and associated emissions are aligned with the EU ETS product benchmarks, while the relevant product units also refer to crude steel production. In addition to CALC1, key indirect emissions from electricity, hydrogen, and heat use are included within the scope, as well as the emissions from the hot rolling. The baseline period can be disaggregated from annual installation-level data to more granular segments, provided a clear intertemporal and/or physical unit demarcation can be demonstrated.

Option 3: LCA scope **(CALC3)**

Both the scope of the processes and emissions covered, and the calculation methods are based on the Product Environmental Footprint (PEF) method, extending the scope to all relevant upstream (e.g., extraction of input materials, pre-processing of scraps, manufacturing of alloys and other ancillary chemicals) and downstream (linked to e.g. recycling activities) emissions.

Classification

In addition to the robust calculation of GHG intensities per tonne of product, a possible second element of a label is the development and use of classification classes based on these GHG intensities. In its most basic form, this classification could distinguish between steel that meets the requirements for low-carbon steel and all other steel not meeting the requirement. In a more advanced form, several performance classes could be established, linking specific GHG-intensity thresholds to corresponding performance categories.

These classification classes could be the same for all steel products covered by the label, or different labelling "families" could be developed per product group. In the context of a low-carbon product label for steel, the following elements can be distinguished.

1. Possible distinction by production route: Steel can be made starting from iron ore (primary route) or by utilising recycled steel scrap (secondary route). Both production routes lead to crude steel, but the production processes and emission intensities are fundamentally different. Based on the production routes and making use of the definitions under the product benchmarks in the EU ETS, it would be possible to distinguish between to two broad label categories:
    - Primary steelmaking, covering both the Blast Furnace/ Basic Oxygen Furnace (BF/BOF) route and the Direct Reduced Iron (DRI) route in line with the relevant benchmarks for primary production under the ETS (coke, agglomerated iron ore, hot metal production)
    - Secondary steelmaking in an Electric Arc Furnace (EAF), in line with the relevant EAF benchmarks under the ETS (EAF carbon steel/EAF high-alloy steel)

    On the other hand, it would also be possible to combine all steel production within one label category, irrespective of the production pathway. As structurally, primary steel production is much more carbon intensive than secondary steel production, within this approach one would have to decide whether an adjustment for the scrap share would be needed, for example via a sliding scale, where a performance class become more stringent as the share of scrap increases. Especially if no GHG emissions are allocated to the use of scrap in the determination of the GHG-intensity, a well calibrated sliding scale for the determination of the performance classes could capture the gradual impact of using more or less scrap, reflecting the different starting point of the two production routes. Furthermore, the primary and secondary production routes will eventually start to overlap when primary steelmaking decarbonises, given that the decarbonisation of the primary steelmaking route will likely include the use of DRIs, which typically produce sponge iron which needs further treatment in an EAF to produce crude steel.

2. Possible distinction by the quality of the end-product: the performance and quality characteristics of steel vary according to its chemical composition. Adding alloy elements can improve the quality of steel, leading to a differentiation between carbon steel, high alloy steel and stainless steel. As these high-alloy steel grades, typically produced in an EAF, have a higher emission intensity, a quality-based differentiation within the label could be considered. The EAF product benchmarks under the ETS account for this difference, given the distinction between EAF carbon steel and EAF high alloy steel.

3. Possible distinction by the two main products categories: Flat products and long products have different applications, while also the production processes differ.

Different approaches can be used for a classification. The following options are assessed:

Option 1: No classification (**CLAS1**)
In this option, the steel label would be limited to one single metric, expressing the tonnes of GHG emissions per tonne of steel. There would be no linked predefined performance

categories linked to this metric, providing flexibility to other policy instruments, such as the ESPR, to develop such classes or thresholds to qualify as low-carbon steel.

Option 2.a: One classification system without a sliding scale (**CLAS2.a**)

In this option, one classification system would be developed for the labelling of steel, defining specific GHG-intensity thresholds. All steel up to the production step covered by the system boundaries would be subject to the same thresholds and classification system, irrespective of its production route or quality.

Option 2.b: One classification system with a sliding scale (**CLAS2.b**)

In this option, one classification system would be developed for the labelling of steel as in CLAS2.a, but the more scrap is used, the more stringent (i.e. less t CO_2eq/ tonne of steel) the thresholds become. As such, this classification could account for the inherent GHG impact of scrap, and for the difference between producing primary steel and steel via scrap-based technologies.

Option 3.a: Differentiated classification systems per production route/steel quality (**CLAS3.a**)
In this option, differentiated classification systems are developed for primary and secondary steel production. It is then further differentiated by steel quality, with the main metric being the content of alloy within the steel. Therefore, four distinct low-carbon steel classifications are developed, i.e. primary-low alloy, primary-high alloy, secondary-low alloy, secondary-high alloy.

Option 3.b: Differentiated classification systems per production type (**CLAS3.b**)

Instead of distinguishing based on the production route, this option provides a different classification system according to the final shape of the steel products, categorizing them as flat or long steel products. Flat products include slabs, hot rolled coil and plates and are predominantly used in automotive, pipes and tubes and constructions. Long products such as bars and wire rods are typically used in the construction, mechanical engineering and automotive industries.[674]

Ensuring data quality

A third aspect of a labelling system is securing the credibility, reliability, consistency and accuracy of the underlying reported data and resulting GHG-intensities and/or resulting label classifications. To prevent greenwashing and ensure the consistent and comparable application of the methodology an appropriate level of control should be applied, involving different actors. The applicant itself may report the required data and calculate the resulting GHG-intensities through self-declaration. A certification body may perform checks on the submitted data, e.g. to avoid procedural inconsistencies. External-third party verification of the application by accredit verifiers may be required, assessing the correct use of the methodology and reported data. This element of the label is also linked to the eligibility to apply for the label: for steel for which all production steps are performed within the EU, detailed GHG emissions for production within specific installation boundaries and corresponding production data are available and reported in the framework of the free allocation rules under the EU ETS. For

[674] JRC (2020). Production costs from iron and steel industry in the EU and third countries.

steel imported on the EU market, and for production steps taking place outside EU, the current information availability is lower but can increase as CBAM is implemented, potentially requiring extra procedures to ensure high data quality. Based on these elements three options emerge:

Option 1: Label for EU steel producers only, based on self-declared emissions and production volumes **(DATA1)**

In this option, only EU steel manufacturers would be allowed to apply for the label. Applicants report their GHG-intensities through self-declaration to a certification body, based as much as possible on validated data under the ETS, that performs basic procedural checks on the submissions and subsequently certifies the relevant GHG-intensity and/or label classification. As the bulk of the data is based on already verified and validated data under the ETS, no further verification is needed.

Option 2: Label for EU steel producers only, with third-party verification and certification **(DATA2)**

As in option 1, only EU steel manufacturers would be allowed to apply for the label. However, an additional verification of the submitted applications and data / calculations therein is required, performed by an independent third-party verifier. Based on the verified application, the independent third-party certification body approves the reported GHG-intensity and/or label classification and issues the label.

Option 3: Label open for all sellers of steel on the EU market, with in-debt third-party verification and certification **(DATA3)**

In this option, the eligibility is linked to whether the steel is placed on the EU market, regardless of the place of production. This would allow imported steel on the EU market to be labelled under the system. As in option 2, third party-verification and certification are required.

As mentioned in Section 6.2.1.8, Member States will also have to ensure that the certification system in place is properly enforced and monitored for risks of fraud.

2. What are the impacts of the policy options?

This section assesses the impacts of the development of an EU voluntary low-carbon product label for steel and goes on to assess the impacts on the design aspects: the determination of the greenhouse gas intensity, the classification, the verification and certification, and the eligibility.

Environmental impacts

Currently over 150 steel label initiatives have been developed worldwide. While these labels offer significant opportunities for producers to demonstrate the carbon intensity of their products, the landscape is highly fragmented. Differences in methodologies, end products and scope of emissions considered make it impossible to compare labels. This lack of consistency can undermine credibility, leads to greenwashing concerns and ultimately hinder the development of lead markets for low-carbon steel. Introducing a standardised EU-wide label, enshrined in EU law, based on a credible and transparent methodology, can help address these issues, boost the demand for low-carbon steel and therefore have a positive impact on the business case for decarbonisation of steel production in the EU.

Moreover, the introduction of an EU-wide label based on reliable and verified data and a uniform methodology can improve the understanding of what constitute steel with lower environmental impact.

However, the environmental benefits of an EU voluntary low-carbon product label for steel depends on its ability to effectively stimulate demand for low-carbon steel. This requires the label to provide buyers of steel with credible information about the GHG emissions associated with the product. At the same time, its impact also depends on the ability of low-carbon producers to differentiate their products from conventional alternatives and to strengthen the business case for low-carbon production. The positive GHG impact of the different design elements for the low-carbon product label is therefore assessed by:

1. The scope of the GHG emission information provided by the label;
2. The label's ability to ensure comparability across products and producers.

Determination GHG-intensity

a. Scope of the GHG emission information

In CALC1, the GHG-emission intensity is limited to the GHG emissions covered by the productions steps of the EU ETS system. For the production of the steel via the primary production route, this includes the processes and covered emissions by the cokes production, the production of agglomerated iron and the emissions in the blast furnace and blast oxygen furnaces. For the secondary production route, this scope covers the direct emissions in the electric arc furnaces. Based on calculations made by the JRC, this scope covers for average production processes 74% of the direct GHG emissions of the total LCA of primary steel production via the classic BF/BOF route. As for secondary steel production, these direct ETS reported emissions only cover 18% of the total LCA GHG emissions, though the LCA emissions of this route are typically much lower than the classic BF/BOF route.[675]

CALC2 provides in particular for the secondary steel production route a much larger share of the total LCA GHG emissions, demonstrating in particular the impact of electricity use. Furthermore, CALC2 also covers GHG emissions from hydrogen, a key future energy carrier and reduction agent for iron production via the (primary) Direct Reduced Iron route, which is expected to be one the major low-carbon technologies for steel production for the future.

CALC3 provides total GHG emissions of the full product life cycle (LCA basis). Compared to the more limited scopes of CALC1 and CALC2, for the primary steel production route the majority of the GHG emission relate to emissions related to coal extraction, and to a lesser extent to emission related to oxygen production needed for the BOF technology. As for secondary steel production, the major source of additional emissions is linked to the extraction of alloys, which are usually used in EAF secondary steel production.

Table 26:Overview of emissions coverage

Option[676]	**CALC1**	**CALC2**	**CALC3**

[675] For this calculation, ETS coverage is limited to the scope of the key ETS product benchmarks for the steel sector, excluding for example ETS-covered products such as lime that is only used in small quantities in the steel making process.
[676] According to Eurofer's European Steel in Figures 2025 report, in 2024, 44.6% of EU-manufactured steel was produced via the Electric Arc Furnace route, while 55.4% came from the Blast Oxygen Furnace and other routes.

Processes and emissions covered	Direct industrial GHG emissions covered by ETS	CALC1 scope, and indirect GHG from electricity, heat and H2 use	Cradle-to-gate LCA GHG emissions
Coverage of total LCA GHG primary production for crude steel (BF-BOF route)[677]	**74%** **1492 kg CO_2eq/ t crude steel**	**78%** **1567 kg CO_2eq/ t crude steel**	**100%** **2017 kg CO_2eq/ t crude steel**
Coverage of total LCA GHG secondary production for crude steel[678]	**18%** **86 kg CO_2eq/ t crude steel**	**60%** **286 kg CO_2eq/ t crude steel**	**100%** **479 kg CO_2eq/ t crude steel**

The additional hot rolling step is part of 4 out the 6 main current initiative for steel labelling[679]. This can be considered also as a representative steel product and integrating the bulk of GHG emissions, which is why the product in scope for the label was chosen as hot-rolled steel.

b. Comparability of the GHG-intensities

CALC1 aligns its scope with the combined scope of the steel product benchmarks under the EU ETS. Therefore, the base unit for the GHG intensity determination is crude steel, manufactured both via the primary and the secondary route. The covered processes and associated emissions to be used for the determination of the GHG-intensity are well-documented within the ETS relevant legislation, which ensures comparability across different steel products. However, by excluding a key indirect emission source such as the GHG emissions related to electricity consumption, the fairness of the comparison across production routes can be questioned and can potentially create an uneven playing field.

CALC2 builds its methodology on the ETS product benchmarks and CBAM as in CALC1, and it adds a limited number of relevant indirect emissions. This approach keeps the high level of comparability and consistent system boundaries across products as in CALC1, while the inclusion of the indirect emissions allows for a more complete assessment of GHG intensities across different products, though this addition does require a consistent methodology to measure electricity related emissions. The emissions not covered, compared to an LCA are in majority linked to the extraction of coal, iron ore and alloys where less primary data under the control of the steel manufacturer/importer are available.

CALC3 draws the most complete assessment of the LCA GHG emissions for the steel products and enables the most complete comparison in terms of GHG-intensity. However, in contrast to CALC1 and CALC2, no direct and verified data from the ETS are used, which may lead to lower overall data-quality and accurateness. Any such label will likely need to rely to a much larger extent on estimates, assumption and default values, as well on MRV systems that are not regulated in a manner as consistent as under the EU ETS.

Classification

In CLAS1, the label information is limited to indicating the GHG-intensity of the product, without attributing it to a specific performance category. While the GHG-intensity on itself provides precise GHG information, the lack of a standardised classification system and a clear definition of a low-carbon products, transfers the burden of interpretation to the end-user of the

[677] Based on internal Commission calculations.
[678] Based on JRC calculations performed in the framework of ESPR activities.
[679] JRC (2025). Defining low-carbon emissions steel: A comparative analysis of international initiatives and standards.

product. This limits the effectiveness of the label as a standalone policy instrument. In this option, complementary policy instruments could be introduced to define harmonised performance categories.

The uniform approach and broad scope of the label under CLAS 2.a increases its useability and usefulness as a stand-alone policy instrument. However, given primary and secondary steel production are assessed under the same classification system, it becomes difficult for primary steel producers to reach high performance classes, given the actual difference in emission intensity between two production routes. As a result, it would reduce the attractiveness of the label for primary route steel producers, limiting the uptake and the market information it can bring and limiting the decarbonisation of the primary production, which cannot be entirely substituted by secondary production. In the latter case it would reduce the information provided through the label to end consumers.

CLAS 2.b addresses this challenge by adjusting the performance class thresholds in line with the amount of scrap used. As such, it could serve as an attractive alternative classification system for both primary and secondary steel producers, and it addresses the complexity of the different production routes and the scrap use and addresses the increase interlinkage between both routes in the medium term (i.e. new production ways through DRI and EAF). It allows primary producers to claim also best of class performance. However, setting the exact coefficients of the sliding scale performance classes could complicate the labelling system. Moreover, following CLAS 2.b the classification is not only solely based on GHG-intensities but also recycled content (i.e. scrap use), which may complicate the understanding and thus underlying logic of low-carbon product labelling system. Furthermore, some may claim it rewards the more resource intensive primary production route.

By having separate classifications systems for primary and secondary steel making, CLAS3.a acknowledges the fundamental differences between the production technologies and provides both primary and secondary steel producers with the opportunity to be categorized in high performance classes. This system would compare steel products within the different production routes. However, CLAS3. A would not compare the two production routes directly, risking that the classification system could be considered overly disaggregated. This could also risk undermining the incentive to use recycled scrap in steelmaking, and it could be considered to be not futureproof, as the sharp distinction between primary and secondary production routes are blurring with the introduction of DRI-based steelmaking that combines both the use of primary resources, i.e. iron ore, and the need for EAF steelmaking.

The same reasoning largely goes for CLAS 3.b, which proposes different classification systems according to the final shape of the steel product. As flat products are predominantly manufactured through the primary production route while long products are typically produced via the secondary production pathway, the resulting classification classes would in practice be rather similar to a system based on production routes- in particular in the near future. However, the inherent technologically neutral character of this option appears to be more future proof than option 3.a. Several existing steel labelling initiatives have introduced 4 to 5 classes and sliding scales (see table below)

Table 27: Cross comparison matrix of initiatives and standards that set thresholds for the definition of "low-carbon steel"[680][681]

Initiative/Standard	Level	Declared Unit	Product Processing stage	Methodological Approach	Threshold stability over time	Quantitative Threshold for iron ore-based steelmaking (best class)	Quantitative Threshold for scrap-based steelmaking (best class)	Number of classes	System Boundary	Environmental Impact Considered	GHG emissions accounted
IEA's definition of Near-Zero Steel and Low-Emissions Steel	S	Metric tonne of crude steel	Crude Steel	Sliding scale	Fixed Threshold	0.4 t CO_2eq/t crude steel (0% scrap use)	0.05 t CO_2eq/t crude steel (100% scrap use)	5	Cradle-to-gate (Scope 1 + Scope 2 + Scope 3.1, 3.3, 3.4 partially)	CO_2e	CO_2, indirect CH_4 emissions only from fuel supply (Scope 3)
ResponsibleSteel (Core Site Certification and Steel Certification)	S, P	Metric tonne of crude steel	Crude Steel	Sliding scale	Fixed Threshold	0.4 t CO_2eq/t crude steel (0% scrap use)	0.05 t CO_2eq/t crude steel (100% scrap use)	4	Cradle-to-gate (Scope 1 + Scope 2 + Scope 3.1 + Scope 3.3 + Scope 3.4 + Scope 3.5)	CO_2e	CO_2, N_2O, CH_4, HFCs, PFCs, SF_6, NF_3
Low Emissions Steel Standard (LESS)	P	Metric tonne of hot-rolled steel	Hot-Rolled Steel	Sliding scale	Fixed Threshold	<0.52 t CO_2eq/t hot rolled steel (QST) (0% scrap use) < 0.47 t CO_2eq/t hot rolled steel (reinforcing & structural) (0% scrap use)	<0.17 t CO_2eq/t hot rolled steel (QST) (100% scrap use) < 0.12 t CO_2eq/t hot rolled steel (reinforcing & structural) (100% scrap use)	5	Cradle-to-gate (Scope 1 + Scope 2 + Scope 3.1 + Scope 3.3 + Scope 3.4 + 3.8)	CO_2e	CO_2 for Scope 1 and Scope 2 emissions. Scope 3 emissions: CO_2, CH_4, N_2O, HFCs (partial), HFCs, SF_6 (1)
Climate Bonds Initiative	C	Metric tonne of finished steel product	Finished Steel Product	Weighted Pathway	Progressive Threshold	1.81 t CO_2eq/t steel by 2030 0.12 t CO_2eq/t steel by 2050	0.32 t CO_2eq/t steel by 2030 0.12 t CO_2eq/t steel by 2050	n/a	Scope 1 + Scope 2 + Scope 3.3	CO_2e	CO_2
Steel Climate Standard - Global Steel Climate Council (GSCC)	P, S	Metric tonne of hot-rolled steel	Hot-Rolled Steel (flat and long products distinction)	Product-based Pathway (Company-specific trajectory based on decarbonisation pathway for flat and long product)	Progressive Threshold	Flat products: 1.31 t CO_2eq/t hot rolled steel by 2030 0.12 t CO_2eq/t hot rolled steel by 2050 Long products: 1.11 t CO_2eq/t hot rolled steel by 2030 0.12 t CO_2eq/t hot rolled steel by 2050		n/a	Cradle-to-gate (Scope 1 + Scope 2 + Scope 3.1 + Scope 3.3 + Scope 3.4)	CO_2e	CO_2, N_2O, CH_4, HFCs, PFCs, SF_6, NF_3 (2)
Chinese Method C2F Steel (CMC2FS)	S, L, P	Metric tonne of crude steel or hot-rolled steel	Crude Steel & Hot-Rolled Steel	Sliding scale	Fixed Threshold	0.4 t CO2/t crude steel or hot rolled steel (0% scrap use)	0.05 t CO2/t crude steel or hot rolled steel (100% scrap use)	5	Cradle-to-gate (Scope 1 + Scope 2 + Scope 3.1 partially + Scope 3.3)	CO_2e	CO_2

(1) In line with the EU ETS
(2) An individual GHG shall be considered Insignificant if it represents less than 0.5% of total Scope 1 GHG emissions, and less than 5% of total Scope 3 emissions within The Steel Climate Standard boundary, on a CO_2e basis.
Level: C - Company; S - Site; L - Production Lines P - Product
Scope 1: Direct GHG emissions occur from sources that are owned or controlled by the company; Scope 2: Scope 2 accounts for GHG emissions from the generation of purchased electricity consumed by the company, and Scope 3: other indirect emissions that are a consequence of the activities of the company, but occur from sources not owned or controlled by the company. (WRI and World Business Council, 2004).
Scope 3.1: Purchased goods and services; Scope 3.2: Capital goods; Scope 3.3: Fuel and energy-related activities not included in Scope 1 and Scope 2; Scope 3.4: Upstream transportation and distribution; Scope 3.5: Waste generated in operations (WRI and WBCSD, 2013).
Source: JRC elaboration

[681] JRC (2025). Defining low-carbon emissions steel: A comparative analysis of international initiatives and standards.

Ensuring data quality

In DATA1, the strong reliance on the responsibility and correct conduct of the applicant may undermine the credibility of the label. While the use of previously verified data under the EU ETS could provide a certain degree of assurance in terms of data accuracy, the lack of an additional verification of the GHG intensity at product level poses a risk, in particular if the scope of the emissions would be extended beyond the ETS product benchmarks. This option might therefore increase fraud and greenwashing risks and might undermine the effectiveness of the label. DATA2 addresses these risks and provides more certainty and adds credibility to the label calculations and underlying data, due to the extra step of the external verification. It therefore increases the usefulness and potential effectiveness of the label. DATA3 enlarges the scope of the label beyond the EU borders, potentially also increasing its impact and contributing to aligning the EU label with other labelling worldwide initiatives. For extra-EU steel manufacturers, the possible use of already reported and verified data is more limited, requiring a more thorough verification and certification to reduce the risks on fraud. CBAM will be a source of relevant information for extra-EU applicants from 2026, therefore it should be required to be used if option DATA3 is retained.

Administrative impacts

The credibility of any label stands or falls with the quality, robustness and transparency of the underlying data, allowing for a harmonised representation of GHG intensities of steel products. Reporting, verification, and label issuance all involve time and financial costs, for both the applicants, potential verifiers and public authorities. On the other hand, a well-designed label can also reduce administrative burdens, for example by providing transparent market information that lowers the information costs for potential buyers of low-carbon products.
As the label is conceived as a voluntary instrument, its administrative impact for manufactures of steel products as whole is expected to be limited. Only interested applicants will perform the necessary steps to acquire a label, based on an internal cost-benefit analysis. Furthermore, as the label aims to set a credible standard for labelling initiatives, its existence might even avoid the need to invest in other labelling initiatives, or in other ways to publicly disclose the lower GHG intensities to potential buyers.

Determination GHG-intensity

Since CALC1 mainly builds on ETS/CBAM reported data, its additional administrative burden to gather data for producers from an EU installation will be limited. Within the framework of the application for free allowances under the ETS, EU steel producers already possess the relevant historical data and are familiar with the specific product benchmark boundaries. For EU steel producers that do not carry out all relevant production steps themselves, e.g. they purchase coking coal for use in their steel production facility, the label calculations will be more complex. In these cases, it would be necessary to demonstrate the GHG intensities of the purchased input materials. Also, by using annual average GHG emission intensities, consistent with the reporting under the ETS free allocation rules, the additional cost impact of data gathering/calculation of the labelling requirements is limited. Historical data have already been verified under the ETS. The need for control and verification will be defined by the label verification criteria. The cost of it would be expected to be limited.

CALC2 also builds on ETS/CBAM data, adding a limited amount of indirect emission sources to the calculations of the GHG-intensity. Provided these indirect sources refer to key inputs such as electricity and/or hydrogen use, one could assume that these data are readily available for applicants for the label or that reliable default values can be utilised. The possibility to have a more segmented baseline period for the determination of the GHG-intensity adds complexity to calculation and might require additional verification steps in addition to the information that would already be available through the EU ETS free allocation.

The LCA methodology to be used under CALC3 could rely on ETS/CBAM reported emissions and builds on the PEF methodology, requiring detailed data from a very comprehensive scope including complexity and variation of the production processes and possibility to use a mass balance approach. Thus, the effort (time/cost) of verification and certification of the label calculations would be increased versus CALC1/2 which mostly rely on already verified data.

Classification

CLAS1, limiting the label information to stating a products' GHG-intensity without further classification, avoids the definition of thresholds within the legislation and marginally simplifies the certification process. However, compared to other options there may be additional administrative burden that is put on the potential users of the label, if these actors should interpret the level of GHG performance themselves based on the reported numbers. It is also not a solution to the main problem as it does not provide any threshold/definition of low-carbon steel failing to create a reliable label to stimulate its lead market. CLAS2.a and CLAS2.b avoids this latter impact, as the clear classification classes increases the usefulness for label users. CLAS2.b could allow to report next to the class, also additional information, notably the exact carbon intensity as well as the share of scrap input in the steel manufacturing process, adding an extra reporting element. Under CLAS3.a the most disaggregated classification system is proposed, also requiring the reporting of more detailed product data (such as quality), and the verification of these elements. The additional data need for CLAS 3.b is more limited.

Ensuring data quality

As DATA1 relies on self-declaration of the GHG-intensities by the steel manufacturers without an independent verification, the administrative burden is minimized compared to an option with more stringent verification and certification requirements as in DATA2. In this latter option, both setting up the verification rules and nominating the certification body(is), as well as the implementation of the procedures, contribute to the administrative burden. However, relying on existing rules, procedures, verifiers and other parties e.g. from the EU ETS, can help to minimise this burden. In DATA3, the most stringent verification measures are required to ensure data quality, particularly due to the lack of readily available data reported through the ETS. For extra-EU manufacturers, some necessary data for determining GHG intensities will be collected under CBAM, given its alignment with the ETS product benchmark methodology. However, data quality under this option may vary among applicants, necessitating a more comprehensive and rigorous verification and certification scheme, which would increase the administrative burden both for applicants, as well as for verifiers and regulators.

Coherence with other elements of the regulatory framework

The proposed label has some clear linkages with both existing and future policy instruments, with two focus areas.

The **EU ETS** is the main climate policy instrument to reduce GHG emissions in energy intensive industries operating in Europe. By putting a price on GHG emissions, it incentivizes manufacturers covered by the system to invest in low-carbon technologies and reduce emission in a cost efficiency way, and it is therefore a supply side measure. At the same time, detailed and accurate monitoring, reporting and verification of GHG emissions is a cornerstone of the system. Installations report annually their GHG emissions at installation level. In addition, industrial installations applying for free allowances also report periodically on their production volumes and associated emissions, following the structure set out under the ETS Free allocation rules. The development of a label aims to boost the demand for low-carbon products, and as such it complements the focus on the supply-side from the EU ETS. At the same time, the label can make use of similar calculations done under the ETS Free Allocation Rules and under CBAM. Under both policy instruments, installation-wide emissions are attributed to specific products: while under the ETS rules these products refer to specific productions steps ('product benchmarks'), under CBAM the GHG emissions are attributed to relevant end products, The label can build on these methodologies, ensuring a coherent approach.

Second, the determination of the GHG intensities for the proposed label can also be a building block itself for other GHG emission reporting initiatives within the broader EU regulatory framework. In particular the option to include product life cycle GHG emissions as an information or performance requirement under upcoming ESPR product delegated acts such as for steel or aluminium and the requirement to include climate data in future mandates under the CPR such as for cement can be an opportunity to exploiting synergies, allowing them to use the steel label as modular data input being as needed complemented by further LCA data. Thereby ensuring consistency and harmonisation with other relevant EU policies.

Determination GHG-intensity

In CALC1, as also discussed under 0, the use of the ETS calculation rules and system boundaries of the Product Benchmarks developed under the Free Allocation Rules, ensures a high level of consistency of the proposed label with the ETS and CBAM methodology. While the label calculations would imply some extra steps compared to the reporting under the Free Allocation Rules, including a more regular reporting of the data, the basic methodology is very similar, including the use of average annual data. CALC2 is also broadly coherent with the ETS and CBAM methodology, but by adding additional covered processes it adds some complexity. In addition, in particular the allowed flexibility to have a more segmented baseline period for the determination of the GHG-intensity deviates from the approach under the ETS. The use of the LCA calculation methodology proposed under CALC3 is not consistent with the current approach under ETS and CBAM but can build on it, as showed by the currently ongoing work in the ESPR context. In CALC 3 notably, the delineation of the scope would be of importance to ensure comparability of GHG intensity across different production routes. As for the role of the low-carbon product label as a building block of other parts of the regulatory framework, options covering a larger part of the total LCA GHG emissions (such as CALC2 and CALC3) have a large potential to be consistent with regulatory initiatives focusing on total LCA GHG emissions.

Classification

Regarding classification, the coherence with the regulatory framework is mainly referring to its potential role as a building block for other parts of the regulatory framework. If no classification system would be linked to the label, as foreseen under CLAS1, other policy instruments need to develop their own classifications, potentially diverging among different instruments. The establishment of classifications as under CLAS2 and CLAS3 increase the usefulness of the label with other policy instruments, for instance as a criterion in public tendering, increasing its value and potential coherence with the regulatory framework as a whole.

Ensuring data quality

By restricting the eligibility to EU manufactured products, that can be expected to report most of the relevant data within the EU ETS framework, DATA1 ensures a high level of compatibility with the ETS. This also opens the possibility for further alignment, e.g. by some targeted modifications to the Free Allocation Rules under the ETS that improve the reporting frequency and data quality for the resulting GHG-intensities, which presently is required to be at least every 5 years. However, the limited verification and certification on the self-declared GHG-intensities might limit the usefulness of this option for other policy instruments, as e.g. for linking to tax or subsidy schemes a high degree of certainty on the exact GHG-intensities is needed and risks on fraud increase. DATA2 addresses this latter element, by requiring more stringent verification and certification procedures. However, as with DATA1 the restricted EU-production coverage may limit the relevance of the label for applications such a linking with the upcoming ESPR requirements (applying to all products placed on the market) or with public procurement criteria. As for DATA3, a direct link with the ETS is not possible, as the extra-EU producers are not covered by the system. This might however partly be addressed through CBAM. At the same time, by extending the scope, DATA3 potentially increases the usefulness of the low-carbon product label and allows for aligning it with other policy instruments and internationally developed standards.

3. How do the options compare?

Key differences between the individual options to design a low-carbon product label are summarised in the following tables The baseline option of having no EU low-carbon product label sets the comparison reference for the different options.

Table 28: Comparison of impacts for the GHG-intensity options29

Key impacts			
Determination GHG-intensity	**CALC1**	**CALC2**	**CALC3**
Environmental impact	+ Limited GHG coverage, good comparability	++ Good GHG coverage, good comparability	+++ Full GHG coverage
Administrative impact	++	+ Based on ETS data/verification, but limited	- Comprehensive and more complex reporting leads to

Key impacts			
Determination GHG-intensity	**CALC1**	**CALC2**	**CALC3**
	Limited data gathering and verifications costs as based on ETS reporting	number of indirect emissions requires extra reporting	higher data gathering and verification costs
Coherence with other parts of the regulatory framework	++ Compatible with ETS and CBAM	+ Largely compatible with ETS and CBAM,	+ Not linked to ETS/CBAM, alignment with other LCA based legislation

Table 30: Comparison of impacts for the classification options 31

Classification	CLAS1	CLAS2.a	CLAS2.b	CLAS3.a	CLAS3.b
Environmental impact	+ Lack of classification limits the effectiveness of the label	+ Uniform classes might disadvantage primary producers and limit uptake	++ Sliding-scale compares across steel production methods, remaining technologically future-proof	+ Separate primary/secondary classification might limit future proofness	++ Flat vs long distinction remains technologically neutral
Administrative impact	- Interpretation of label on users	++ Separate classes increase the usability	++ Separate classes increase the usability	+ More disaggregated categories increase reporting requirements	++ Two different classification systems for flat vs long products increase the usability of the label
Coherence with other parts of the regulatory framework	+ Single metric could be useful for other policy instruments	++ Classes increase the usability	++ Classes increase the usability	++ Classes increase the usability	++ Classes increase the usability

Table 32: Comparison of impacts for the data quality options 33

Data quality	DATA1	DATA2	DATA3
Environmental impact	0	+	++

Data quality	DATA1	DATA2	DATA3
	Risk of greenwashing	Verification increases credibility of the label	Potential impact beyond EU borders
Administrative impact	++ Self-declared data minimizes admin burden	+ Verification and certification can build on ETS approach	- Rigorous verification and certification needs for extra-EU
Coherence with other parts of the regulatory framework	0 Fully compatible with ETS, more limited compatibility with other instruments	+ Compatible with ETS, extra verification increases usefulness for other instruments	++ No direct link with ETS, label could serve procurement and align with other labels

4. Preferred option

Following the analysis of impacts and comparison of options, the preferred policy option would be CALC2, CLAS2b and DATA 2.

The development of a low-carbon product label is one of the initiatives included in the communication on the Clean Industrial deal, aimed to allow industrial producers to distinguish carbon intensity of their industrial production and to benefit from targeted incentives. As such, the development of the label itself and in particular its effectiveness is linked to other elements of the regulatory framework, and in the proposal for an Industrial Accelerator Act. At the same time, the establishment of the label will be coherent with ongoing initiatives on developing comprehensive LCAs (to be used in ESPR and CPR). The preferred option achieves the objective at the least costs by optimising its leverage of the existing data sources and frameworks of the ETS and CBAM. The selected system boundaries allow for a meaningful comparison of the carbon intensity of most steel products put on the EU market, without requiring overly detailed data. The choice of an adapted sliding scale (see classification paragraph) allows for an effective measure, which can compare all production routes of steel and take into account the transformation of the sector in the medium and long term where primary and secondary production will be more and more intertwined.

Determination of GHG intensity

In line with the aims of developing a feasible and impactful product label, with limited administrative impact, the GHG intensity of the steel should be as much as possible calculated using relevant existing product benchmarks established under the EU ETS framework. In addition to these direct industrial GHG emissions, a limited number of key indirect emission sources should be included, i.e. electricity and hydrogen. The relevant GHG-intensity should be calculated in a straightforward way, with annual averages as the preferred approach. However, in some cases a more granular segmentation might be allowed, provided a clear intertemporal and/or physical unit demarcation can be demonstrated.

Classification

To maximise the effectiveness of the low-carbon product label and increase its possible usefulness for other policy instrument, classes of performances should be integrated in the label, based on clear quantitative GHG-intensity thresholds. To maximise the comparability of diverse production pathways and account for the inherent GHG emissions included in scrap, it is recommended to adjust the performance class thresholds in line with the amount of scrap used. However, the exact shape of the curve and the scrap adjustment should be defined in a way that avoids unintended consequences, maximises environmental benefits and still provides sufficient incentives for decarbonisation for both technologies. At the same time, it could be envisaged that the label provides multiple types of information: in addition to indicating a performance class under the classification system, it could also show the actual GHG emission intensity and/or the amount of recycled content used in the product.

For illustration purposes, the figure below provides an initial indication about what the label could look like, at least in its basic elements. The actual levels, the steepness of the curves and the (potential) flattening of the curve require further analysis. Besides the curves, some reference scenarios are added; the dots reflect the emission intensities of specific technology scenarios, with calculations based on the system boundaries of the preferred options of the impact assessment and including the hot rolling step, as this was widely supported by the industry.

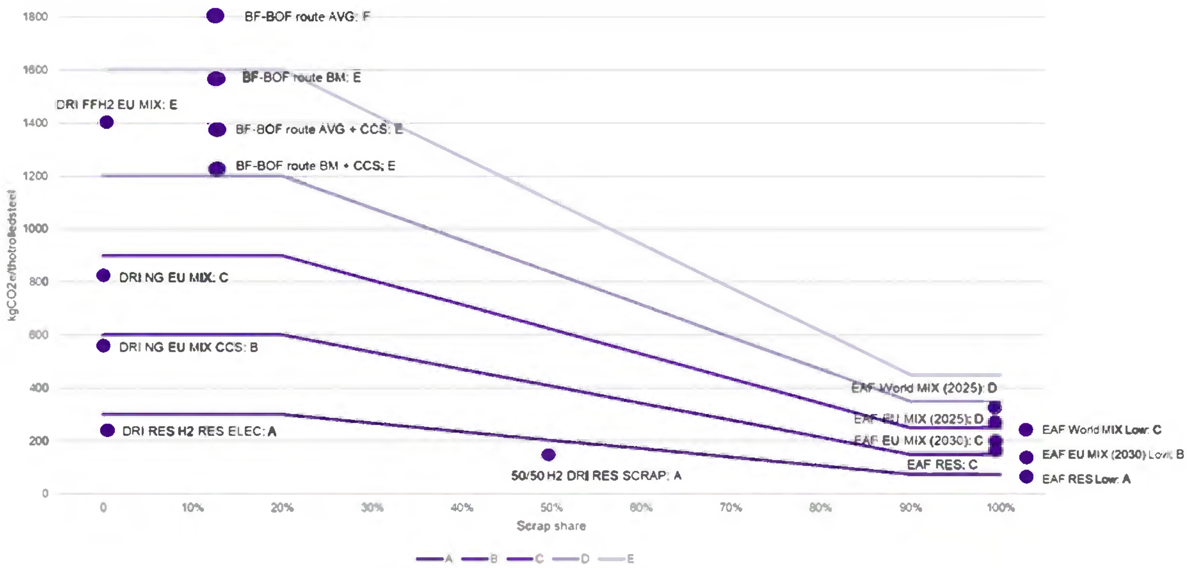

Figure 36: Sliding scale

Table 34: Production route details

Production route	**kgCO$_2$/ ton**	**Scrap input**	**Scrap input**	**Remarks**
BF-BOF route AVG emissions	1898	15%	15%	Based on average emissions from ETS installations (2016-2017)
BF-BOF route BM emissions	1547	15%	15%	Based on ETS benchmark values, for the period 2021-2025
BF-BOF route AVG emissions + CCS	1365	15%	15%	Based on ETS values and scientific literature
BF-BOF route BM emissions + CCS	1226	15%	15%	Based on ETS benchmark values and scientific literature
DRI NG EU MIX	842	0%	0%	Based on information from MIDREX DRI and scientific literature

Production route	**kgCO_2/ ton**	**Scrap input**	**Scrap input**	**Remarks**
DRI NG EU MIX CCS	542	0%	0%	
DRI FF H2 EU MIX	1405	0%	0%	
DRI RES H2 RES ELEC	247	0%	0%	
50/50 H2 DRI RES SCRAP	170	50%	50%	Project with 50% renewable hydrogen DRI and 50% scrap with lower assumptions on fossil fuel injections– hot rolling process is assumed to be 0 for this modelling exercise
EAF EU MIX (2025)	256	100%	100%	Own elaboration and 2025 EEA EU mix
EAF EU MIX (2030)	207	100%	100%	Own elaboration with 2030 EU mix
EAF World MIX (2025)	312	100%	100%	Own elaboration with 2025 World mix
EAF RES ELEC	164	100%	100%	
EAF RES ELEC Low	72	100%	100%	Assumption of lower fossil fuel injections and hot rolling emissions
EAF World MIX (2025) Low	240	100%	100%	
EAF EU MIX (2030) Low	136	100%	100%	

The sliding scale proposed is slightly adapted, to enable a fair comparison between primary and secondary steel producers. While the idea of the sliding scale is to make the threshold of a certain class stricter the more scrap is used, primary production usually involves a certain share of scrap between 10% to 20% - "pure" primary production (i.e. without any scrap) is unlikely. To reflect this, a flat curve is proposed for projects with low amount of scrap input (inferior or equal to 20%), with the thresholds staying the same for scrap input of 0% to 20%. This will also incentivise primary producers to take higher share of scrap in their production. To have a level playing field for secondary producers and encourage overall secondary production, for production where most of the input is scrap (>90%), the thresholds for CLASS A and B being already very ambitious can also be more lenient.

Key assumptions include:

- RES ELEC means 100% renewable electricity – where emissions from electricity are assumed to be 0. The EU MIX (2025) scenario assumes the carbon intensity mix from the latest numbers from the EEA[682] and the World mix are from the 2025 Global Ember electricity review.[683] The EU mix of 2030 draws from the Impact assessment on a 2040 Climate Target[684].

[682] European Environment Agency (2025). Greenhouse gas emission intensity of electricity generation in Europe.
[683] EMBER (2025). Global Electricity Review 2025.
[684] European Commission (2024). Commission staff working document impact assessment report, part 1, accompanying the document Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Securing our future, Europe's 2040 climate target and path to climate neutrality by 2050, building a sustainable, just and prosperous society, SWD/2024/63 final

- Renewable hydrogen impact is assumed to be 0. For fossil fuel hydrogen (FFH2), the world average of the IEA[685] based on steam methane production without CCS is used.
- The Low scenarios represent lower emissions linked to fossil fuel injection in the electric arc furnace and lower emissions linked to hot rolling. Those scenarios were added due to very wide range of possible emissions linked to fossil fuel injection in an EAF and lack of diverse sources of specific data on hot rolling.
- For BF-BOF, as no project specific data is publicly available, CCS numbers are based on theoretical potential capturing rates[686] and exclude emissions linked to the transformation and transportation of the CO_2. It does not consider possible changes to the use of waste gases and potential increase in electricity uses due to the use of CCS.
- For natural gas DRI (NG DRI), CCS is based on theoretical capture rates[687] averaged from information by MIDREX, one of the main DRI technology providers. It also excludes emissions linked to transformation and transportation of CO_2.
- All hot rolling numbers are derived from LESS

Ensuring data-quality

To ensure credible and reliable data underpinning the GHG intensities, it is recommended to require separate verification and certification for the GHG intensities developed as part of the label. For data already reported under the EU ETS and CBAM, a simplified procedure could be considered. Furthermore, it is recommended to establish a label that is open both for steel products manufactured inside and outside the EU, increasing its potential impact and alignment with global initiatives and given sufficient data verification rules are in place.

685 IEA (2023). Comparison of the emissions intensity of different hydrogen production routes, 2021.
686 Fan, Z., Friedmann, S.J. (2021). Low-carbon production of iron and steel: Technology options, economic assessment, and policy. Joule, Volume 5, Issue 4, 21 April 2021, pages 829-862.
687 IEEFA (2024). Carbon capture for steel?

Annex 12a: Relevant steel production product benchmarks under the ETS

Primary steel making

Coke production

What? Coke-oven coke (obtained from the carbonisation of coking coal, at high temperature) or gas-works coke (by-product of gas-works plants) expressed in tonnes of dry coke, determined at the discharge of the coke oven or gas-works plant. Lignite coke is not covered by this benchmark. Coking in refineries is not included but covered by the CWT methodology for refineries.
Which emissions and processes covered? All processes directly or indirectly linked to the process units coke ovens, H_2S/NH_3 incineration, coal preheating (defreezing), coke gas extractor, desulphurisation unit, distillation unit, steam generation plant, pressure control in batteries, biological water treatment, miscellaneous heating of by-products and hydrogen separator are included. Coke oven gas cleaning is included.

Agglomerated iron-ore production

What? Agglomerated iron-bearing product containing iron ore fines, fluxes and possibly iron-containing recycling materials with the chemical and physical properties such as the level of basicity, mechanical strength and permeability required to deliver iron and necessary flux materials into iron ore reduction processes. Expressed in tonnes of agglomerated ore as leaving the agglomerated iron ore production plant. Agglomerated iron ore returned to the production process is not to be considered as part of the product.
Which emissions and processes covered? All processes directly or indirectly linked to the production of agglomerated iron ore are included.

Hot metal production

What? Iron produced from iron ores for primary steelmaking including (a) liquid iron saturated with carbon for further processing, considered as product of blast furnaces, and expressed in tonnes of liquid iron at the exit point of the blast furnace, excluding liquid iron produced from sponge iron under (b); (b) sponge iron at the exit point of a direct reduced iron reactor and expressed in tonnes of sponge iron at the exit point of the direct reduced iron reactor. Similar products such as ferroalloys are not covered by this product benchmark. Residual material and by-products are not to be considered as part of the product.
Which emissions and processes covered? All processes directly or indirectly linked to the process units blast furnace, hot metal treatment units, blast furnace blowers, blast furnace hot stoves, direct reduced iron reactor, electric arc furnace and electric smelting furnace for sponge iron, basic oxygen furnace, secondary metallurgy units, vacuum ladles, casting units (including cutting), slag treatment unit, burden preparation, BF and other gas treatment units, dedusting units, scrap pre-heating, coal drying for PCI, vessels preheating stands, casting ingots preheating stands, compressed air production, dust treatment unit (briquetting), sludge treatment unit (briquetting), steam injection in BF unit, steam generation plant, converter BOF gas cooling and miscellaneous are included.

Secondary steel making

EAF carbon steel

What? Steel containing less than 8% metallic alloying elements and tramp elements to such levels limiting the use to those applications where no high surface quality and processability is required and if none of the criteria for the content of the metal alloying elements and the steel quality for high alloy steel are met. Expressed in tonnes of crude secondary steel ex-caster. Steel produced from sponge iron already covered under the hot metal benchmark is not covered by this benchmark. All processes directly or indirectly linked to the process units electric arc furnace, secondary metallurgy, casting and cutting, post-combustion unit, dedusting unit, vessels heating stands, casting ingots preheating stands, scrap drying and scrap preheating are included. Processes downstream

of casting are not included. For the purpose of data collection, the total electricity consumption within the system boundaries shall be considered.
Which emissions and processes covered? All processes directly or indirectly linked to the process units electric arc furnace, secondary metallurgy, casting and cutting, post-combustion unit, dedusting unit, vessels heating stands, casting ingots preheating stands, scrap drying and scrap preheating are included. Processes downstream of casting are not included. For the purpose of data collection, the total electricity consumption within the system boundaries shall be considered.

EAF high-alloy steel

What? Steel containing 8% or more metallic alloying elements or where high surface quality and processability is required. Expressed in tonnes of crude secondary steel ex-caster. Steel produced from sponge iron already covered under the hot metal benchmark is not covered by this benchmark.
Which emissions and processes covered? All processes directly or indirectly linked to the process units electric arc furnace, secondary metallurgy, casting and cutting, post-combustion unit, dedusting unit, vessels heating stands, casting ingots preheating stands, slow cooling pit, scrap drying and scrap preheating are included. The process units FeCr converter and cryogenic storage of industrial gases are not included. Processes downstream of casting are not included. For the purpose of data collection, the total electricity consumption within the system boundaries shall be considered.

Annex 13: Overview of third countries conditionalities for FDI

The impact of FDI conditionalities can be better understood by referring to existing measures in other economies, notably the United States' Inflation Reduction Act (IRA) of 2022, Canada's 'Made in Canada Plan' of 2023, and China's long-standing investment conditionalities dating back to the 1990s. Each model shows how linking investment incentives to local content, labour, and environmental standards can lead to increased industrial resilience, skilled and well-paid employment, and strengthening of local supply chains.

United States

The IRA of 2022 in the USA directs nearly EUR 378 billion in federal funding to clean energy, with the goal of substantially lowering carbon emissions. The funds are delivered through a mix of tax incentives, grants, and loan guarantees.[688] However the access to these funds is linked to locally sourced input requirements as well as labour and environmental conditionalities. Many subsidies require "Made in America" inputs or assembly, for example, grid-scale renewable projects using domestically produced steel, iron, and components.[689] Furthermore, projects must meet Prevailing Wage and Apprenticeship (PWA) criteria, where workers must be paid local prevailing wages, and a certain percentage of workforce must be qualified apprentices.

As a result, foreign investors are transferring technology, building factories, and cultivating a skilled workforce in the U.S. This strengthens innovation in the clean tech sector, including batteries as well as enhances industrial security and resilience. These investments are also anchoring full domestic supply chains, including raw materials mining and processing. For example, in 2023, 40% of critical minerals for EVs were sourced and processed in the US or permitted jurisdictions, and 50% of battery components were domestically produced or assembled.[690] Positive social outcomes include the creation of over 26 000 new jobs[691] through foreign automotive and battery investments, with wage requirements ensuring fair pay. Investments are also building local production capabilities, including R&I centers, meaning more knowledge transfer and local supplier linkages.

Canada

Similarly, Canada has also introduced conditionalities connected to labour and environmental standards, as well as local content requirements to support local industry. A particularly noteworthy example is the environmental conditionality put on the production of clean hydrogen in Canada.[692] The 2023 federal budget presented in 2023 earmarks EUR 54 billion worth of tax credits and infrastructural investment to encourage investment in low-carbon electricity, manufacturing, and other green industrial activity ('Made in Canada plan').[693] These investments are subject to similar conditionalities as those outlined in the case of the United States. As a result, Canada has seen, over EUR 15 billion in announced EV and battery-related investments.[694] Projects such Volkswagen's PowerCo[695] and Stellantis and LG

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[688] European Commission (2025). COMMISSION STAFF WORKING DOCUMENT Key Performance Indicators (KPIs)/Overview of Resilience Measures by Selected Global Players.
[689] European Parliament (2023). EU's response to the US Inflation Reduction Act (IRA).
[690] Energy Monitor (2023). Weekly data: US outpaces EU in the race to build EV batteries.
[691] Ibid.
[692] Ibid.
[693] European Commission (2025). COMMISSION STAFF WORKING DOCUMENT Key Performance Indicators (KPIs)/Overview of Resilience Measures by Selected Global Players
[694] Battery Industry (2025). Canadian government announces $25m of EV investments.
[695] Volkswagen Group (2023). Volkswagen-backed PowerCo SE reaches significant milestone in St. Thomas gigafactory project.

investment for a 45 GWh plant[696] created an estimated 4 000 direct and several thousand indirect well-paid jobs. This marks a big shift for Canada, which had virtually no battery manufacturing before 2022.

China

China has applied FDI conditionalities for decades as a tool for technology acquisition and industrial upgrading. Since the 1990s, foreign firms in key sectors such as automotive, rail, and energy were required to meet local content thresholds (up to 80–90%) face high tariffs on imports. [697] In wind power, similar requirements mandated at least 70% domestic production This resulted in foreign companies like VW, GM, Siemens, and Vestas having cultivated local supplier networks and transfer supply chain know-how throughout the years.[698]

In parallel, technology transfer requirements obliged foreign companies to share patents, establish R&I centres, and train local engineers. These measures were enforced through joint venture rules and licensing conditions.[699] This long-term strategy generated vast knowledge spillovers, localised supply chains, and propelled China to global leadership in clean energy and advanced manufacturing.

[696] Stellantis (2022). Stellantis and LG Energy Solution to Invest Over $5 Billion CAD in Joint Venture for First Large-scale Lithium-ion Battery Production Plant in Canada.

[697] F. Scheifele, M. Bräuning, B. Probst (2022). The impact of local content requirements on the development of export competitiveness in solar and wind technologies. Renewable and Sustainable Energy Reviews. ,

[698] Ado, R., (2013), Local Content Policy and the WTO Rules of Trade-Related Investment Measures.

[699] Railway Technology (2017). The importance of China's high-speed tech transfer policy.

Annex 14: Extended information on the scenarios in the LEAD_VC cost absorption

As noted in Annex 4, to assess the potential impact, LEAD_VC looked into 2 scenarios for costs absorption to take into account uncertainties regarding the possible reaction of non-EU manufacturers:

In the *Internal market reaction* scenario, non-EU vehicle manufacturers will not be able to access public procurements or benefit from support schemes. In the latter case, they will not be able to cover the loss of subsidies coming from the support schemes and the prices of their vehicles will increase by the amount of the lost subsidies. In other words, consumers will face a price increase equalling the lost subsidies for non-EU vehicles. This scenario is considered the most favourable scenario for EU EV manufacturers and suppliers, but the least favourable for the consumers.

The *non-EU manufacturers absorb the price increase* scenario is based on the same assumptions as *Internal market reaction* scenario: non-EU vehicle manufacturers will not be able to access public procurements or benefit from support schemes. However, in the latter case, the non-EU manufacturers fully absorb the loss of subsidies so that the price of their vehicles does not increase. In other words, non-EU vehicle manufacturers apply a discount on their vehicles for consumers to compensate for the loss of subsidies following the entry into force of the measure. However, such a behaviour would inevitably come with significant financial challenges for non-EU manufacturers. This scenario is considered the least favourable scenario for EU EV manufacturers and suppliers, but the most favourable for the consumers.

While the *Internal market reaction scenario* is the one reflected throughout the Impact Assessment, this Annex 14 retains the second scenario for comparison and information purposes to explore different market possibilities.

1. **Made in EU requirements in vehicle components for public procurements and support schemes**

Impact on vehicle component suppliers

EU suppliers in the "non-EU manufacturers absorb the price increase" scenario		
	2027	**2030**
Passenger cars		
sales increase - billion euro	0.9	1.6
LCVs		
sales increase - billion euro	0.1	0.2
HDVs		
sales increase - billion euro	0.026	0.031

In the non-EU manufacturers absorb the price increase scenario, the sales increase of EU suppliers is expected to be more limited, rising only by EUR 0.9 billion in 2027 and EUR 1.6 billion in 2030. Sales of EU suppliers are lower in this than in the *Internal market reaction* scenario because the increase in sales of EU EVs will be lower in the *Non-EU manufacturers* *absorb the price increase* scenario (see sales increase in the impact on the downstream sector). It is because non-EU car makers absorb the price differential, which reduces their margins to limit the substitution of consumers from non-EU (with a price increase after the measure) for EU (with a price decrease after the measure) that happen in *Internal market reaction*.

In this scenario the sales increase of EU suppliers in the LCV vehicle segment is expected to be more limited, rising only by EUR 0.1 billion in 2027 and EUR 0.2 billion in 2030.

Furthermore, the sales increase of EU suppliers is expected to be more limited, rising only by EUR 25.6 million in 2027 and EUR 30.9 million in 2030 for HDVs.

Impact on downstream sector (automotive manufacturers)

EU EV manufacturers in the "non-EU manufacturers absorb the price increase" scenario

In EUR billion	**2027**	**2030**
Passenger cars		
cost increase	0.0	1.5
sales increase	2.0	0.1
LCVs		
cost increase	0.0	0.2
sales increase	0.3	0.1
HDVs		
cost increase	0.0	0.13
sales increase	0.055	-0.17

In both scenarios, given the current 70% made in EU, the measure would not lead to any further costs for EU EV manufacturers in 2027.

For passenger cars: under the *Non-EU manufacturers absorb the price increase* scenario, if we assume that non-EU manufacturers fully absorb the relative price increase, EU EV manufacturers will still benefit from a sales increase of EUR 2 billion thanks to the price differential between EU and non-EU manufacturers as a result of reallocation of subsidies. In this scenario, the proposed target for 2030 will lead to a cost increase of EUR 1.5 billion, however, the projected sales increase will be limited to EUR 0.1 billion. The sales increase is lower in this scenario because the sales price differential between EU and non-EU cars will be zero as non-EU manufacturers internally absorb the policy. In this scenario, the price-differential is larger than in the *Internal market reaction* scenario. Under this scenario, the non-EU EV manufacturers reduce their margins to absorb the price differential, hence it will come at a cost for them, hence it comes at a higher cost for non-EU manufactures. However, as there are still large positive benefits in 2027 for the EU manufacturers, cumulative gains may still be positive even under the *Non-EU manufacturers absorb the price increase* scenario.

For LCVs: if we assume that non-EU manufacturers fully absorb the relative price increase, EU manufacturers of light commercial vehicles will still benefit from a sales increase of EUR 0.3 billion in 2027. In this scenario, the proposed target for 2030 will lead to a cost increase of EUR 0.2 billion, whereas the projected sales increase will be limited to EUR 0.1 billion because non-EU manufacturers would need to reduce their margins to absorb the price differential.

Under the *Non-EU manufacturers absorb the price increase* scenario, if we assume that non-EU manufacturers fully absorb the relative price increase, EU EV HDV manufacturers will still benefit from a sales increase of EUR 54.9 million. In this scenario, the proposed target for 2030 will still lead to a cost increase of EUR 129 million, and this is going to be accompanied by a projected sales reduction for EU EV HDV manufacturers (-172 million euro) as a worst-case scenario. As sales of electric HDVs increase over time, the amount of subsidy taken into account in the assumptions may be insufficient to offset the negative impact of this measure.

Global Added Value:

Value Added in EUR billion		
Non-EU manufacturers absorb the price increase	**2027**	**2030**
automotive	0.5	0.0
intermediate	0.4	0.7
Global value added - Only first round of Value Chain	0.9	0.7
Global value added - Estimated all Value Chain	1.8	2.1

Furthermore, the measure is projected to lead to the generation of EUR 0.9 billion Global Value Added in 2027 and EUR 0.7 billion in 2030 when assessing the impact, taking into account only the first tier of the value chain.[700]

Impact on consumers

EU consumers in the "Non-EU manufacturers absorb the price increase" scenario		
	2027	**2030**
Passenger cars		
EVs price changes (%)	-1.6%	-0.2%
EVs sold change (thousand)	127.7	10.1
LCVs		
EVs price changes (%)	-2.0%	-0.6%
EVs sold change (thousand)	18.5	8.2
HDVs		
EVs price changes (%)	-0.4%	0.6%
EVs sold change (thousand)	0.6	-2.0

Under *Non-EU manufacturers absorb the price increase* scenario, if we assume that non-EU manufacturers fully absorb the relative price increase, the price of EVs is expected to decrease by 1.6% by 2027 and by 0.2% by 2030. Consequently, consumers are going to be impacted positively, and the sale of EVs is going to increase by 127 700 vehicles in 2027 and by 10 100 vehicles in 2030.

For LCVs, prices are going to decrease by 2% in 2027 and by 0.6% in 2030. The sales of EVs are going to increase by 18 500 vehicles in 2027 and by 8 200 vehicles in 2030.

[700] Global Value Added (GVA) refers to the total economic value generated by the projected production of EU EV manufacturers and the EU suppliers, as well as further intermediate inputs necessary to increase the Made in EU requirement of the measure and increase production of EU EVs

For HDVs, prices are going to slightly decrease by 0.4% in 2027 and then increase by 0.6% in 2030. The sales of EV HDVs are going to slightly increase by 600 vehicles in 2027 and then decrease by 2 000 units in 2030.

Impact on emissions

In the *Non-EU manufacturers absorb the price increase* scenario, production and transport emissions are almost unchanged compared to the Reference. In 2027, substitution from EVs to ICEs could lead to higher emissions from the fuel use of new passenger cars (1 Mt) in *Internal market reaction*, but to lower emissions (2.8 Mt) in *Non-EU manufacturers absorb the price increase*; this effect almost disappears in 2030.
In sum, the environmental effects remain limited and are very similar across LEAD_VC 1 and LEAD_VC 2.

2. **Introduce Made in EU requirements in automotive components for public procurement, public support schemes and all vehicles placing on the market.**

Impact on EU vehicle component suppliers

EU suppliers in the "Non-EU manufacturers absorb the price increase" scenario		
In EUR billion	**2027**	**2030**
Passenger cars		
sales increase	1.1	1.9
LCVs		
sales increase	0.2	0.3
HDVs		
sales increase	0.031	0.037

In LEAD_VC 2, the impacts are similar as under LEAD_VC 1:

- For passenger cars, In the *Non-EU manufacturers absorb the price increase* scenario, the sales increase of EU suppliers is expected to be more limited, rising only by EUR 1.1 billion in 2027 and EUR 1.9 billion = in 2030.
- For LCVs: the sales increase of EU suppliers is expected to be more limited, rising only by EUR 0.2 billion in 2027 and EUR 0.3 billion in 2030.
- For HDVs: the sales increase of EU suppliers is expected to be more limited than the alternative scenario, rising only by EUR 30.6 million in 2027 and EUR 37 million in 2030.

Impact on downstream sectors

EU EV manufacturers in the "Non-EU manufacturers absorb the price increase" scenario		
in EUR billion	**2027**	**2030**
Passenger cars		
cost increase	0.0	1.8
sales increase	2.4	0.1
LCVs		

cost increase	0.0	0.2
sales increase	0.4	0.2
HDVs		
cost increase	0.0	0.15
sales increase	0.066	-0.21

Under *Non-EU manufacturers absorb the price increase*, if we assume that non-EU manufacturers fully absorb the relative price increase, for passenger cars, EU EV manufacturers will still benefit from a sales increase of EUR 2.4 billion. In this scenario, the proposed target for 2030 will lead to a cost increase of EUR 1.8 billion, however, the projected sales increase will be limited to EUR 0.1 billion. The sales increase is lower in this scenario because the sales price differential between EU and non-EU cars will be lower.

For LCVs: manufacturers will still benefit from a sales increase of EUR 0.4 billion in 2027. In this scenario, the proposed target for 2030 will lead to a cost increase of EUR 0.2 billion, whereas the projected sales increase will be limited to EUR 0.2 billion.

For HDVs: EV manufacturers will still benefit from a sales increase of EUR 65.6 million. In this scenario, the proposed target for 2030 will still lead to a cost increase of EUR 154.1 million, and this is going to be accompanied by a projected sales reduction for EU EV HDV manufacturers (EUR -206 million).

Global Value Added

Value Added in EUR billion		
Non-EU manufacturers absorb the price increase	**2027**	**2030**
automotive	0.6	0.0
intermediate	0.5	0.8
Global value added - Only first round of Value Chain	1.1	0.8
Global value added - Estimated all Value Chain	2.1	2.5

Furthermore, the measure is projected to lead to the generation of EUR 1.1 billion Global Value Added in 2027 and EUR 0.8 billion in 2030 when assessing the impact, taking into account only the first tier of the value chain.

Impact on consumers and citizens

EU consumers in the “Non-EU manufacturers absorb the price increase” scenario		
	2027	**2030**
Passenger cars		
EVs price changes (%)	-1.9%	-0.2%
EVs sold change (thousand)	152.6	12.1
LCVs		
EVs price changes (%)	-2.4%	-0.7%
EVs sold change (thousand)	22.1	9.8
HDVs		
EVs price changes (%)	-0.5%	0.8%

EVs sold change (thousand)	0.7	-2.4

Under *Non-EU manufacturers absorb the price increase*, if we assume that non-EU manufacturers fully absorb the relative price increase, the price of passenger and LCV EVs is expected to decrease:

For passenger cars: by 1.9% by 2027 and by 0.2% by 2030. Consequently, consumers are going to be impacted positively, as the sale of EVs is going to increase by 152 600 vehicles in 2027 and by 12 100 vehicles in 2030.
For LCVs: by 2.4% in 2027 and by 0.7% in 2030. The sales of EVs are going to increase by 22 100 vehicles in 2027 and by 9 800 vehicles in 2030.

For HDVs: by 0.5% in 2027 and then increase by 0.8% in 2030. The sales of EV HDVs are going to slightly increase by 700 vehicles in 2027 and then decrease by 2 400 units in 2030.

Impact on emissions

In *Non-EU manufacturers absorb the price increase,* production and transport emissions are almost unchanged compared to the Reference. In 2027, substitution from EVs to ICEs could lead to higher emissions from the fuel use of new passenger cars (0.8 Mt) in *Internal market reaction*, but to lower emissions (2.2 Mt) in *Non-EU manufacturers absorb the price increase*; this effect almost disappears in 2030.

Annex 15: Sensitivity analysis: costs and benefits

Where uncertainties are identified regarding the impact of cost and benefits of different measures, this annex presents a sensitivity analysis and provides ranges of estimates to present the order of magnitude. This Annex builds on the main data sets outlined in Annex 4 but presents a wider depiction of impacts. The values used in Annex 4 for the total costs and benefits calculations are also reflected below for information, *while the sensitivity analysis ranges are presented in italics.*

However, for LEAD EII the sensitivity analysis differs from adjustment costs modelled by FIDELIO and presented throughout the Impact Assessment. The analysis below are theoretical maximum costs based on the expected vehicle deployment of 2030, and the average price of a vehicle in the EU. Both results, those from FIDELIO and sensitivity analysis below, use the same price increase from using low-carbon steel as a starting point, but are analysed differently.

Administrative savings

- PERM: The cost savings from implementing a digitally integrated permit granting process are calculated based on a study on business procedures carried out to underpin the Single Digital Gateway impact assessment[701]. It concluded that for 9 procedures, the cost savings for all EU businesses (EU business in 2023 represented 33 million enterprises[702]), - if e-procedures were introduced where missing - would be in the order of magnitude of EUR 6.5 billion for domestic users (i.e. 433.3 million for 2.2 million businesses in the manufacturing sector). Following an adjustment calculation to the EUR 6.5 bn to assume an average of 5 permit- granting procedures, and assuming the costs for all procedures is equal, this could translate into savings of EUR 240 million specifically for the manufacturing sector for an average of 5 procedures.

- The sensitivity analysis is carried out with the assumption that only a third of the manufacturing industries can carry out their transformation process by 2030. In that range, the savings are reduced to 80 million as shown below.

PERM	**Difference to the baseline**		
	PO1	**PO2**	**PO3**
Businesses			
Administrative savings **(one-off)**	Digitalisation of permitting procedures EUR 240 million *Sensitivity: EUR 80 million – EUR 240 million*		

Adjustment costs

[701] SWD/2017/0213 final - 2017/086 (COD)
[702] Eurostat (2024). Large businesses make up only 0.2% of EU enterprises.

Assumptions taken for adjustment costs for the **automotive sector**:

LEAD_EII Low-carbon provisions (steel costs only):

Price increase:

- The adjustment cost for a midsize passenger vehicle is estimated to range from 0.3% to 0.7% of the final price, with a 100% low-carbon steel depending on the decarbonisation pathway.[703] A 25% low-carbon steel target would see a price increase ranging from 0.075% to 0.175% (EUR 28 – 65 per passenger vehicle).
- Heavy duty vehicles will see a price increase calculated as EUR 25.89 increaser per tonne of steel times 7.2 [704] (amount of steel in tonnes present in a heavy weight vehicle).

Cost distribution:

- The number of passenger cars and light commercial vehicles purchased in 2030 is projected to reach 12.8 million. This total is made of 11 million passenger cars, plus 1.8 million light commercial vehicles. Additionally, heavy duty vehicles will reach 382 000. [705]
- By 2030, passenger vehicles sales are expected to break down as follows: 60% corporate 36.5% private purchases by citizens, and 3.5% public procurement. It is assumed that heavy-duty vehicles are procured only by businesses and Member States. Costs are therefore split between "impacts to downstream sectors" for corporate and "impacts on citizens" for private households throughout Section 6 and the breakdown of costs in the individual tables. The distribution of the different market segments is as follows:
    - 3.5% through public procurement
    - 70.1% through public support schemes
    - 26.4% through private purchases.
- In the context of this exercise's cost distribution, it is assumed that the market share, including the split between corporate fleets and private purchases, as well as the share covered by public support schemes, remains unchanged for 2030
- As the exact amount of subsidies that will potentially cover the green premium cannot be estimated in this analysis, nor the absorption of costs by the manufacturer's, these figures represent a theoretical maximum cost.

LEAD_EII	Difference to the baseline		
	PO1	**PO2**	**PO3**
Member States administrations			
Adjustment costs (recurring)	*Sensitivity analysis: Vehicle fleet EUR 14.04 million – EUR 32.59 million*[706]	*Sensitivity analysis: Vehicle fleet EUR 14.04 million – EUR 32.59 million*[707]	*Sensitivity analysis: Vehicle fleet EUR 14.04 million – EUR 32.59 million*[708]
Citizens/Consumer			

[703] BCG (2022). Transforming the Steel Industry May Be the Ultimate Climate Challenge.
[704] Based on JRC modelling of LEAD_VC impacts.
[705] Based on JRC modelling of LEAD_VC impacts.
[706] A 25% low-carbon steel target would see a price increase ranging from 0.075% to 0.175% (EUR 28 – 65 per passenger vehicle).
[707] A 25% low-carbon steel target would see a price increase ranging from 0.075% to 0.175% (EUR 28 – 65 per passenger vehicle).
[708] A 25% low-carbon steel target would see a price increase ranging from 0.075% to 0.175% (EUR 28 – 65 per passenger vehicle).

LEAD_EII	Difference to the baseline		
	PO1	**PO2**	**PO3**
Adjustment costs ((recurring)	*Sensitivity analysis :* Passenger cars: *EUR 91.7 million – EUR 212.87 million*	*Sensitivity analysis :* Passenger cars: *EUR 91.7 million – EUR 212.87 million*	*Sensitivity analysis : Passenger cars: EUR 130.8 million – EUR 303.68 million*
Businesses			
Adjustment costs (recurring)	*Sensitivity analysis: corporate fleets EUR 179.6 million – EUR 417.125 million*	*Sensitivity analysis: corporate fleets EUR 179.6 million – EUR 417.125 million*	*Sensitivity analysis: corporate fleets EUR 256.3 million- EUR 595.04 million*
TOTAL (sensitivity)	***Automotive: 285 million – 662.6 million***	***Automotive: 285 million – 662.6 million***	***Automotive: 401 million- 931 million***

LEAD_SOL

Two different price scenarios compare the cheapest alternative for PV (e.g. Chinese imports) to a European NZIA- compliant PV with polysilicon and wafers / ingots from China.

- 65 GW of Chinese modules: EUR 10.335 billion. *For 58 GW EUR 9.222 billion.*
- 65 GW of European products with poly-wafer come from China: EUR 12.35 billion. *For 58 GW EUR 11.02 billion.*

The delta between them is EUR 2.015 billion for 65 GW of solar PV, which is broken down per market segment as follows:

- Public procurement: 0.03 × 2.015 = EUR 0.06045 billion
- Auctions: 0.19 × 2.015 = EUR 0.38285 billion
- Schemes: 0.12 × 2.015 = EUR 0.2418 billion
- Rest of the market: 0.66 × 2.015 = EUR 1.3299 billion

The sensitivity delta following the more conservative estimate of deployment, is 1.798 billion for 58 GW which is broken down per market segment as follows:

- *Public procurement: 0.03 × 1.798 = EUR 0.05394 billion*
- *Auctions: 0.19 × 1.798 = EUR 0.3416 billion*
- *Schemes: 0.12 × 1.798 = EUR 0.2157 billion*
- *Rest of the market: 0.66 × 1.798 = EUR 1.18 billion*

58 GW is based on solar capacity deployment projection in 2030[709]. Although there is no low scenario for 2030, it has been extrapolated from the low scenario of years 2026-2028.

LEAD_SOL	**Difference to the baseline**		
	PO1	PO2	PO3
Member States			

[709] SolarPower Europe (2025). Reshoring Solar Manufacturing to Europe. A cost gap analysis and a policy impact simulation.

LEAD_SOL	**Difference to the baseline**		
	PO1	PO2	PO3
Adjustment costs (recurring)	Public procurement: EUR 60.45 million Auction margins decrease by: EUR 382.85 million *Sensitivity:* *Public Procurement: EUR 53.04 million-60.45 million* *Auction margins decrease by: EUR 341.6 million -EUR 382.85 million*		Public procurement: EUR 60.45 million Auction margins decrease by: EUR 382.85 million *Sensitivity:* *Public Procurement: EUR 53.04 million- 60.45 million* *Auction margins decrease by: EUR 341.6 million -EUR 382.85 million*
Citizens/Consumer			
Adjustment costs (recurring)	Public support schemes: EUR 241.8 million *Sensitivity:* *Public support schemes: EUR 215.7 million - EUR 241.8 million*		Public support schemes: EUR 241.8 million Other PV placed on the market : EUR 1.3299 billion *Sensitivity:* *Public support schemes: EUR 215.7 million - EUR 241.8 million* *Other PV placed on the market : EUR 1.18 billion - EUR 1.3299 billion*
TOTAL sensitivity	***EUR 610.34 million – 685.1 million***		***EUR 1.79 billion – EUR 2.01 billion***

LEAD_BAT

Assumptions taken for adjustment costs:

- The total adjustment costs compare the average cost of manufacturing the same battery chemistries (i.e., localised battery cells, cathodes and anodes) in the current cheapest market, China, with those manufactured in the EU with a cost differential ranging from 26% to 50%. These costs do not take into account the phased approach, which would reduce the impact on prices during the first years of entry into force.
    - Battery cell manufactured in China by Tier 1 manufacturers (i.e., 60 EUR/kWh in 2024),
    - Battery cell manufactured in in the EU with localised CAM and AMM, (i.e., 75.6-90 EUR/kWh).
- Additionally, global price decreases in batteries have been accounted for, as these are expected to drop significantly in the upcoming years. As battery cell costs decline over time, the total cost differential with China is expected to decrease, ranging between 11-21 EUR/kWh in 2028, 9-17 EUR/kWh in 2030, and between 6-12 EUR/kWh in 2035.

LEAD_BAT	Difference to the baseline		
	PO1	**PO2**	**PO3**
Member States administrations			
Adjustment costs (recurring)	BESS: average EUR 46 million EVs: average EUR 231.5 *Sensitivity:* *Auctions for BESS: EUR 26 – 66 million* *Public procurement for EVs: EUR 132 – 331 million*		BESS average EUR 46 million) EVs: average EUR 231.5 *Sensitivity:* *Auctions for BESS: EUR 26 – 66 million* *Public procurement for EVs: EUR 132 – 331 million*
Citizens/Consumer			
Adjustment costs (recurring)	EVs: average EUR 511 million *Sensitivity EVs[710]: EUR 292-730 million*		EVs: average EUR 0.9 billion BESS average: EUR 494 million *Sensitivity:* *EVs : EUR 0.5 – 1.3 billion* *BESS : EUR 282-706 million*
Businesses[5]			
Adjustment costs (recurring)	EVs: average EUR 1.55 billion *Sensitivity EVs : EUR 0.9-2.2 billion*		EVs average : EUR 1.55 billion BESS : EUR 187.5 million *Sensitivity :* *EVs: EUR 0.9-2.2 billion* *BESS : EUR 107-268 million*

[710] We assume that there is public support to buy EV vehicles in Europe for corporate purchases. In contrast, public support is only available for consumers in Austria, Belgium, Croatia, Cyprus, Czechia, Estonia, France, Greece, Hungary, Ireland, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Slovenia, Spain, and Sweden (ACEA, 2025). Against this background, we estimate that LEAD_VC 1 would affect 80.2% of EV registrations, including 60.0% from corporate purchases, and 20.2% from consumers.

LEAD_BAT	Difference to the baseline		
	PO1	**PO2**	**PO3**
TOTAL sensitivity	***EVs 1.3 billion – 3.26 billion*** ***BESS: EUR 26 – 66 million***		***EV : 1.5 billion- 3.8 billion*** ***BESS : 415 million – 1.04 billion***

LEAD_VC

In the LEAD_VC analysis, the most critical parameters are the elasticities governing consumer behaviour. We consider the demand elasticity of vehicles to capture the effect of prices on quantities (price effects), the cross-product elasticities to capture substitution between ICE and EV, and the cross-region elasticities to capture substitution between EU- and non-EU-made EVs. These elasticities determine EV demand, the type of purchased vehicles (ICE vs. EV), the source of those vehicles (EU vs. non-EU), and their evolution in the aftermath of a policy intervention that alters relative prices. We define these elasticities more formally and provide the preferred values used in the impact assessment in Annex 4. In what follows, we do a sensitivity analysis on the set of elasticity parameters, decreasing and increasing them by 0.1, one by one:

- Demand elasticity ranges from -0.4 to -0.6, with a preferred value of -0.5.
- Cross-product elasticities:
  - EV vs. ICE ranges from 0.2 to 0.4, with a preferred value of 0.3.
  - EV vs. EV ranges from -1.6 to -1.4, with a preferred value of -1.5.
- We adjust the other two elasticities (ICE vs. ICE and ICE vs. EV) that are not critical for the analysis to preserve the demand elasticity in its preferred value of -0.5.

- Cross-region elasticities:
  - Non-EU vs. EU ranges from 0.9 to 1.1, with a preferred value of 1.0.
  - EU vs. EU ranges from -1.1 to -1.3, with a preferred value of -1.2.
  - EU vs. non-EU ranges from 0.9 to 1.1, with a preferred value of 1.0.
  - We adjust the non-EU vs. non-EU elasticity to preserve the preferred demand elasticity of -0.5.

The following table summarises the results of this sensitivity analysis for LEAD_VC 1 under the “Internal market reaction” scenario in 2030.

		Demand	**Cross-product**	**Cross-region**	**Overall**
Impact on EU EV manufacturers					
Passenger cars	Sales (billion euro)	6.0-6.0	5.9-6.0	5.6-6.3	5.6-6.3
LCVs	Sales (billion euro)	0.8-0.8	0.8-0.8	0.8-0.8	0.8-0.8
HDVs	Sales (billion euro)	0.12-0.14	0.13-0.14	0.12-0.14	0.12-0.14
TOTAL	**Sales (billion euro)**	**6.9-7.0**	**6.9-7.0**	**6.5-7.3**	**6.5-7.3**
Impact on vehicle component suppliers					
Passenger cars	Cost (billion euro)	1.6-1.6	1.6-1.6	1.6-1.6	1.6-1.6
	Sales (billion euro)	7.6-7.7	7.6-7.7	7.0-8.3	7.0-8.3

		Demand	Cross-product	Cross-region	Overall
LCVs	Cost (billion euro)	0.2-0.2	0.2-0.2	0.2-0.2	0.2-0.2
	Sales (billion euro)	1.3-1.3	1.2-1.3	1.1-1.3	1.1-1.3
HDVs	Cost (billion euro)	0.13-0.13	0.13-0.13	0.13-0.13	0.13-0.13
	Sales (billion euro)	(–0.01)-0.01	(–0.01)-0.01	(–0.02)-0.02	(–0.02)-0.02
TOTAL	**Cost (billion euro)**	**1.9-2.0**	**2.0-2.0**	**2.0-2.0**	**1.9-2.0**
	Sales (billion euro)	**8.9-8.9**	**8.9-9.0**	**8.1-9.5**	**8.1-9.5**
Value Added					
Automotive (EV manufacturers and component suppliers)		1.9-1.9	1.9-1.9	1.8-2.0	1.8-2.0
Intermediate (out of automotive sector)		2.6-2.6	2.6-2.6	2.3-2.8	2.3-2.8
Global value added - Only first round of Value Chain		4.5-4.5	4.5-4.5	4.1-4.8	4.1-4.8
Global value added - Estimated all Value Chain		**9.7-9.7**	**9.6-9.8**	**8.8-10.3**	**8.8-10.3**
Impact on consumers					
Passenger cars	EVs price changes (%)	1.2%-1.2%	1.2%-1.2%	1.2%-1.2%	1.2%-1.2%
	EVs sold change (thousand)	(–88.4) -(–64.3)	(–76.4) -(–76.2)	(–77.8) -(–74.9)	(–88.4) -(–64.3)
LCVs	EVs price changes (%)	0.4%-0.4%	0.4%-0.4%	0.4%-0.4%	0.4%-0.4%
	EVs sold change (thousand)	2.0-2.3	2.1-2.5	0.0-4.3	0.0-4.3
HDVs	EVs price changes (%)	1.2%-1.2%	1.2%-1.2%	1.2%-1.2%	1.2%-1.2%
	EVs sold change (thousand)	(–1.8) -(–1.5)	(–1.7) -(–1.7)	(–1.8) -(–1.6)	(–1.8) -(–1.5)
TOTAL	**EVs price changes (%)**	**1.2%-1.2%**	**1.2%-1.2%**	**1.2%-1.2%**	**1.2%-1.2%**
	EVs sold change (thousand)	**(–88.2) -(–63.5)**	**(–75.4) -(–75.9)**	**(–72.2) -(–79.5)**	**(–72.2) -(–79.5)**

The cross-region elasticity is the parameter that most affects the results for EU EV manufacturers, vehicle component suppliers, and the value added generated. Demand elasticity is the parameter that most affects consumer behaviour. However, the sensitivity analysis shows the robustness of the results presented in the impact assessment, with values falling within a small range and not significantly affecting the policy's economic effects.

Environmental benefits

LEAD_EII, *LEAD_BAT, LEAD_SOL and LEAD_VC:* In relation to the monetisation of GHG emissions, a cost of carbon is used[711]. Figures underpinning the analysis are below, and the 2030 value used of EUR 60-189 per tCO_2eq used to give an estimation of the benefit range.

[711] European Commission (2019). Handbook on the external costs of transport.

This is an approximation, and no variation is made to reflect the time profile of when emissions will occur.

Values in current EUR per tCO2

	Low	Central	High
Up to 2030	60	100	189
Post 2030	156	269	498

	PO1	**PO2**	**PO3**
LEAD_EII (low-carbon steel and cement)	Total steel, cement and aluminium: 4.28 Mtonnes CO_2 (EUR 428 million) Sensitivity: EUR 256 million to EUR 809 million	Total steel, cement and aluminium: 4.28 Mtonnes CO_2 (EUR 428 million) Sensitivity: EUR 256 million to EUR 809 million	Total steel, cement and aluminium: 13.58 Mtonnes CO_2 (EUR 1 358 million) Sensitivity: EUR 814 million to EUR 2 566 million
Similar question LEAD_BAT	25.6 Mtonnes CO_2 (EUR 2 560 million) Sensitivity: EUR 1 530 million to EUR 4 830 million	25.6 Mtonnes CO_2 (EUR 2 560 billion) Sensitivity: EUR 1 530 million to EUR 4 830 million	34.17 Mtonnes CO_2 (EUR 3 400 million) Sensitivity: EUR 2 050 million to 6 450 million
LEAD_VC	0.7 Mtonnes CO_2 (EUR 70 million) Sensitivity: EUR 42 million to EUR 132 million	0.7 Mtonnes CO_2 (EUR 70 million) Sensitivity: EUR 42 million to EUR 132 million	0.9 Mtonnes CO_2 (EUR 90 million) Sensitivity: EUR 54 million to EUR 170 million
TOTAL	**30.58 Mtonnes CO_2** **(EUR 3 058 million)** ***Sensitivity: EUR 1 830 million to EUR 5 780 million***	**30.58 Mtonnes CO_2** **(EUR 3 058 million)** ***Sensitivity: EUR 1 830 million to EUR 5 780 million***	**48.65 Mtonnes CO_2** **(EUR 4 865 million)** ***Sensitivity: EUR 2 910 million to EUR 9 195 million***

Annex 16: Net-Zero Technologies

While the impact assessment report focuses on batteries and PV technologies, this Annex expands the scope of the analysis to the additional net-zero technologies for which Made in EU requirements have been proposed. Specifically, it provides detailed information and a comprehensive cost-benefit analysis that includes wind energy, nuclear fission energy technologies, heat pumps, electricity grid technologies, solar thermal technologies and electrolysers. This expanded assessment not only illustrates the rationale behind the design of Made in EU requirements for each of these technologies but also evaluates a range of socioeconomic impacts. It considers factors such as manufacturing capacity availability and geographic variations in production costs and other pertinent dimensions, offering insights into the feasibility and impact on consumers. By delving into these pertinent dimensions, the Annex aims to provide a more nuanced understanding of both the potential benefits and challenges associated with regional manufacturing mandates for emerging net-zero technologies.

Identification of NZIA main specific components to be covered by Made in EU requirements

The Net-Zero Industry Act defines main specific components of net-zero technologies as those components essential for manufacturing the final product. To ensure the EU is resilient in the deployment of net-zero technologies, it is fundamental to develop a diversified supply of main specific components. A further level of ambition that also aims at leveraging the energy transition as an industrial opportunity to create jobs and create added value within the EU – which is a necessary factor to gain broad consensus on the energy transition – entails that the EU produces some of these essential components domestically. Reshoring the entire supply chain at once is impractical; it must be carefully managed to avoid supply-demand imbalances that could hinder technology deployment.

A strategic and gradual approach to reshoring is essential, which prioritizes components for which the EU is best fit to compete. This has been the guiding element in the definition of the draft 'Made in EU' requirements in the Industrial Accelerator Act (IAA). The methodology relied on two steps: first identifying competitively producible components and then verifying sufficient manufacturing capacity is available. The degree of competitiveness of the EU in producing net-zero technologies main specific components has been analysed comparing the levelized cost of production (and its underlying drivers such as capital costs, labour costs, operational costs and energy costs) in the EU and overseas. Such assessment aimed at ensuring that the proposed made in EU requirements are tailored and guarantee proportional investments without excessive expense (see Section *'Assessment of socioeconomic implications of IAA provisions related to net-zero technologies'*). Once the strategic components have been identified, the status and projected evolution on manufacturing capacity in the EU has been assessed vis-à-vis expected demand to ensure realistic made in EU ambitions (see section *'EU capacity to supply its demand for net-zero technologies'*). When manufacturing capacity falls short of demand, made in EU requirements have been either postponed or adjusted to prevent demand-supply imbalances and longer lead times. In such cases, requirements may be generalized to promote flexibility: rather than stipulating that specific components like PV cells must be EU-made, the requirement could be "one component should be made in the EU." This flexibility encourages the industry to produce competitively viable components while adapting to capacity constraints.

This section outlines for various net-zero technologies how strategic components that should feature Made in EU requirements have been identified.

PV

Cells and modules are crucial stages in the PV value chain, offering significant added value and job creation opportunities[712], making them strategic priorities for EU industries to leverage the benefits of PV adoption. Additionally, cells and modules have the lowest energy intensity in the PV value chain. With EU energy prices higher than those of many competitors, the EU is most likely to be competitive in producing components of lower energy intensity, such as PV cells and modules.

The PV inverter industry in the EU is well-established but faces growing competition from third countries. Inverters are also a crucial component from a cybersecurity standpoint. As such, PV inverters should be prioritized as a strategic component, ensuring they are manufactured within the EU.

Therefore, building on the analysis on the design of policy measure conducted in Annex 9 of this report, Made in EU requirements for solar PV could initially target inverters, modules, and cells. However, due to capacity constraints, as determined by conservative assessments of projected manufacturing capabilities, this requirement would be adjusted to: "inverters and at least two main specific components." This flexible approach prioritizes strategic components while allowing for the production in the EU of other main specific components (e.g. solar glass, PV trackers, and polysilicon) to meet demand effectively.

Heat pumps

Heat pumps assembly is neither energy-intensive nor labour-intensive, indicating that the EU can undertake this phase domestically without significantly increasing costs[713]. The majority of heat pump production costs stem from the manufacturing of key components, particularly compressors, which make up approximately 70% of the cost differential across countries. Producing affordable heat pumps requires large-scale compressor production to achieve economies of scale, ideally in locations with lower energy costs. Consequently, Made in EU requirements are proposed only for the final assembly of heat pumps, excluding other main specific components.

The current heavy reliance on compressors from China will be addressed through the NZIA's resilience contribution, aiming for supply chain diversification toward third countries with lower energy costs than the EU. Thus, Made in EU requirements for heat pumps could initially focus on final assembly. However, due to limited manufacturing capacity for air-to-air heat pumps, the focus will be on hydronic heat pumps, which have sufficient manufacturing capacity that risks underutilization if proposed measures in the IAA are not implemented. While manufacturing capacity for hydronic heat pumps already exists (see Section *'EU capacity to supply its demand for net-zero technologies'*), the Made in EU requirements are suggested to take effect three years post-adoption to level the playing field and allow companies with less presence in Europe to adapt.

Electrolysers

In hydrogen electrolysers, the stack is the most strategic component because it houses the core elements essential for the electrochemical process. The assembly of the stack is characterized by relatively lower energy and labour costs, making the EU competitive in this stage of the value chain. Moreover, there is already ample manufacturing capacity in the EU (see Section *'EU capacity to supply its demand for net-zero technologies'*), which risks being underutilized

[712] Bruegel (2024). Smarter European Union industrial policy for solar panels
[713] International Energy Agency (2024). Energy Technology Perspectives 2024

if the proposed measures in the IAA are not executed. Therefore, Made in EU requirements are explicitly established for the electrolyser stack.

The bipolar plate ranks next to the stack in terms of production cost share for electrolysers[714]. This plate, made from metal, graphite, or composite materials, does not offer significant added value in its production. Due to its energy-intensive manufacturing process, the EU is unlikely to produce it competitively, thus it should not be regarded a strategic component necessitating Made in EU requirements.

Separators, membrane electrode assemblies, electrodes, gaskets, and porous transport layers constitute a relatively small portion of electrolyser production costs. Therefore, also in light of the fact that Made in EU requirements for bipolar plates are excluded, setting such requirements for these components would not lead to the cost increase presented in Figure EL for 'non-stack equipment'. Given that these components should be subject to Made in EU requirements, and given the existing EU manufacturing capacity to meet current demand - with the potential for quickly scaling up to meet the 2030 demand (see Figure EL in Section *'EU capacity to supply its demand for net-zero technologies'*) - the IAA's proposed requirements could have been framed to explicitly include these components. However, this presents challenges due to differing main specific components across various electrolyser types covered in NZIA, making explicit references complex. Instead, stating "stack and at least two additional main specific components of the electrolyser originate within the Union" offers needed flexibility.

While the proposed Made in EU requirements align with the number of components to be diversified away of the dominant supplier in the NZIA, EU electrolyser producers have consistently warned that the NZIA's ambition is insufficient and diminishes the protection that was provided in the second Innovation Fund hydrogen auction.

Batteries
As analysed in Section 5.2 and subsequent Annex 9 of this impact assessment report, the LEAD_BAT policy measure proposes Made in EU requirements for up to six main specific components among the ten listed in the Commission Implementing Regulation 2025/1178. While there is flexibility regarding which main specific components may comply with the requirements, three of them are explicitly mentioned as mandatory, meaning they shall be originated from the EU: the battery cell, the cathode active material (CAM) and the Battery Management System (BMS).

Battery cells are the fundamental components of a battery, where chemical energy is stored and transformed into electrical energy. This component is key for battery innovation, as it continually enhances energy density and safety. Furthermore, battery cells make up for around 70% of the total battery price. For Electric Vehicle (EV) batteries, a conservative assessment of operational and under construction manufacturing capacity in the EU indicates that it is possible to satisfy the made in EU requirements for battery cells one year of entry into force of the IAA. For stationary battery energy storage systems (BESS), the Made in EU requirements are proposed to kick in three years after the entry into force of the IAA, when a robust EU-based battery cell manufacturing capacity for stationary storage is expected to be established. Additionally, although battery cell production in the EU is more expensive than in Asian countries, an increase in the scale of production and an improvement in the manufacturing processes is expected to bring down battery cell manufacturing costs in the EU, closing the competitiveness gap considerably[715].

[714] Bloomberg New Energy Finance (2024). Electrolyzer Price Survey 2024: Rising Costs, Glitchy Tech
[715] International Energy Agency (2025). What Next for the Global Car Industry

The BMS is essential for ensuring the safety and efficiency of batteries by overseeing their overall state and controlling factors such as charge balance and temperature. BMS systems often include connectivity features for real-time monitoring, which make them important for energy security to protect data integrity and prevent tampering. Therefore, for BESS Made in EU requirements are proposed to kick in one year after the entry into force of IAA. For EV batteries, the requirements are proposed from three years after the entry into force of IAA, giving more flexibility and time to battery manufacturers.

The Cathode Active Material (CAM) in a battery significantly influences its performance, as the type of material used affects energy density, cycle life, and thermal stability. Besides, the CAM accounts for the largest cost share of the battery cell. Given the importance of the CAM, both technologically and economically, Made in EU requirements are proposed for both EV batteries and BESS. Such requirements are proposed to apply from three years after entry into force of the IAA recognising that although some manufacturing capacity of CAM in the EU is already operational, this has to expand to fully meet the expected demand.

Besides the Made in EU requirements explicitly to battery cells, BMS and CAM, requirements have also been set for an additional number of generically defined main specific components. This is meant to provide flexibility to manufacturers to choose which components are better off manufactured in the EU. Given that the Made in EU requirements are set for battery cells, it is expected that battery modules, battery packs, and battery thermal management systems will be also made in the EU (as there is already sufficient manufacturing capacity) thus complying with the requirements of "three additional main specific components originating in the EU". When it comes to other downstream main specific components, it is worth noting that the EU already has operational manufacturing capacity in separators, electrolytes and Anode Active Materials, and there are announcements to expand these capacities (see Annex 9).

Wind

The manufacturing of wind turbines is highly adapted to the specific project, i.e. far less commoditised than other net-zero technologies like solar PV and batteries. At the same time, quality requirements are very high, and the production of wind turbines and their components is very knowledge-intensive. The energy intensity is high for the manufacturing of components like blades or permanent magnets. For most other components like e.g. gearboxes or drivetrains, a higher share of energy is required for producing the primary materials than for producing the components out of the primary materials. Generally, the material cost accounts for more than half of the cost of the final turbine. The labour intensity varies by component, with e.g. the blade being a main specific component of wind turbines with relatively high labour intensity.

These aspects – high material intensity, high knowledge intensity, varying labour and energy intensity – determine how the supply chains that shape the EU's wind energy deployment look today: a strong footprint in the EU with international supply chains for input materials and specific components. At the same time, China has wind manufacturing overcapacities and is pushing further into international markets. Looking at deployment, the EU's current deployment can for most components (except e.g. permanent magnets and foundations, while the capacity to produce foundations will be expanded) be supplied from producers in the EU, while the deployment needed to reach the 2030 renewable energy goals could not be met by domestic production, except for nacelles and towers (see Figure W in Section *'EU capacity to supply its demand for net-zero technologies'*). Currently, high dependencies from a single country of supply exist for permanent magnets (China, 93%) which require access to the necessary input materials and energy[716].

The high dependency on permanent magnets needs to be addressed gradually, as it is done in the NZIA. Further to that, based on the above considerations it is deemed appropriate to require that one year after the IAA's entry into force one main specific components of the wind turbine originates in the EU, and two years later two main specific components. This maintains EU value chains, as well as ensuring high flexibility to source in a way that aids the overall competitiveness of the European wind industry and ensures the necessary deployment.

Nuclear fission energy technologies

Europe possesses world□class expertise in nuclear fission energy technology, yet the EU supply chain has been eroded by decades of under□investment. To meet the growing demand for nuclear power while advancing the broader goals of European autonomy and technology sovereignty, the supply chain must be revitalised. Targeted Made in EU requirements can, over the long term, contribute to rebuild a competent, resilient and autonomous nuclear□sector supply base without compromising the availability of critical components or the overall functioning of the market, especially at a time when nuclear generation is expected to expand. Therefore, a rather cautious strategy is proposed that (i) limits the scope to a reduced set of main specific components and (ii) introduces a sufficient transition period. This approach minimises short□term cost spikes and gives manufacturers sufficient time to adapt, ensuring a smooth and sustainable upgrade of the EU nuclear supply chain that is crucial for the upcoming years to properly address the electrification challenges of the European economy.

Made□in□EU content requirements are, in principle, vital for every main specific component because of the sensitivity of nuclear assets and the need to revitalise the European supply chain. However, to avoid supply□chain bottlenecks, preserve fair competition among the few existing players, and compensate for the absence of detailed data on cost differences across regions, the proposed requirements have been deliberately softened and framed in a way that eases compliance. As a result, the Made in EU obligations apply to only four main specific components out of seven, without explicitly referring to any of those components - to provide extra flexibility to manufacturers - and will become operative three years after the IAA enters into force.

The proposed Made in EU obligations are fully achievable, as the EU has sufficient manufacturing capacity to meet its immediate deployment needs for all main components, except two in the short term, and is projected to fully satisfy its needs by 2030 (see Figure NU in Section *'EU capacity to supply its demand for net-zero technologies'*).

Solar thermal

In solar thermal systems, the solar thermal collector is the most strategic main specific component, responsible for capturing and converting solar energy into heat. Its manufacturing process involves the highest added value and highest job creation opportunities within the solar thermal sector. The production of solar thermal technologies is primarily driven by material costs, which tend to be consistent across regions, indicating that the EU can competitively manufacture these products. As explained in Section *'Assessment of socioeconomic implications of IAA provisions related to net-zero technologies'*, regional cost differences in producing complete solar thermal systems are limited and are largely offset once transportation

[716] European Commission (2025). Communication from the Commission providing updated information to determine the shares of the European Union supply of final products and their main specific components originating in different third countries under Regulation (EU) 2024/1735 on establishing a framework of measures for strengthening Europe's net-zero technology manufacturing ecosystem (Net-Zero Industry Act). 18.6.2025 C/2025/3236

costs are considered. Therefore, limiting Made in EU requirements exclusively to the solar thermal collector further reduces risks of cost disparities. Given the already ample manufacturing capacity in the EU (refer to Figure ST in Section *'EU capacity to supply its demand for net-zero technologies'*), these requirements could be enforced immediately upon entry into force.

Electricity grid technologies

EU grid technology and cable manufacturers are global leaders in their fields. However, rising component costs, extended procurement lead times, and a backlog of orders have created supply chain voids that China is strategically positioned to fill. This dynamic intensifies national security risks due to the growing reliance on China, including potential vulnerabilities to espionage, economic coercion, and military threats. The significance of this risk is heightened given that certain electricity grid technologies are complex electronic systems that communicate, can be remotely controlled and updated by software throughout their lifetime. These devices can be compromised during production, as cybersecurity vulnerabilities can be introduced through supply chain breaches with hardware or software tampered during production, testing, or distribution. Such breaches are included via "hardware Trojans" or pre-installed backdoors that enable remote exploitation without the need for external network access, and cyber attackers might use them to manipulate power flows and disrupt grid stability. For instance, around 80% of all new PV systems in Europe are now equipped with inverters from China[717]. Companies like Huawei and Sungrow control 170 GW of solar PV capacity remotely, totalling over 200 GW when accounting all Chinese brands - equivalent to the output of 200 nuclear power plants.

Ensuring EU origin for electricity grid technologies significantly mitigates the risk of compromised hardware or software being exploited in cyberattacks and thus safeguards the EU energy security and ensure strategic autonomy. In line with the Joint Communication on strengthening Economic Security[718], Made in EU requirements for net-zero technologies aim to support the development of trustworthy suppliers of critical subcomponents within the EU. Technologies like inverters, converters, electric cabinets, and other technologies to digitalize the grid are connected grid electricity technologies critical for the energy system and must be protected from risky software and firmware updates, remote access vulnerabilities, and supply-chain dependencies. Similarly, electric charging technologies for transport are crucial for cybersecurity due to their connectivity and integration with broader power grids and payment systems. Power cables are especially critical as they form the backbone of electricity transmission and distribution, ensuring the stable and efficient delivery of electricity across regions, and any compromise can have widespread impacts on energy security and infrastructure integrity. Therefore, the IAA proposes targeted Made in EU requirements for these electricity grid technologies to enter into force three years after adoption. Acknowledging the lack of precise data on EU manufacturing capacity and production cost differences across regions for some of these devices, this cautious timeline is intended to provide manufacturers flexibility to adapt to the requirements and prevent supply bottlenecks, the formation of oligopolies and disproportionate cost increases. Besides, for electricity grid technologies where shortages of supply have been identified Made in EU requirements have not been proposed.

[717] European Solar Manufacturing Council (2026). Updated Recommendation for the Commission to publish Guidance on improving Cyber Security for Solar PV and Battery Storage

[718] European Commission (2025). Joint Communication to the European Parliament and the Council – Strengthening EU economic security. 3.12.2025

EU capacity to supply its demand for net-zero technologies

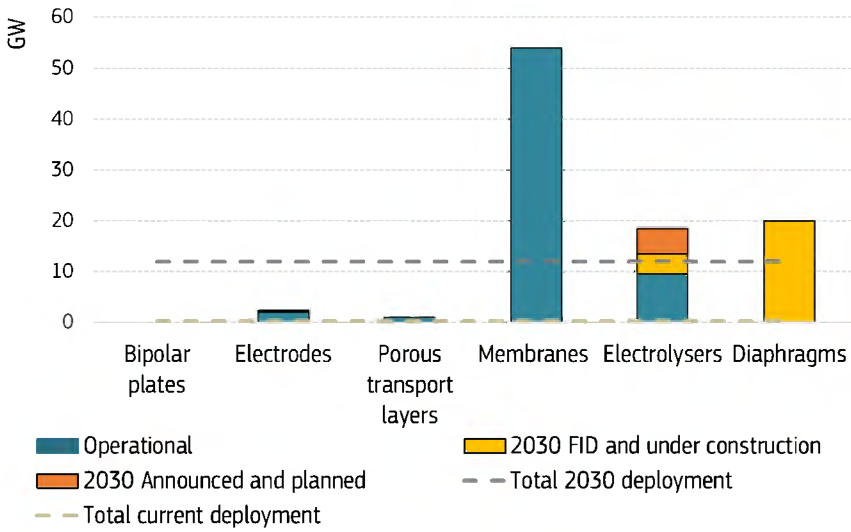
Net-zero technologies in the EU face manufacturing challenges posed by global competition, and particularly by China. European producers often struggle to remain cost-competitive: solar PV modules imported from China are sold at prices that are roughly half the production cost and only about one-third of the break-even level needed for EU firms to sustain their operations. Chinese wind turbines are 10–45% cheaper than European equivalents. In batteries, China dominates 86% of global cell supply and controls over 90% of key materials, while Chinese electrolysers are sold 33–50% cheaper than EU equipment.

EU manufacturing in solar PV is limited primarily to modules, inverters, and polysilicon, while the battery manufacturing landscape is heavily dominated by Asian companies. At the same time, several technologies reveal a problem of overcapacity within Europe itself. Heat pump factories can deliver more than 6 million units per year, exceeding the estimated 5 million needed annually by 2030, leaving many lines idle. Electrolyser plants likewise suffer from low utilisation, running at just below 20% of their nameplate capacity in 2024. In batteries, announced projects could boost capacity from 188 GWh in 2024 to 872 GWh by 2030, yet more than 250 GWh of planned projects have already been cancelled due to weak demand for EU batteries. This reflects the volatility of EU policy signals and the limited coordination between deployment needs and industrial production capacity.

Electrolysers

The deployment of electrolysers in the EU is characterised by a significant gap with ambitions, primarily due to delays in renewable hydrogen projects. Currently, EU manufacturing capacity can sufficiently meet deployment demands for most elements within the electrolyser value chain, except for bipolar plates and diaphragms (see Figure EL). These components can be swiftly scaled up once market signals are established. The Made in EU requirements for electrolysers can be met already in the short-term and would contribute to develop a resilient and robust hydrogen economy.

Figure EL: Manufacturing capacity of hydrogen electrolyser components vis a vis deployment needs, 2025 and 2030



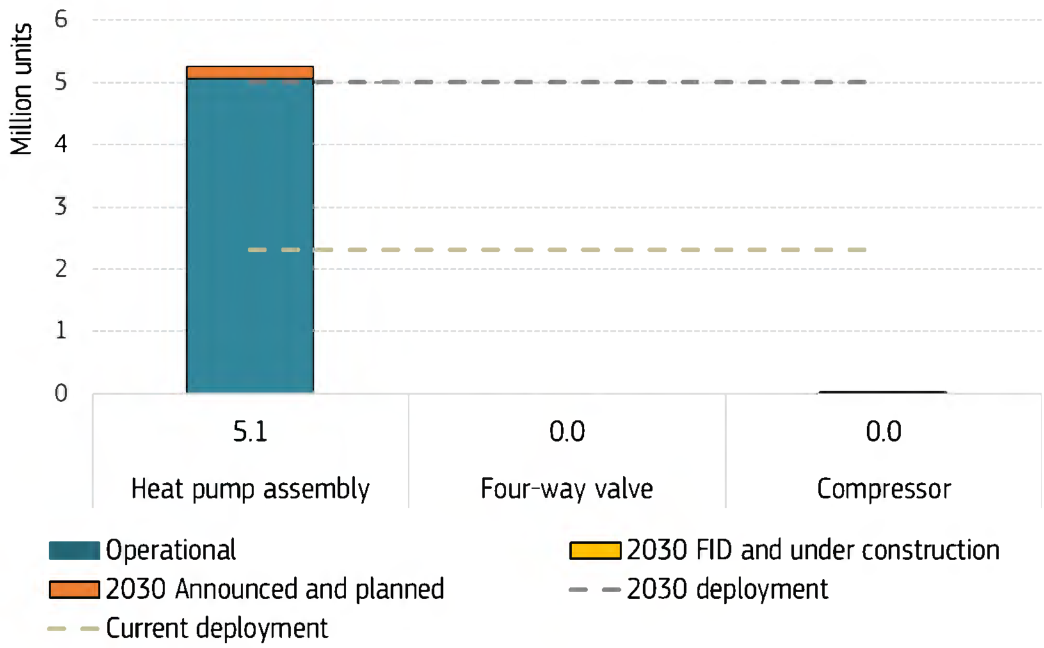
Source: European Commission (2026)[719]

Heat pumps

[719] European Commission (2026). Net-Zero Technology Monitoring Dashboards

Following the RepowerEU initiative, numerous industry stakeholders have proactively increased heat pump manufacturing capacity across the EU to accommodate anticipated demand surges. Although the EU heat pump assembly ecosystem is now characterized by overcapacity, particularly for hydronic heat pumps, there remains a notable deficit in manufacturing essential components such as compressors and four-way valves, which are predominantly imported from China (see Figure HP). To enhance supply chain resilience and reduce dependency on external sources, it is critical to strategically diversify the supply of these components. The resilience contribution in the context of the Net-Zero Industry Act (NZIA) is the main measure to achieve such diversification. In addition, encouraging the assembling of heat pumps within the EU will minimize the risk of national initiatives fragmenting the Single Market, ensuring a more cohesive and robust approach to heat pump deployment across Member States.

Figure HP: Manufacturing capacity of heat pump components vis a vis deployment needs, 2025 and 2030

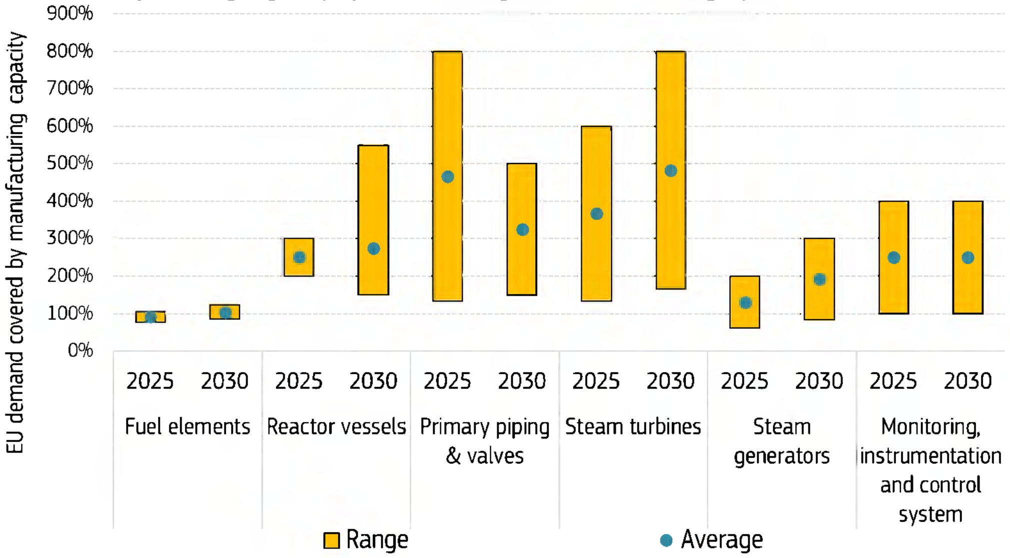


Source: European Commission (2026)[688]

Nuclear fission energy technologies

Throughout this decade, the EU is poised to satisfy its nuclear fission energy technologies deployment needs with sufficient manufacturing capacity (see Figure NU). For each main specific component of nuclear fission energy technology, at least five suppliers exist across the EU. However, short-term fulfilment of demands for nuclear fuel elements and steam generators with domestic production might be challenging. The nuclear component manufacturing ecosystem is not as developed as it was thirty years ago, due to a three-decade shortage of new nuclear fission energy projects that resulted in many original equipment manufacturers for the EU nuclear fleet disappearing. The EU nuclear supply chain relies heavily on a limited number of suppliers concentrated in a handful of countries, principally France, Germany, Italy, Spain, Sweden, Romandia, Slovakia and the Czech Republic, each hosting specialized factories for nuclear components. Besides, the production market's limited appeal—arising from high costs, technological barriers, and limited deployment—creates an environment that does not encourage the entrance of new market actors. Therefore, Made in EU requirements should not be introduced before 2030 to guarantee a level playing field in a sector that demands adherence to specific nuclear codes. Moreover, these requirements should apply only to new nuclear plants, ensuring there is adequate time to align the compatibility of reactor designs with components developed in Europe, while thereby avoiding disruption of established supply chains with limited flexibility.

Figure NU: Manufacturing capacity of nuclear components vis a vis deployment needs, 2025 and 2030

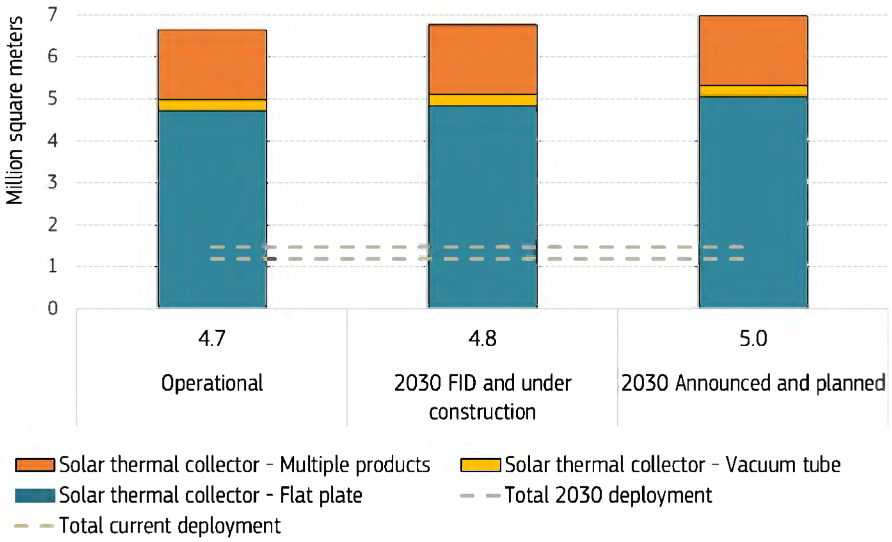


Source: NuclearEurope

Solar thermal technologies

The EU has robust manufacturing capacity for solar thermal collectors (see Figure ST). In 2024, the capacity significantly exceeded current deployment needs, with EU companies planning expansions to boost exports. The European industry specializes in flat plate collectors, while has limited capacity to manufacture vacuum tube collectors, which are largely imported from China. Notably, the absorber (the part of the collectors that absorbs the solar heat) is predominantly produced in Europe.

Figure ST: Manufacturing capacity of solar thermal components vis a vis deployment needs, 2025 and 2030



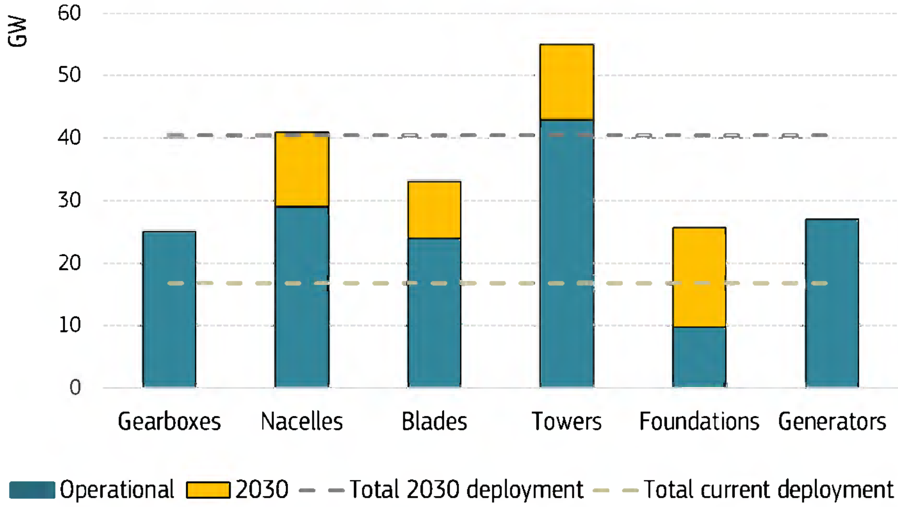
Source: European Commission (2026)[688]

Wind technologies

According to WindEurope, the EU currently has adequate manufacturing capacity across the wind technology value chain to meet its current deployment needs inside the EU (see Figure W), which are however not meeting the deployment needs to comply with the 2030 goals.

Hence, further capacity expansion beyond present plans is needed. Chinese wind turbine manufacturers are working towards expanding in the EU market, exemplified by MingYang's collaboration with Italian firms. The NZIA's resilience contribution has prompted some EU companies to receive manufacturing requests from Chinese OEMs.

Figure W: Manufacturing capacity of wind components vis a vis deployment needs, 2025 and 2030



Source: Wind Europe (2025), How much can Europe manufacture and install?

Electricity grid technologies

EU electricity grid technologies are projected to witness substantial expansion to enable the clean energy transition. Significant developments and massive investments are needed across manufacturing and infrastructure enhancement to ensure readiness for future energy demands.

The EU has a sizable production base for electricity transmission and distribution cables, enabling it to closely meet deployment needs. For high voltage, extra-high voltage and medium voltage array subsea cables, the EU and the United Kingdom combined currently have a conservative estimate of manufacturing capacity of about 7 700 km/year[720]. This is measured against an average projected demand from 2026 to 2040 of about 8 200 km/year[721], largely based on political decisions rather than committed orders, suggesting a potential shortage of about 550 km/year. However, this short-term deficit is expected to be swiftly addressed by the planned manufacturing capacity expansions. Existing EU cable manufacturers have committed to invest over EUR 4 billion to expand their manufacturing capabilities, aiming to significantly increase manufacturing capacity of subsea cables by 2030. With these investment plans expected to be realized in the next few years, manufacturing capacity will reach about 12 500 km/year[698], thus significantly exceeding deployment needs, which are projected to increase by 40% in 2030[722]. For high voltage direct current underground cables, the EU has a manufacturing capacity of about 3 500 km/year. This is measured against an average projected demand from 2026 to 2040 of about 2 300 km/year, which suggests that the EU has sufficient capacity to fully meet its domestic deployment needs.

In addition, Europe is already home to several well-established companies in the subsea cable manufacturing industry, along with even more in the onshore cable sector, fostering healthy

[720] 4c Offshore (2025). Transmission and Cables Outlook Q3 2025
[721] 4c Offshore (2025). Database
[722] DSO Entity (2025). ENTSO-E, Europacable, DSO Entity and T&D Europe publish Joint Roadmap for Future Proof Grids

competition. In niche markets where oligopolies might arise due to Made in EU requirements, the geographic scope of the Made in EU concept serves to mitigate such risks.

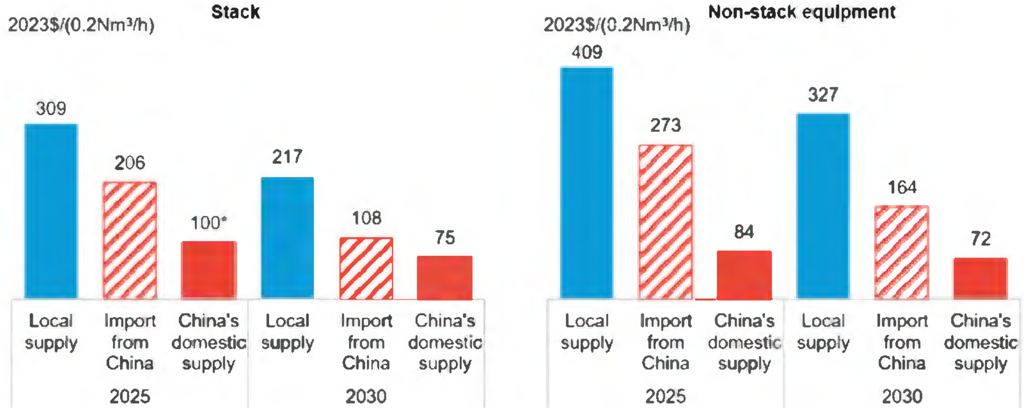
The EU also has a robust power electronics sector with capabilities in design, production, software development, and maintenance. Where EU manufacturing capacity related to electricity grid lags behind is in transformers: domestic supply of transformers is tight because of limited manufacturing capacity, which causes long lead times for transformers to be installed[723].

Socioeconomic implications of IAA proposed measures related to net-zero technologies

Electrolysers

Today, entirely EU-made electrolysers have a CAPEX 50% more expensive than electrolysers imported from China, and by 2030 they are projected to be twice as expensive (see Figure ELY2). While this presents a cost challenge, EU-made electrolysers offer higher efficiency and lifecycle performance[724]. Despite higher CAPEX, the superior efficiency and longer durability of entirely EU-made electrolysers translate into smaller differences in hydrogen production costs: a conservative analysis finds that from now until 2050 hydrogen produced with EU-made electrolysers will cost less than 10% more than hydrogen produced using Chinese electrolysers[725]. Moreover, as explained in Section '*Identification of NZIA main specific components to be covered by Made in EU requirements*', the IAA proposes to set Made in EU requirements only for a subset of electrolysers' main specific components, which will significantly minimise impact on cost. Procurement decisions favour lower upfront costs, which risk accelerating market share losses for EU manufacturers in a critical phase up scale, which highlights the importance of strategic investments and policy initiatives that emphasize quality and performance.

Figure EL: Price of stack and non-stack components of electrolysers based on origin



Source: BloombergNEF[690]

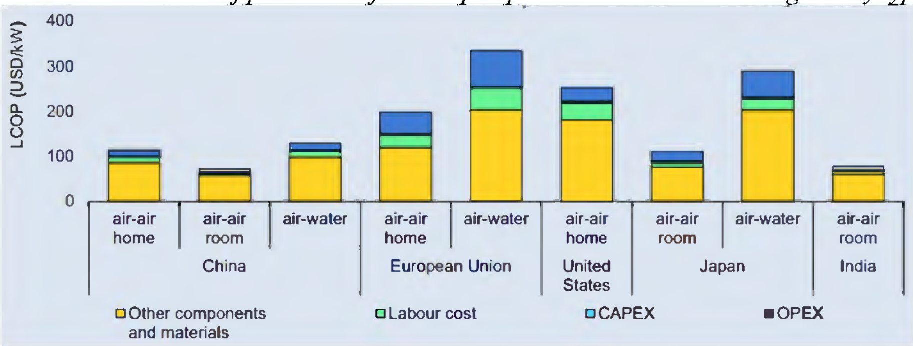
Heat pumps

The International Energy Agency indicates that producing heat pumps in the EU is generally more costly compared to other countries (see Figure HP2). Specifically, a hydronic heat pump entirely manufactured in the EU can cost twice as much as one made in China and 10% more

[723] BloombergNEF(2025). Power Transformer Trends 2025
[724] Bloomberg New Energy Finance (2025). Electrolysis System Cost Forecast 2050: Higher for Longer
[725] The levelised cost of hydrogen produced with EU-made electrolysers is estimated at 5.8 EUR/kg, whereas for electrolysers with components sourced from China to an extent that fulfils the IAA requirements, the cost is calculated to be at 5.3 EUR/kg.

than one manufactured in Japan. Similarly, air-to-air heat pumps produced in the EU cost about twice as much as their Chinese and Japanese counterparts. However, when considering installation costs and ancillary services, the price difference for consumers purchasing a heat pump is smaller, thereby having limited influence on consumer choice. Moreover, as explained in Section '*Identification of NZIA main specific components to be covered by Made in EU requirements*', the IAA proposes to set Made in EU requirements only for the final assembly of heat pumps, excluding other main specific components, which will significantly minimise impact on cost.

Figure HP2: Levelised cost of production for heat pumps in selected countries/regions by type, 2023



Source: International Energy Agency[726]

In response to the slower deployment of heat pumps and increased imports, EU manufacturers have had to cut jobs or starting partial unemployment, affecting more than 1000 employees in 2023 and more than 7000 in 2024 (European Heat Pump Association, 2025). Implementing Made in EU requirements can play a crucial role in safeguarding existing jobs, fostering new employment opportunities, and encouraging investment. According to the EHPA, the sector employs approximately 430 000 people in the EU, with a significant portion of direct jobs tied to manufacturing. Given that the manufacturing ecosystem consists of around 250 sites across the EU, often in rural areas and constituted by SMEs, encouraging EU production would bolster local economies and small businesses.

Nuclear fission energy technologies

According to trade statistics from 2025, fuel elements imported from Russia were about 10% cheaper than those produced in the EU, while those imported from the US were 30% cheaper[727]. In contrast, fuel elements imported from the UK were 70% more expensive than those made in the EU. The cost of producing nuclear fission energy technologies main specific components in the EU differs from other regions due to several key factors. For instance, compared to Asian manufacturers, EU labour costs today are generally higher because the salaries of the highly qualified professionals required for specialised engineering tasks are higher. Compliance with stringent regulatory and safety standards adds another layer of expense, as significant investment is needed for specialized testing and certification processes. Furthermore, energy prices in the EU are generally above the EU average, impacting the energy costs of manufacturing processes especially for some nuclear main specific components. Consequently, for a limited transitional period imposing Made in EU requirements is expected to increase the production cost of these components. However, labour costs in Asia are already trending upward, and energy prices are expected to stabilise at levels comparable to those in the EU, which will narrow the cost gap over time. Moreover, while in the short□term energy and labour costs play against the EU competitiveness in producing nuclear fission energy technologies,

[726] International Energy Agency (2024). Energy Technology Perspectives 2024
[727] EUROSTAT (2026). COMEXT database

this will partially be offset by the Union's emphasis on technological innovation and advanced manufacturing techniques. These innovations boost production efficiency and enable the delivery of components that meet the highest standards of quality and safety. In addition, any cost premium should be weighed against the long term benefits of investing in safety, reliability and the overall resilience of the nuclear energy supply chain.

The nuclear sector in the EU employs approximately 500 000 people, including 230 000 in direct positions within the sector. Notably, many of these jobs are highly specialised and require advanced skills, underscoring the importance of maintaining such expertise in the EU - especially to effectively manage strategic assets like nuclear fission power plants.

Solar thermal technologies

Manufacturing solar thermal technologies within the EU is generally more expensive than in many other global regions. As per Solar Heat Europe, the complete solar thermal system with flat plate collectors has a production cost in the EU about 40% higher than in China and approximately 20% higher than in Turkey. Similarly, the entire solar thermal system with vacuum tubes has a production cost in the EU about 35% higher than in China and 20% higher than in Turkey. These cost differences primarily stem from regional variations in the prices of materials such as glass, copper, and aluminum. Despite these disparities, the bulky nature of solar thermal products often eliminates the price advantage of imported products due to the higher transportation costs, historically enabling EU producers to remain competitive. However, these dynamics are shifting as fierce competition from third-country producers begins to affect certain EU Member States. By improving key competitiveness drivers and implementing policy measures such as local content requirements, the EU can better maintain its competitive edge while supporting domestic industry growth and stability. Finally, as explained in Section *Identification of NZIA main specific components to be covered by Made in EU requirements*, the IAA proposes to set Made in EU requirements only for solar thermal collector, excluding other main specific components, which will significantly minimise impact on cost.

The industrial ecosystem for solar thermal technologies is widespread across the EU, with a high concentration of companies located in Greece and in Cyprus[728]. Around 90% of such companies are SME. The sector employs around 10000 people in the EU[729].

Electricity grid technologies

Manufacturing high voltage and extra-high voltage subsea and underground cables is not a labour-intensive process, instead materials costs account for the lion share of total production costs. Since these materials are globally traded and typically exhibit limited price variation across regions, differences in production costs are expected to be relatively small. Although some Asian countries may benefit from lower energy and CAPEX costs, these advantages should largely be offset by transportation costs to Europe, especially considering the need for specialised vessels with high operational costs. However, trade statistics indicate that in 2025 high-voltage power cables imported from China were 20% cheaper than those manufactured in the EU[730]. This price differential is unlikely to be solely attributed to production cost drivers, suggesting the possible presence of direct or indirect State aid compensations and/or price dumping practices by extra-EU producers.

[728] Solar Heat Europe (2026). Market Data
[729] Roca Reina, J.C., Taylor, N., Volt, J., Carlsson, J., Georgakaki, A. et al., Clean Energy Technology Observatory: Solar Thermal Energy in the European Union - 2025 Status Report on Technology Development, Trends, Value Chains and Markets, Publications Office of the European Union, Luxembourg, 2025, https://data.europa.eu/doi/10.2760/8841716, JRC143924.
[730] EUROSTAT (2026). COMEXT database

For other electricity grid technologies, trade statistics depict a mixed picture. Devices manufactured in the EU are generally more expensive than imports from China but are cheaper compared to imports from other third countries. Specifically, for converters, devices imported from China in 2025 were about 30% cheaper than their EU-manufactured counterparts, while devices imported from Thailand were about 20% more expensive than EU-manufactured ones. Similarly, electric cabinets imported from China in 2025 were almost 40% cheaper than those manufactured in the EU, while devices imported from Turkey were slightly more expensive than EU-manufactured ones.

Wind technologies

The price gap between Chinese wind turbines and Western turbines ranges between 10% and 45%. Interest for Chinese turbines in diverse markets is hence growing, and Chinese manufacturers use strategic pricing (including deferred payment) to enter new markets. In that, the price difference is also due to market entry strategies and might not remain this high. Additionally, Chinese manufacturers offer larger wind turbines than those produced and offered by EU manufacturers.

On the other hand, wind turbine production and the broader wind energy industry deliver substantial economic benefits to the EU: according to WindEurope, the sector had an annual turnover of EUR 60 billion, 65% of this adding value to the EU economy, in 2019. The sector represents 300.000 jobs in the EU. A strong European wind supply chain, with roughly 250 factories and major turbine OEMs holding a large global market share, boosts local industry, high-value jobs, and regional development while generating taxes (EUR 5 bn in 2019) and supporting exports. According to WindEurope, wind farms pay €2.3/MWh in local taxes on average.

Impact on electricity prices

Assessing the impact of establishing Made in EU requirements on solar PV, wind, and nuclear sectors on electricity prices is challenging. Although the previous paragraphs indicate that these requirements could lead to not-negligible CAPEX increases, their effect on the levelized cost of electricity is mitigated. For instance, if a PV module is assembled in the EU, using EU-produced PV cells and solar glass, along with three main specific components diversified according to the NZIA resilience requirements, its levelized cost of electricity (LCoE) would be 6 EUR c/kWh. This represents a modest increase from the levelized cost of electricity of 5.2 EUR c/kWh for PV modules at current market prices[731]. An onshore wind turbine with two main specific components produced in the EU would have a LCoE 4% higher than an equivalent turbine with those components supplied from China (i.e. 48 EUR/MWh and 46 EUR/MWh respectively). Similarly, a nuclear fission power plant with four main specific components produced in the EU is expected to have a LCoE 1% higher than an equivalent power plant with those components supplied from extra-EU countries (i.e. 79 EUR/MWh and 78 EUR/MWh respectively). Despite this rise, the impact on the merit order in the power market is minimal. PV, wind or nuclear would only set the electricity price during limited hours of exclusive clean energy production. Even then, the resulting price increase would be limited and overall, electricity costs would remain significantly lower than those determined by fossil fuel generators.

Although Made in EU requirements might lead to higher costs in renewable energy auctions, as explained in the impacts Section of the report, understanding the extent to which these costs might be transferred to consumers through additional levies or surcharges on electricity bills is complex. This depends on various factors, including auction types (such as feed-in tariffs

[731] SolarPower Europe and Fraunhofer ISE (2025). Reshoring Solar Manufacturing to Europe.

versus contracts for difference), specific auction designs, the level of renewable energy penetration, wholesale market conditions, and cost allocation mechanisms. In 2024, taxes and levies - the typical means for recovering the cost of renewable auctions - accounted for approximately 20% of total electricity prices on average in the EU[732], indicating that any pass-through effects on consumers would remain limited.

Similarly, while Made in EU requirements for electricity grid technologies are expected to result in increased costs in public procurement, determining how the potential higher CAPEX is passed on to consumers is not straightforward. Once the additional costs associated to the fulfilment of Made in EU requirements for electricity grid technologies are taken into consideration, the levelized cost of the electricity network is expected to increase from 22.7 EUR/MWh to 23-23.4 EUR/MWh (an increase between 1% and 3%)[733]. To put this in perspective, for an average household such an increase translates into an additional EUR 1-3 per year in network charges on the electricity bill.

The role of public procurement, auctions and public schemes in deploying net-zero technologies

Electrolysers
Public procurement, auctions and public support schemes to households account for almost none of the deployed electrolyser capacity. Most of the current capacity has been supported through State Aid, while programs such as Horizon Europe and the Innovation Fund have also contributed. Although auctions for hydrogen have been conducted, no capacity has yet been deployed through this method.

Heat pumps
While precise data on the share of heat pump deployment covered by public procurement, auctions, and public support schemes is unavailable, it is evident that public support schemes currently play the most significant role in heat pump deployment. Though auctions are not yet implemented, they are anticipated to gain relevance, also as part of the Innovation Fund auction to decarbonise industrial heat[734]. Public procurement, although presently modest in scale, is expected to become increasingly significant, especially in light of the Energy Performance of Building Directive, which aims to bolster energy efficiency and heat pump use.

Nuclear fission energy technologies
Though exact data is lacking, the deployment of nuclear fission power plants typically includes various forms of State aid, mainly through Article 107 of the TFEU. Public procurement is pivotal in this sector, as utilities are mandated by Procurement Directive 2014/25/EU to follow public procurement procedures when sourcing nuclear components. In practice, public utilities and partially public utilities often regard public procurement rules overly restrictive, especially for critical products and equipment, possibly leading them to seek exemptions based on national security or technology exclusivity.

Solar thermal technologies
While precise deployment data through public procurement, auctions, and public support schemes is not available, public support schemes are evidently the primary in solar thermal

[732] EUROSTAT (2026). Electricity price statistics
[733] Calculated including, beyond the EUR 1.2 trillion investment required in electricity grid by 2040 (as outlined in the European Commission's European Grids Package, COM(2025) 1005 final), the additional investment necessary to deploy power cables, inverters, converters and Electric Vehicle Supply Equipment manufactured within the EU instead of imported from third countries.
[734] European Commission (2025). Commission publishes Terms and Conditions for the first pilot auction for industrial heat decarbonisation with a budget of €1 billion

technologies deployment. Though auctions are not yet implemented, they are anticipated to gain relevance, also as part of the Innovation Fund auction to decarbonise industrial heat[695]. Public procurement, although presently modest in scale, is expected to become increasingly significant, especially in light of the Energy Performance of Building Directive, which aims to bolster energy efficiency and solar thermal systems.

Wind technologies
Auctions are the predominant allocation mechanism for wind energy in the EU, accounting for about 60% of total wind energy deployment depending on the year. Exact data on public procurement of wind energy is not available, but while Denmark prominently uses it and Finland makes limited use of it, other Member States reliance on public procurement to deploy wind energy is negligible. Publicly owned utilities are also found to apply public procurement to deploy wind energy, however no data is available on the size of that market. Member States other than Denmark generally rely on auctions to deploy wind energy. Public support schemes hold little relevance for onshore and offshore wind energy deployment.

Electricity grid technologies
In the EU, most deployment of electricity grid technologies is done by Transmission System Operators (TSOs), which are normally public undertakings that operate through public procurement processes abiding to Regulation 2014/25/EU. Notably, over 70% of new transmission cables are expected to comply with these public procurement rules.

At the European distribution network level, approximately two-thirds of the European electricity grid infrastructure is operated by 19 corporate groups from the energy sector. Of these, 11 are majority publicly owned and eight are privately owned. At present, this means that approximately 2.837 million kilometers of distribution networks are operated by the 11 public operators and 4.813 million kilometers by private suppliers.

EU trade balance

Electrolysers
In 2024, nearly 90% of electrolysers deployed in Europe were domestically manufactured. Nevertheless, there is a significant risk of increased reliance on Chinese imports, which could jeopardize the EU's security of supply. This concern is underscored by comparing current and projected global supply and demand trends, alongside China's dominance. Chinese production capacity exceeds 50% of global production, its projected production significantly exceeds its domestic deployment targets and foreseeable demand, which could influence international markets and trade dependencies[735]. To mitigate these risks, the EU must strategically bolster local production to develop a robust domestic supply chain.

Heat pumps
The EU is a net importer of hydronic heat pumps (EUR 580 million in 2024), mainly from China. However, this EU trade deficit does not yet indicate concerning dependencies: the EU relied on third countries for 22% of the total EU supply in 2023[736]. In contrast, the EU exhibits pronounced dependency for air-to-air heat pumps (EUR 560 million of trade deficit in 2024), mainly from China, due to limited domestic manufacturing capacity.

[735] International Energy Agency (2024). Energy Technology Perspectives 2024
[736] European Commission (2025). Communication from the Commission providing updated information to determine the shares of the European Union supply of final products and their main specific components originating in different third countries under Regulation (EU) 2024/1735 on establishing a framework of measures for strengthening Europe's net-zero technology manufacturing ecosystem (Net-Zero Industry Act). 18.6.2025 C/2025/3236

Nuclear fission energy technologies
The EU is a net importer of nuclear fission fuel elements (EUR 63 million in 2024), mainly from Russia. Imports of other fission nuclear components to the EU remain limited, correlating with the restrained nuclear deployment within the region.

Solar thermal technologies
The EU is a net exporter of solar thermal technologies (EUR 170 million in 2024), mainly to Switzerland. This positive trade balance highlights the quality and innovation within the EU's solar thermal sector, suggesting opportunities to further expand export markets.

Wind technologies
The global market share of EU manufacturers is declining rapidly: from 30% in 2022 it fell to 23% in 2023, while Chinese manufacturers increased their share from 46% to 55%. EU companies continue to dominate in the EU with a market share of 89% in 2023.

The EU is still a net exporter of wind turbines and many of its underlying components. However, it faces a severe dependency for permanent magnets (used in wind turbine generators), which are almost entirely imported from China.

Electricity grid technologies

The EU faces a trade deficit for inverters and converters, importing large volumes of these products from China. For most other electricity grid technologies, the EU has a positive trade balance, exporting mostly to the Unites States and the United Kingdom. However, for certain electricity grid technologies there is a significant risk of increased reliance on Chinese imports, which could jeopardize the resilience, reliability and cyber-security of the EU electricity system. For instance, for high voltage, extra-high voltage and medium voltage array subsea cables China has developed a manufacturing capacity (about 11 000 km/year[737]) more than twice higher than its foreseeable domestic demand (about 4 700 km/year[738]). Moreover, this surplus in Chinese production closely matches the total EU annual demand, suggesting a possible strategic positioning by China to potentially expand its presence in the European market.

Administrative costs

The assessment of administrative costs incurred by Member States and businesses due to the implementation of the Made in EE requirements for electrolysers, heat pumps, nuclear fission energy technologies, solar thermal technologies, wind technologies and electricity grid technologies has estimated recurring costs to be approximately EUR 5 million. Most of such administrative costs is associated to Member States (EUR 4.95 million), while businesses account for about EUR 45 000.

Table ADMS offers a detailed breakdown of administrative costs for Member State by net-zero technology, while Table ADBU provides a similar overview for businesses.

Table ADMS – Administrative costs for Member States associated to the implementation of the IAA Made in EU requirements for net-zero technologies beyond batteries and solar PV

Net-zero technology	Administrative costs (recurring)
Electrolysers	¼ FTE x 27 Member States

[737] 4c Offshore (2025). Transmission and Cables Outlook Q3 2025
[738] 4c Offshore (2025). Database

	Total cost: EUR 412 800
Heat pumps	¼ FTE x 27 Member States Total cost: EUR 412 800
Nuclear fission energy technologies	¼ FTE x 27 Member States Total cost: EUR 412 800
Solar thermal technologies	¼ FTE x 27 Member States Total cost: EUR 412 800
Wind	¼ FTE x 27 Member States Total cost: EUR 412 800
Electricity grid technologies	1 FTE x 27 Member States Total cost: EUR 1 651 100

Table ADBU – Administrative costs for Businesses associated to the implementation of the IAA Made in EU requirements for net-zero technologies beyond batteries and solar PV

Net-zero technology	Administrative costs (recurring)
Electrolysers	½ week FTE Nr companies affected: 4 (20 large companies x 18%) Total cost: EUR 2 100
Heat pumps	½ week FTE Nr companies affected: 29 (160 large companies x 18%) Total cost: EUR 16 900
Nuclear fission energy technologies	½ week FTE Nr companies affected: 4 (20 large companies x 18%) Total cost: EUR 2 100
Solar thermal technologies	½ week FTE Nr companies affected: 22 (120 large companies x 18%) Total cost: EUR 12 700
Wind	½ week FTE Nr companies affected: 4 (20 large companies x 18%) Total cost: EUR 2 100
Electricity grid technologies	½ week FTE Nr companies affected: 8 (40 large companies x 18%) Total cost: EUR 4 200

Full Time Equivalents and number of affected companies are estimated using the same methodology and assumptions described in Annex 4 Section 2.1.