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PART 1/2

COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT REPORT

Accompanying the

Proposal for a Directive of the European Parliament and of the Council

on energy efficiency (recast)

{COM(2021) 558 final} - {SEC(2021) 558 final} - {SWD(2021) 624 final} -
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Glossary

Acronym	*Meaning or definition*
BPIE	Buildings Performance Institute Europe
BSL	Baseline scenario
CBA	Cost Benefit Assessment
CEER	Council of European Energy Regulators
CHP	Combined Heat and Power (generation)
CTP	Climate Target Plan
DSO	Distribution System Operator
EE	Energy Efficiency
EED	Energy Efficiency Directive
EE1st	Energy Efficiency First
EEOS	Energy Efficiency Obligation Schemes
EPBD	Energy Performance of Buildings Directive
EPC	Energy Performance Contract
ESO	Energy Savings Obligation
ESR	Effort Sharing Regulation
EUCO	European Council
EU	European Union
ETS	Emissions Trading System
FEC	Final Energy Consumption
FF55	Fit for 55 package
FTE	Full Time Equivalent
GDP	Gross Domestic Product
GEM-E3	An applied General Equilibrium Model
GHG	Greenhouse Gas
GPP	Green Public Procurement
IA	Impact Assessment
ICT	Information and Communications Technology
IEA	International Energy Agency
JRC	Joint Research Centre of the European Commission
LTRS	Long-Term Renovation Strategies
LULUCF	Land use, land use change and forestry
MS	Member States

Mtoe	Million Tonnes of Oil Equivalent
NECP	National Energy and Climate Plan
NZEB	Nearly Zero Energy Building
PC	Public Consultation
PEC	Primary Energy Consumption
PEF	Primary Energy Factor
PRIMES	An energy system model (Price-Induced Market Equilibrium System)
REDII	Renewable Energy Directive
RSB	Regulatory Scrutiny Board
SME	Small and medium sized enterprise
TFEU	Treaty on the Functioning of the European Union
TSO	Transmission System Operator

Term	***Meaning or definition***
Additionality	Energy savings under EED Article 7 must be in addition to those that would have occurred in any event without the activity of the obligated, participating or entrusted parties, or implementing public authorities. Savings resulting from the implementation of mandatory Union law are considered savings that would have occurred in any event and thus cannot be claimed as energy savings for the purpose of Article 7(1).
Cogeneration	Cogeneration, also called combined heat and power (CHP) is the simultaneous production of electricity and useful heat.
District heating	District heating is a system for distributing heat generated in a centralised location through a system of insulated pipes for residential and commercial heating requirements such as space and water heating.
Energy Performance Contract	An Energy Performance Contract (EPC) is a mechanism for an external organisation to finance energy saving capital investments from future energy savings.
Energy service	Energy service means the physical benefit, utility or good derived from a combination of energy with energy-efficient technology or with action, which may include the operations, maintenance and control necessary to deliver the service, which is delivered on the basis of a contract and in normal circumstances has proven to result in verifiable and measurable or estimable energy efficiency improvement or primary energy savings
Final Energy Consumption	Final energy consumption is the total energy consumed by end users, such as households, industry and agriculture. It is the energy which reaches the final consumer's door and excludes that which is used by the energy sector itself.
Primary Energy Consumption	Primary energy consumption measures the total energy demand of a country. It covers consumption of the energy sector itself, losses during transformation and distribution of energy. It excludes energy carriers used for non-energy purposes (such as petroleum not used not for combustion but for producing plastics).
Rebound effects	The rebound effect is the reduction in expected gains from new technologies that increase the efficiency of resource use, because of behavioural or other systemic responses. These responses diminish the beneficial effects of the new technology or other measures taken.

1. INTRODUCTION

1.1. The political context

With the adoption of the European Green Deal in December 2019[1], the Commission set out *"a new growth strategy that aims to transform the EU into a fair and prosperous society, with a modern, resource-efficient and competitive economy where there are no net emissions of greenhouse gases in 2050 and where economic growth is decoupled from resource use. It also aims to protect, conserve and enhance the EU's natural capital, and protect the health and well-being of citizens from environment-related risks and impacts"*. To reach these objectives, "*energy efficiency must be prioritised*".

At that occasion, the Commission also announced that it would present an impact-assessed plan to increase the EU's greenhouse gas (GHG) emissions reduction target for 2030 in a responsible way, and committed to "*review and propose to revise, where necessary, the relevant energy legislation by June 2021*"[2].

In March 2020, the Commission made a proposal for a European Climate Law[3], and in September 2020, it presented a Climate Target Plan (CTP) for 2030[4], emphasising the need for a higher contribution of energy efficiency and renewable energy to enable achievement of a net 55% GHG emission reduction most cost-effectively. This is also in line with the Paris Agreement objective to keep the global temperature increase to well below 2°C and pursue efforts to keep it to 1.5°C. The accompanying Impact Assessment (CTP IA) explored the achievability of the higher targets and the contributions of different instruments, including for energy efficiency, to achieve them.

In December 2020, the European Council's conclusions[5] noted that "*To meet the objective of a climate-neutral EU by 2050 in line with the objectives of the Paris Agreement, the EU needs to increase its ambition for the coming decade and update its climate and energy policy framework. (...) To that end, the European Council endorses a binding EU target of a net domestic reduction of at least 55% in greenhouse gas emissions by 2030 compared to 1990."* Moreover, it is noted that: *"climate ambition will be raised in a manner that will spur sustainable economic growth, create jobs, deliver health and environmental benefits for EU citizens, and contribute to the long-term global competitiveness of the EU economy by promoting innovation in green technologies"*.

On 22 April 2021, the European Parliament and the Council came to a provisional political agreement to achieve at least a 55% reduction in GHG emissions by 2030. This sets the framework for action to reduce GHG emissions over the coming decades, but needs to be implemented through specific legislation to ensure those reductions occur.

For that purpose, in its 2021 Work Programme[6] the Commission announced the preparation of a 'Fit for 55' package for the second quarter of 2021. This package covers

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1 The European Green Deal (COM(2019) 640 final)
2 Annex to the Green Deal Communication, page 2
3 Proposal for a regulation of the European Parliament and of the Council establishing the framework for achieving climate neutrality and amending Regulation (EU) 2018/1999
4 Stepping up Europe's 2030 climate ambition. Investing in a climate-neutral future for the benefit of our people (COM/2020/562 final)
5 https://www.consilium.europa.eu/media/47296/1011-12-20-euco-conclusions-en.pdf
6 COM(2020) 690 final

a wide range of policy areas, including the revision of the Energy Efficiency Directive (EED[7]).

This impact assessment examines the options for revising the EED taking into account the other relevant elements of the package (see section 1.5).

1.2. The importance of energy efficiency

The importance of energy efficiency is illustrated by the EU's long-standing policy for saving energy and promoting energy efficiency[8], and has also come to the fore as a key element for achieving the EU's climate objectives and a cost-effective clean energy transition. This is because combustion of fuel for energy contributes about 75% of EU GHG[9] emissions, coming from energy industries, energy users in the residential sector and transport (see Figure 1). Reducing those emissions is necessary for achieving EU climate goals for 2030 and 2050, as examined in the CTP IA, a view which is supported by 85% of respondents from all stakeholder groups that responded to the Public Consultation (PC) for the revision of the EED[10]. A majority of respondents also support a revision of the EED to achieve this.

Reducing energy use is also important for many other reasons[11]; it reduces the EU's energy import dependence and improves energy security; it contributes to improved air quality, reduced environmental damage from materials extraction, resource efficiency and a circular economy; it supports energy system integration, has positive effects on social issues, including the alleviation of energy poverty and the creation of jobs, ; and encourages innovation and supports and facilitates economic growth[12]. Most of these co-benefits are difficult to quantify, but its positive effects are well known to Member States, stakeholders and experts in general and they are perceived to the society at large. Efforts have been made to also come to the quantification of these benefits[13].

Figure 1: Greenhouse gas emissions by main activity (2017)[14]

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7 Directive (EU) 2018/2002 of the European Parliament and of the Council of 11 December 2018 amending Directive 2012/27/EU on energy efficiency

8 In its 1995 White Paper on an Energy Policy for the European Union (COM(95)682), the Commission recognised the importance of promoting energy efficiency as well as the environmental and climate problems due to energy use.

9 https://www.eea.europa.eu/data-and-maps/data/data-viewers/greenhouse-gases-viewer. This does not include greenhouse gas emissions and removals from land use, land use change and forestry (LULUCF).

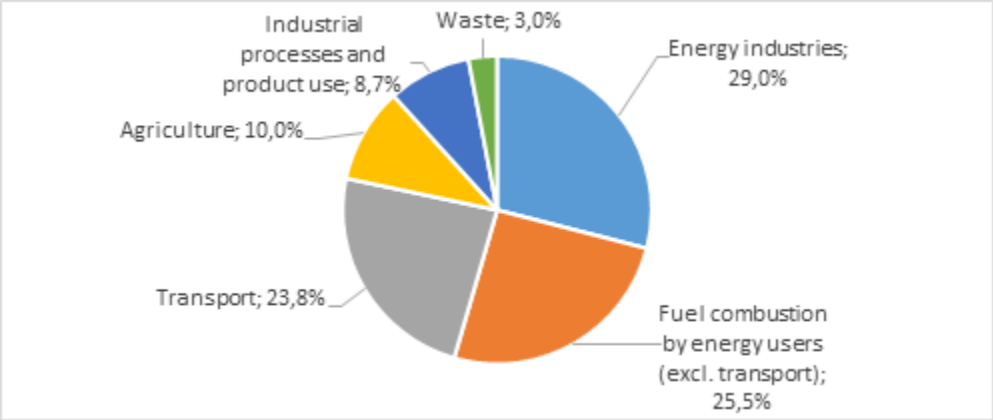
10 https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12552-EU-energy-efficiency-directive-EED-evaluation-and-review

11 https://www.odyssee-mure.eu/data-tools/multiple-benefits-energy-efficiency.html

12 IEA analysis shows that energy efficiency investments in buildings create around 15 jobs for every million dollars - the most jobs for the options assessed. Energy efficiency in industry is close behind at 10 jobs per million dollars investment. IEA World Energy Outlook Special Report: Sustainable recovery; June 2020

13 https://combi-project.eu/2018/06/22/combi-results-overview-policy-conclusions/

14 https://ec.europa.eu/eurostat/cache/infographs/energy/bloc-4a.html



As illustrated in Figure 2, energy-related GHG emissions can be reduced by a combination of **using less energy** and shifting towards the supply of **less GHG-intense energy**.

Figure 2: The contribution of energy efficiency to GHG emissions reduction.

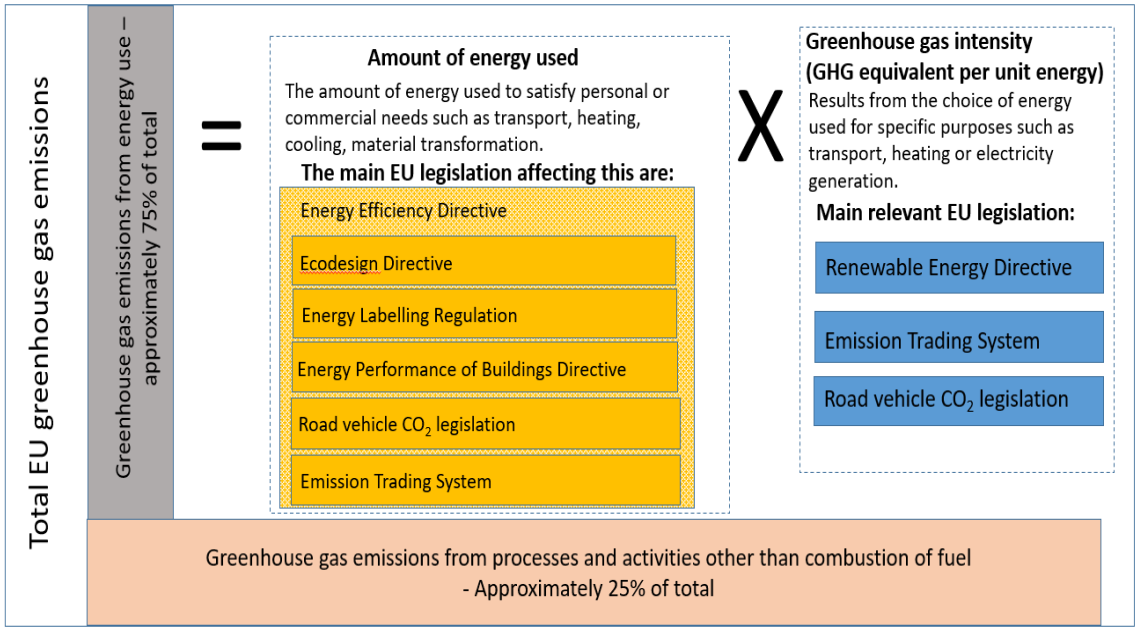


Figure 2: The contribution of energy efficiency to GHG emissions reduction.Figure 2 also indicates the main EU legislation that is driving changes in these two areas. GHG intensity is reduced by influencing energy supply through promoting renewable energy (e.g. through the Renewable Energy Directive[15]), and influencing demand through GHG-differentiated pricing measures (e.g. the Emission Trading System[16] (ETS) or the Energy

[15] Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources

[16] Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC, as amended.

Taxation Directive (ETD)[17]) and regulations (e.g. of light vehicles encouraging electrification).

The main ways that EU legislation is driving less energy use are by more energy efficient products (e.g. through the ecodesign framework), more energy efficient buildings (e.g. through the building-related provisions and legislation), more energy efficient vehicles (e.g. through road vehicle CO_2 regulation), pricing measures (e.g. through the ETS) and better information on energy saving opportunities (e.g. through energy performance certificates and energy labelling and actions for energy efficiency financing).

The role of this legislation – as well as that of the main other EU policies and legislation that can have an impact on energy use and may contribute to the EED's overall energy efficiency target – is described in more detail in ***Error! Reference source not found.***.

As the key legislation impacting the level of GHG emissions from energy, most of these instruments are being revised as part of the 'Fit for 55' package in a coherent and consistent way. The next section looks in more detail at this legislation and how it interacts with, complements and is complemented by, the EED.

1.3. The role of the EED and interlinkages with key related legislation

Reducing energy use and the role of the EED

Society's use of energy is largely driven by the size of its population and the level of economic activity and has tended to grow over time. This growth in energy use is offset by technical improvements leading to higher energy efficiency. The natural rate at which energy efficiency improves has been speeded up by the implementation of minimum performance standards that eliminate the worst performers from the market. This primarily relates to new goods (i.e. products[18], vehicles[19], buildings[20]) and services. Innovation is further stimulated by providing information such as labels[21] to show the differing performance and encourage economic actors to compete with increasingly more energy efficient offerings.

The impact of these standards and labels is determined by the rate of replacement (or upgrade) of the products they apply to. These rates vary enormously (e.g. 1% per year energy renovation of buildings[22], 6% per year for cars[23], every 21 months for smartphones[24]). Provided the rate of improvement of energy efficiency of new products is sufficiently high (and the energy needed for their production is low enough), overall energy use can be reduced by **accelerating the replacement rate**. In addition, **incentivising consumers to choose more energy efficient products** when they make a purchase also accelerates the rate of reduction of energy use. Moreover, the way of using

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17 Council Directive 2003/96/EC of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity

18 E.g. Eco-design legislation

19 E.g. CO_2 emissions standards for road vehicles

20 E.g. The energy performance of buildings Directive

21 E.g. Energy and car labelling legislation, Energy Performance Certificates for buildings

22 Renovation wave

23 Improvements to the definition of lifetime mileage of light duty vehicles: https://ec.europa.eu/clima/sites/default/files/transport/vehicles/docs/ldv_mileage_improvement_en.pdf

24 Average smartphone replacement cycle worldwide 2017 - Statista: https://www.statista.com/statistics/781708/global-average-smartphone-replacement-cycle/

energy can be influenced through pricing measures[25] as well as behavioural aspects (e.g. fuel-efficient driving and turning off devices not in use). Nevertheless, the existence of market barriers means that pricing is not overly effective as a mechanism to stimulate higher energy efficiency.

The EED aims to enhance energy efficiency by using these mechanisms, through the action of the Member States, to deliver increased energy savings above what would be achieved through minimum performance standards and pricing measures alone. Member States achieve the changes in the market through a range of measures at their disposal including removing barriers, offering subsidies, undertaking information campaigns and setting obligations on energy suppliers. The EED also requires a set of enabling measures to facilitate the delivery of higher levels of energy efficiency across the economy.

It is estimated that the impact of EU level action on minimum standards and pricing alone will achieve around half of the additional energy savings needed to meet the increased 2030 ambition, while the remainder will need to be achieved through measures enacted as a result of the EED.

The main elements of the EED

It can be seen that most of the relevant EU legislation is aimed at improving the energy efficiency of new energy using processes, actions and devices. In addition, the ETS and Energy Tax Directive (ETD) affect prices, which will have an effect on both activity and energy efficiency choices. There are a number of mechanisms by which the EED operates that are complemented by and complement the mechanisms and EU legislation referred to above.

One of the main roles the EED plays is to set the obligation on Member States to reduce their energy use. This triggers Member States to use the available mechanisms (making industrial processes more efficient, speeding up replacements, developing skills, investing in higher energy efficiency class devices, altering behaviour, providing good and detailed information, etc.) which lead to the actions and investments that deliver energy savings in use.

Energy efficiency faces barriers stemming notably from the involvement of large numbers of actors, the small scale of a very large number of actions to be taken and the remaining perceived uncertainty over benefits. Another important role of the EED is thus to address these and other remaining barriers.

Moreover, it is for the EED to ensure that Member States adequately undertake actions in the areas where there are or particular importance (for example district heating, cogeneration and energy services). The main mechanisms through which the EED operates are by:

- Setting an overall energy efficiency target for Member States;
- Creating specific energy saving obligations, which Member States are required to achieve (primarily in Article 7);
- Ensuring an exemplary role for the renovation of public buildings;
- Requiring Member States to support energy savings where these may be too complex, face too many frictions or lack appropriate incentives (e.g. public

[25] E.g. the Energy Tax Directive, the Emission Trading System

procurement, heating & cooling, energy transmission and distribution, energy performance contracts.[26]);

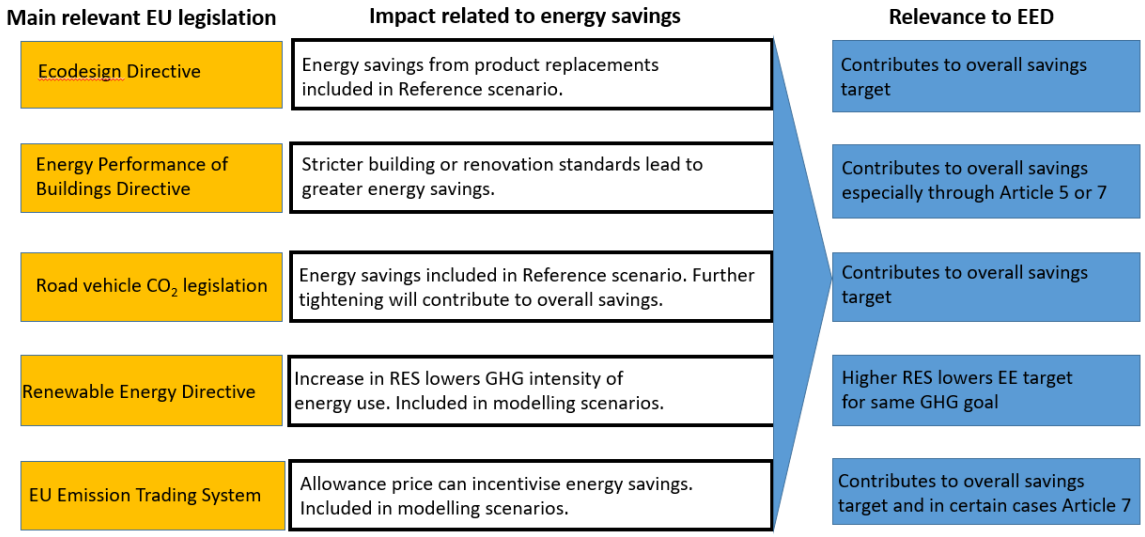
- Setting an obligation on Member States to implement enabling measures for example access to energy audits and ensuring adequate qualifications and certifications relevant to energy savings;
- Setting an obligation on Member States to ensure appropriate information is available for energy end users;
- Promoting the provision of finance for energy efficiency investments.

These are the broad elements of the EED as it was created in 2012. In December 2018, it was amended[27] as part of the 'Clean Energy for All Europeans package', in particular to include a new headline 2030 EU energy efficiency target of at least 32.5% (compared to projected energy use in 2030). The intervention logic of the EED is explained in more detail in **Error! Reference source not found.**.

Contribution of other EU legislation to the EED objectives

While these many other pieces of legislation have an impact in their own right on energy efficiency, they also contribute to achieving the objectives of the EED, in particular as regards the energy efficiency target. Figure 3 provides an overview of these main impacts and how they are relevant to the EED. In general, any changes to this other legislation, which increase the energy savings from them, will contribute to achieving the overall energy efficiency target set by the EED.

Figure 3: How other energy efficiency legislation interacts with the EED



The areas where the EED acts

Certain elements of the EED are addressed at specific energy consuming areas. Table 1 shows the main energy consumption in key areas of the economy addressed by the EED (with the relevant EED Article shown in brackets). Given that significant savings

[26] In this context, it has to be noted that in transposing the EED, Member States must give local and regional authorities a leading role in designing the measures laid down, in order to address the specific features of their climate, culture and society.

[27] Directive 2018/2002. The main changes were to introduce a 2030 target, amend the Energy Savings Obligations and change the metering requirements.

potential still exist in these areas, further promotion of energy efficiency actions are necessary in all of them.

Table 1 Estimated EU Final Energy Consumption (FEC) in economic sectors in the scope of the EED

Area	Activity level	% EU FEC
Businesses (Article 8)	368 Mtoe	40%
(of which industry)	240 Mtoe	26%
Households / consumers (Article 12)	245 Mtoe	27%
Heating and cooling (Article 14)	≈450 Mtoe	≈50%
(of which district heating and cooling)	12-14% of EU heat demand	6-7%
(of which cogeneration)	40 Mtoe heat	4.4%
Public sector buildings (Article 5)	15 Mtoe	2%
Public procurement (Article 6)	45-90 Mtoe	5-10%
Energy transmission and distribution losses (Article 15)	5-10% of electricity (CEER)	1.3-2.7%
	Transmission and distribution losses – 23 Mtoe	2.5%
Energy services (Article 18)	Estimated to be in the order of 25 Mtoe (41 billion Euro turnover)	≈2.5%

The transport sector which consumes around 32% of FEC is the sole main energy using sector that is currently not specifically addressed in the EED.

1.4. Governance of the Energy Union and Climate Action

Under the Regulation on the Governance of the Energy Union and Climate Action[28], each Member State is required to establish a 10-year integrated national energy and climate plan (NECP) for 2021-2030, outlining how it intends to contribute – *inter alia* – to the 2030 target for energy efficiency.

Member States submitted final National Energy and Climate Plans in December 2019 and proposed their contributions towards the EU 2030 energy and climate targets (40% GHG emission reduction, 32% renewable energy production in final energy and a 32.5% energy efficiency target). The assessment of these plans showed the existence of an 'ambition gap' as regards the existing 2030 EU energy efficiency target, meaning that the sum of Member States contributions fall short of the EU 32.5% actual headline target.

Therefore, and in line with Article 31 of the Governance Regulation, relevant policies and measures need to be strengthened, and the Commission must propose measures and exercise its powers at Union level to ensure the achievement of the Union's energy efficiency target. Also to that end, the revision of the Energy Efficiency Directive will

[28] Regulation 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action

play a crucial role, but it obviously needs to go further as the GHG reduction ambition level and the role played by energy efficiency therein are being changed.

1.5. The revision of the EED as part of the 'Fit for 55' package

The European Commission 2021 Work Programme announced a 'Fit for 55' package to reduce GHG emissions by at least 55% by 2030 and achieve a climate-neutral Europe by 2050.

Energy efficiency is a key area of action to enable the cost-effective decarbonisation of the EU economy[29], must be prioritised and, according to the conclusions of the IA CTP, needs to be decreased by 36-37% as regards final energy consumption.

The 'Fit for 55' package brings together the relevant policy instruments that can contribute to the 55% GHG reduction target and aims to do so in a coherent and proportional manner among other relevant regulations and directives. This is notably the case for the Energy Efficiency Directive (EED), the Renewable Energy Directive (REDII), the EU Emissions Trading System (ETS), Effort Sharing (ESR), Land use, Land Use Change and Forestry policies (LULUCF), energy taxation and CO_2 emission standards for vehicles.

With this objective in mind, the CTP IA assessed the interaction and expected contribution of the different measures to the overall carbon GHG emissions objective for 2030, showing that contributions from all relevant policies are needed to reach the 55% increased ambition and, ultimately, the carbon neutrality target set for 2050.

In particular, with energy supply and use responsible for 75% of emissions, the CTP underlines the need for higher ranges for renewables and energy efficiency targets, to contribute in a cost-efficient manner to the increased emissions reduction target. Given the key role of the EED in EU energy efficiency policy, the CTP IA also stressed the need for its revision alongside that of the other elements of the EU climate and energy framework.

All the CTP policy scenarios include a combination of a pricing mechanism as well as sector specific measures to ensure the required uptake of energy efficiency measures and the deployment of renewable energy. This approach aims to avoid the risk of incoherence or regulatory overshoot among the initiatives under the 'Fit for 55' package.

More generally, the optimal policy mix is shown to be based on a combination of strengthened economic incentives (in particular carbon pricing) with updated regulatory policies, notably in the field of renewables and energy efficiency. It should also update the enabling framework (R&D policies, financial support, etc.).

Regulatory policies, such as renewables, energy efficiency, and CO_2 standards for vehicles aim at addressing market failures and other barriers to decarbonisation. At the same time, they also create an enabling framework for investment, which supports cost-effective achievement of the climate targets by reducing perceived risks, increasing the

[29] Amongst various sources, see the Communication A Clean Planet for all – A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy (COM/2018/773 final), where the role of energy efficiency as *a condition sine qua non* for all decarbonisation scenarios is assessed.

efficient use of public funding and helping to mobilise and leverage private capital. These regulatory policies also pave the way for the future transition needed to achieve the EU objective of the climate-neutrality.

Since the CTP IA already explored the balance of combinations of instruments to identify the most cost-effective package, this is outside the scope of this impact assessment.

Of the other elements of the 'Fit for 55' package, how the approach taken to pricing in the CTP IA is taken over for this impact assessment has the most significant impact. This is because higher energy prices can lead to both a reduction in energy using activity and increase the attractiveness of energy efficient investments. The role energy efficiency can play to reduce the distributional effects from higher energy prices is also important. In view of this the 'Fit for 55' package impact assessments retain three different pricing scenarios without any decision on a preference. This assessment checks that the measures assessed are compatible with these scenarios.

The CTP IA shows that, depending on the approach taken to pricing instruments, the overall EU energy saving target for Final Energy Consumption should lie in the range of 36-37%, while that for Primary Energy Consumption should be in the 39-41% range. Therefore, this is assumed as the target level to be set in the EED, which the measures explored in this impact assessment need to achieve in concert with the other legislation.

Based on the estimated impact of the other legislation, in particular for products and buildings, a consequence of the overall energy efficiency target is the level of the Energy Saving Obligations required. This needs to increase to ensure that Member States take sufficient measures to accelerate energy efficient investments. Depending on the choice of pricing instruments, the range of the obligation needs to increase to between 1.4 and 1.6% per year.

It analyses policy options to inform a decision on how the revision of the EED could, in combination with the other planned policy changes, ensure the necessary energy savings are achieved. It draws upon an ex-post evaluation of the Directive[30], the CTP IA, the PC results (see **Error! Reference source not found.**), several studies, targeted stakeholder workshops and the findings of a Taskforce of Member States experts[31].

2. PROBLEM DEFINITION

2.1. The problem

Various studies carried out by the Commission, as well as evidence from stakeholders[32], show that, even with existing technologies, there is still significant scope for energy efficiency investments and cost-effective savings in Member States' economic sectors and in society at large (see **Error! Reference source not found.** for further details).

30 Evaluation SWD (reference to be added once available)

31 In the course of 2018, it became increasingly clear that the EU was not on track to achieve its 2020 energy efficiency target. In response to the growing energy consumption trends, the Commission set up a dedicated task force of Member States' experts to examine the underlying reasons and to mobilise efforts to reach the EU energy efficiency targets for 2020.

32 See e.g. https://www.eiif.org/sites/default/files/2020-12/EiiF_White%20paper_2020_REV.15.pdf

However, under business-as-usual, and even more so as a result of the COVID19 crisis, a large share of this energy efficiency and energy saving potential would remain unexploited, largely due to market and regulatory failures, which prevent cost-effective energy efficiency investments and actions from taking place.

As a result, unless higher levels of energy efficiency are achieved, GHG emissions would be higher for a given unit of output, important co-benefits would not be realised[33] and the EU would not meet its 55% GHG emission reduction target in a cost-effective manner as shown by the CTP IA.

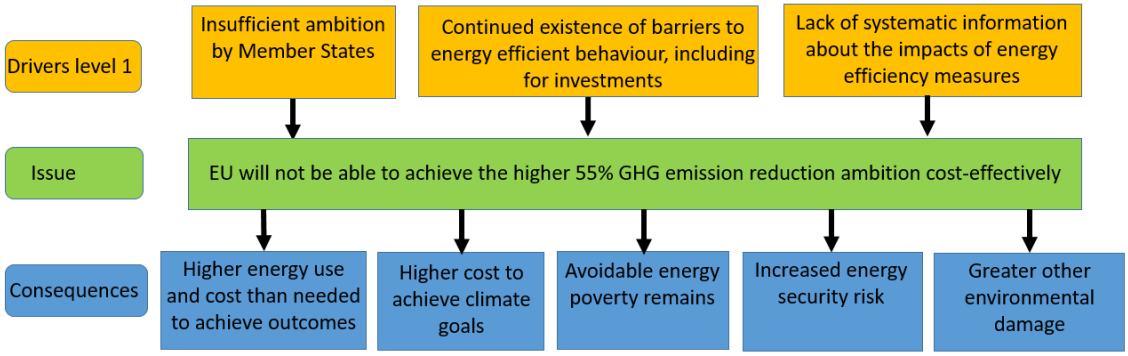
This is driven by three main factors:

1. Insufficient ambition and efforts by Member States;
2. Continued existence of barriers to energy efficient behaviour, including for investments;
3. Lack of systematic information about the impact of energy efficiency measures.

The consequences of these three negative drivers, if not addressed, would be higher energy use and the related higher costs, a substantially more expensive path to the EU full decarbonisation by 2050, at best no solution for avoidable energy poverty, more dependence on energy imports, with all the consequences linked to an ever developing complex geopolitical situation, and a worsening of the already depleted environment.

The problem tree in Figure 4 shows in a synthetic way the overall issue and its main drivers and consequences and the next section sets out these drivers in more detail.

Figure 4: Problem tree



The changing climate itself can also impact energy use. The PESETA III report[34] indicates that EU heating and cooling demand could decrease by 5% in the 2020-2050 period. This trend is not consistent across all Member States, and in some cooling needs may increase substantially accompanied by lower heating demand. Other potential implications may be restrictions on the availability of cooling water for industry leading to the use of alternative cooling technologies and changes in the efficiency of energy transformation installations."

[33] For example monetary savings, better societal acceptance, more effective use of resources, improved health, reduced energy poverty, etc. See also www.combi-project.eu

[34] Assessment of the impact of climate change on residential energy demand for heating and cooling; Joint Research Centre; 2018

2.2. The drivers

2.2.1. Driver 1 – Insufficient incentives to drive ambition and efforts by Member States

Achieving the necessary level of energy savings relies largely on Member States' ambition when setting objectives, and their efforts when developing and implementing energy efficiency measures at national level.

One key measure of this ambition is the indicative national contributions to the EU energy efficiency target that Member States had to set out in their National Energy and Climate Plans (NECPs) under the Governance framework. These national contributions do not add up to the necessary energy savings in line with the existing 2030 target[35], showing an ambition 'gap' in this area. While these national contributions were designed to meet a lower target in a different political context than today[36], it still points to the need to look at the incentives Member States have when developing their energy efficiency policies. The Member States' Taskforce recognised delayed implementation of energy efficiency policies as one of the causes of increased energy consumption.

A possible reason for this lack of ambition may be the fact that there are no binding national energy efficiency targets. This is in contrast with the situation for renewables where until recently Member States were obliged to meet national targets, with the result that the overall EU target was indeed met. It also provided scope for the Commission to effectively enforce compliance with these targets, where appropriate through infringement action.

Also the nature of the EU-level target plays an important role. Contrary to the situation for renewables and GHG emissions, the overall energy efficiency target is not explicitly binding at EU level. Although the EED sets final and primary energy consumption limits for the EU as a whole, and the Governance Regulation provides for further EU measures if the targets are not met, the indicative nature of the target does not support its achievement.

There are also a number of structural reasons for why Member States struggle to be more ambitious, including the fact that energy efficiency policies are difficult to design, implement and monitor. In fact, such policies typically must combine mutually reinforcing information-based instruments, regulatory instruments, monitoring and reporting mechanisms and economic and financial programmes. At the same time, these policies have to sufficiently reach and incentivise a range of relevant decision makers, be they individual consumers, businesses or investors. This also requires coordinated policy development at national, regional and local levels. While it is important for Member States to make efforts in all the main energy-using sectors, there is no "one size fits all" approach, as the barriers, challenges and actors are different (see driver 2). Therefore, an additional challenge is that the measures will need to differ depending on the sector.

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35 An EU-wide assessment of national energy and climate plans driving forward the green transition and promoting economic recovery through integrated energy and climate planning (COM/2020/564 final)

36 Further details about this 'ambition gap' are provided in **Error! Reference source not found.**.

Implementing such diversified policies requires a consistent and continuous implementation effort, and the appropriate level of knowledge, skills and tools to be able to reach the target groups and stimulate change. Evidence, for example from the ELENA programme[37] and the Covenant of Mayors[38], shows that these skills are not equally developed at all levels of government, and this constitutes a barrier to Member States more successfully driving greater energy savings.

Given the difficulty of policy-making in this area, Member States tend to prefer acting on the other variables of the fundamental equation highlighted in section 1.3 such as renewables or ETS. However, the CTP IA has shown that this is not cost-effective and would result in achieving the 55% GHG target at much higher cost.

Another important element is the fact that, the EED provides for many flexibilities and conditionalities (e.g. in Articles 5 and 6). While originally included to provide for national specificities, these have allowed Member States to choose alternatives that often result in a lower amount of energy savings than would be cost-optimal[39]. This was identified as a shortcoming by stakeholders in the dedicated workshops and through their PC responses where a majority indicated that existing flexibilities does not allow the EED to fully achieve its objectives.

In summary, to achieve their contributions Member States must create the appropriate frameworks, provide finance and implement a range of other measures targeting individual decision makers (e.g. consumers and businesses) in a range of sectors, who ultimately need to decide to implement energy efficiency measures. This driver therefore has strong interlinkages with the other drivers.

2.2.2. Driver 2: Continued existence of barriers to energy efficient behaviour, including for investments

A key reason for energy efficiency policies is the need to address the behavioural and market failures and barriers that lead, from the point of view of society, to unrealised economically viable energy savings. Behavioural failures refer to the cognitive limitations and biases that prevent consumers and investors to appreciate rationally the benefits of energy efficiency[40]. Market failures arise from the fact that many impacts and aspects of energy supply and use are not priced into the cost of energy[41]. Market barriers such as lack of information and awareness, lack of finance or lack of information about financial opportunities, legal complications of ownership of dwellings and management structures[42], and split incentives for example between owners and tenants of rented dwellings result in economically rational energy savings not being realised.

These factors prevent consumers, businesses and investors from adopting cost-effective energy efficiency measures, and can be categorised into economic, behavioural and organisational barriers or, alternatively, into market and non-market failures. The

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37 ELENA – European Local ENergy Assistance https://www.eib.org/en/products/advising/elena/index.htm

38 https://www.covenantofmayors.eu/en/

39 For example, the flexibility given to Member States in view of the renovation target in Article 5 limits its effectiveness, as it allows to renovate less buildings to the cost optimal level.

40 DellaValle N., Bertoldi P. (2021) "Toward a more situated energy efficiency policy agenda".

41 E.g. impacts on air pollution, biodiversity, resource use, climate change and energy security

42 Economidou M et al., Energy efficiency upgrades in multi-owner residential buildings - Review of governance and legal issues in 7 EU Member States

previous impact assessments[43] extensively detailed these aspects and they have not changed since then.

The main consequence of these barriers and failures is that EU energy consumption is higher than it would be with perfectly economically rational behaviour that takes into account long-term benefits. This diverts financial resources from other uses to pay for energy consumption and leads to excessive consumption of natural resources, higher energy dependence, less competitive businesses and higher energy poverty.

Although the evaluation shows the EED has made a clear contribution to addressing such failures and barriers, this has been uneven and in some areas unsuccessful, partly due to weaknesses in the provisions of the Directive itself.

The following sections provide more details for each of the main intervention areas of the EED linked to this driver – and which should therefore be addressed:

Public sector

The public sector is an important economic actor in its own right (see Table 1 Estimated EU Final Energy Consumption (FEC) in economic sectors in the scope of the EEDTable 1) and is responsible for around 5 to 10% of total EU FEC[44]. Overall, the EU-share of public procurement contracts attributed to central government bodies is estimated to be approximately 16%. At Member State level this varies between 5% and 86%[45]. Public buildings are estimated to use around 2% of EU FEC. Cost effective savings potentials still exist in the entire public sector both in the renovation and energy management of existing buildings as well as the future procurement of energy efficient buildings, products and services.

The EED recognises the exemplary role of public authorities through the obligation to renovate annually 3% of central government buildings (Article 5), and procuring buildings, products and services with high energy efficiency performance (Article 6).

As regards buildings, the existing obligations only target cost-effective savings in the central government sector, which represents a small part of public authorities. Information from the evaluation, from analysis in the EED Concerted Action framework and from the PC replies shows that measures only at national level are not considered sufficient. Moreover, the Renovation Wave initiative[46] highlighted the need to step up renovation rates and depth[47], including for public buildings.

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43 SEC(2011) 779 final; SWD(2016) 405 final

44 Moles-Grueso, S., Bertoldi, P. and Boza-Kiss, B., Energy Performance Contracting in the Public Sector of the EU – 2020, EUR 30614 EN, Publications Office of the European Union, Luxembourg, 2021, ISBN 978-92-76-30877-5, doi:10.2760/171970, JRC123985.

45 Evaluation of Articles 6 and 7 of the Energy Efficiency Directive (2012/27/EU) (SWD(2016)403 final; https://ec.europa.eu/energy/sites/ener/files/documents/3_en_autre_document_travail_service_part1_v3.pdf).

46 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – A Renovation Wave for Europe – Greening our buildings, creating jobs, improving lives" (COM(2020)662)

47 It also announced a targeted revision of the EPBD, which is planned for adoption at the end of 2021

Similarly, the current obligations for public procurement only target cost effective savings in the central government sector, which represent some 15-17% of all public procurement[48] by public authorities.

With regard to public procurement and renovation practices, the evaluation showed that there are limited resources and lack of expertise or tools to adequately consider energy efficiency. Moreover, there seems to be a reluctance to include energy efficiency requirements systematically in procurement, mainly because purchase price - rather than 'total cost of ownership' - is still regarded as the main criterion.

Industry

Industry is one of the sectors that has achieved significant energy efficiency improvements over the last decade. Nevertheless, as demonstrated in **Error! Reference source not found.**, cost-effective savings potentials still exist.

The underlying presumption is that as an economically driven sector, businesses should implement economically viable energy saving investments. There are however various reasons why this may not be the case. There may be challenges related to the availability of finance or to uncertainty over whether energy efficiency investments would really deliver the savings claimed, especially if it is a vendor of the equipment that is explaining its potential.

Nonetheless, a key barrier is likely to be that most businesses do not have the expertise to know what technical energy saving opportunities are available, or what their economic benefits might be for the business.

It is to address this weakness that the EED contains an obligation for energy audits for larger businesses and requires Member States to also make energy audits available to SMEs. Nevertheless, information from stakeholders and assessments indicates that only a small proportion of cost effective energy saving opportunities identified in audits are implemented.

The EED mainly addresses energy efficiency in industry through the requirement for large companies to carry out energy audits (Article 8). The evaluation indicates that audits have been effective for increasing awareness of energy savings potentials, identifying energy saving opportunities and assessing their financial feasibility in enterprises. Nevertheless, the share of cost-effective potential identified in audits that are actually implemented is rather low.

A study exploring the implementation of the energy audit requirements notes that recommendations are implemented following mandatory audits are only around a quarter of those for voluntary audits. It states *"The main reason for this difference seems to be the lack of implementation of recommendations. While the likelihood of recommendations for activities by the auditor are broadly similar across the two studies, the rate of implementation is much lower for companies in the study undertaking obligatory audits. The reason for this seems to be that voluntary participation in an audit may already signal a motivation to improve and follow through on audit recommendations."*

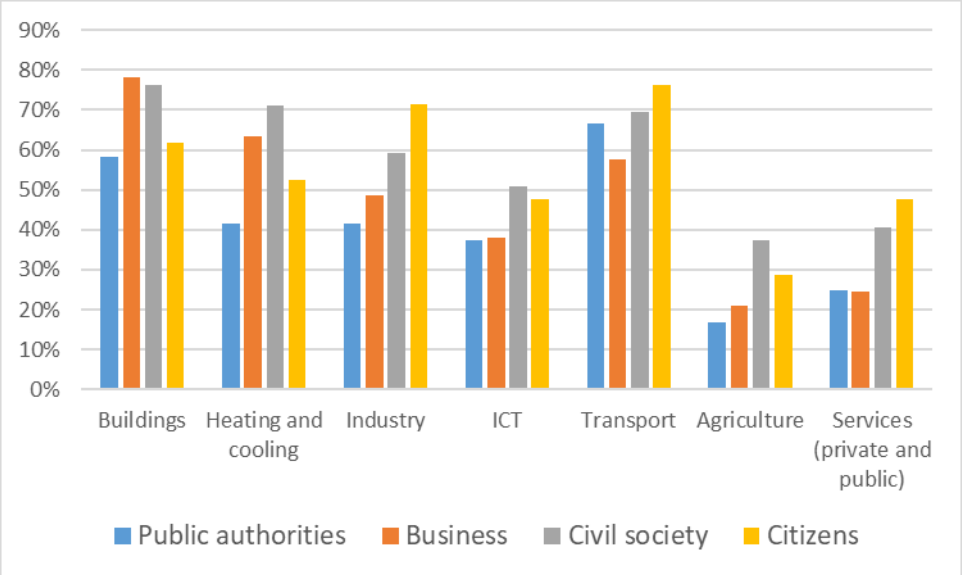
[48] DG GROW estimate

A specific industry sector that has seen a significant increase in energy consumption over the last decade is information and communication technologies (ICT), including data centres. In 2018, the energy consumption of data centres in the EU was 76.8 TWh. This is expected to rise to 98.52 TWh by 2030, a 28% increase.

This increase in absolute terms can as well be seen in relative terms: within the EU, data centres accounted for 2.7% of electricity demand in 2018 and will reach 3.21% by 2030, if development continues on the current trajectory[49]. Europe's Digital Strategy[50] already highlighted the need for highly energy-efficient and sustainable data centres and transparency measures for telecoms operators on their environmental footprint.

In the PC, 41% of respondents believed that more action was needed in the ICT sector in view of the higher energy savings ambition for 2030. The disaggregation of these opinions is shown in Figure 5 where it can be seen that this view is relatively consistent across the groups. The siting of data centres and ensuring their waste heat could be used was considered important or very important by the majority of respondents.

Figure 5 Stakeholder views on the sectors in which additional effort is needed



Heating & Cooling

Heating and cooling consumes half of EU FEC, making it the biggest energy end-use sector. There remains much potential for reducing energy use in this sector, while still achieving the temperatures needed. Heating and cooling, therefore, plays a crucial role in the EU's ambition to transition into a clean and carbon-neutral economy by 2050. Much of the effort is needed in the field of better insulating buildings but there is also potential

[49] https://digital-strategy.ec.europa.eu/en/library/energy-efficient-cloud-computing-technologies-and-policies-eco-friendly-cloud-market

[50] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – Shaping Europe's digital future (COM(2020) 67 final)

in terms of more efficiently supplying the heat or cold needed[51]. As Figure 5 shows, there is considerable support for taking more action in this area, especially from business.

Measures in other legislation, for example the RED, aim to increase the share of lower GHG energy in the supply of heating and cooling. Similarly, pricing measures can encourage the replacement of heating equipment and use of less GHG intense fuels.

The use of networks, which currently supply around 13% of heat needs, for heating or cooling, in particular if these are receiving surplus heat or cooling input from industry, involves many barriers and coordination challenges. It is a sector where there is substantial expertise available within the EU and where an industry has evolved to supply this market. For these reasons, the EED contains specific provisions on heating and cooling, which address high-efficiency cogeneration and efficient district heating and cooling.

The EED requires Member States to carry out comprehensive assessments of the potential for high-efficiency cogeneration and efficient district heating and cooling (Article 14)[52]. The requirement to carry out cost-benefit analyses has helped stimulate the uptake of high-efficiency cogeneration that delivered 30.2 Mtoe primary energy savings in 2018[53]. There is still evidence of considerable amount of waste heat available in the most recent comprehensive heating and cooling assessments submitted by the Member States[54]. PC respondents indicated these elements were considered to have had a moderate impact (3.2/5) in stimulating energy efficiency in the sector. Overall, the evaluation found that the comprehensive assessments helped to increase the overall importance and awareness of heating and cooling in Member States, but that the overall impact is rather low. This is largely due to the lack of follow up given to the findings from these assessments and the wide use of exemptions allowed by Article 14.6. CHP heat supply has remained relatively constant around 40 Mtoe over the whole of the last decade.

The definitions are also used in assessing the provision of state aid. Concern has been raised that the current definitions result in state aid being granted to installations with GHG emissions that are unlikely to remain compatible with the decarbonisation trajectory required.

Energy transformation, transmission and distribution

Energy losses in energy transformation, transmission and distribution can be significant[55] and therefore the EED requires Member States to ensure that energy efficiency is

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51 An EU Strategy on Heating and Cooling (COM/2016/051 final)

52 For an overview of these comprehensive assessments please see: https://ec.europa.eu/energy/topics/energy-efficiency/heating-and-cooling_en#comprehensive-assessments

53 Eurostat 2021 https://ec.europa.eu/eurostat/documents/38154/4956229/CHPdata2005-2017.xlsx/871cc151-5733-423f-ae38-de9b733aa81e [22.04.2021]

54 Comprehensive assessments are published at https://ec.europa.eu/energy/topics/energy-efficiency/heating-and-cooling_en. As examples, the assessment by Finland estimates remaining waste heat potential at 35 TWh, while France estimates its waste heat potential above 60 °C from industry as 12,3 TWh.

55 See for example; 2nd CEER Report on Power Losses; Council of European Energy Regulators; 2020

considered in these sectors (Article 15)[56]. At the same time, as equipment is replaced at the end of its lifetimes, there will be a gradual natural evolution toward higher efficiency, in particular for electricity.

The available information shows a gradual reduction in energy supply losses[57], but there remains potential to increase its energy efficiency. However, a number of key factors limit action to realise it. There is a concern that investments to increase energy efficiency may ultimately result in higher prices for final consumers and Cost Benefit Analysis results often advise against significant intervention. In the case of gas network operators, there may be a reluctance to invest because of uncertainty about their long term role.

Given the diversity of network structures there is also a reluctance to have a "common methodology". The absence of common methodologies and reporting, make it difficult to compare networks or operators or benchmark performance. In fact, there is no uniform EU definition of energy losses, which results in sub-optimal data quality.

The evaluation found that several provisions of Article 15 have been effectively implemented in the Member States, for example, treating energy losses as a separate item in the national efficiency regulations and incentivising demand-side resources. However, there is not sufficient data to enable a comprehensive analysis of the effectiveness of the provisions.

Transport

While the energy savings potential remains large in all sectors, there is a particular challenge related to transport, as it is responsible of 33% of FEC[58] and is one of the few sectors that has seen an increase in energy consumption over the last decade.

The Sustainable and Smart Mobility Strategy[59] adopted in 2020 lays the foundation for how the EU transport system could achieve its green and digital transformation and become more resilient to future crises. However, it does not include explicit energy efficiency measures.

Currently, the EED does not directly address the transport sector, although Member States can count energy savings from national measures targeting transport sector towards the Article 7 target. Nevertheless, only a small share of energy savings (5%)[60] reported by Member States under the EED stems from transport, indicating a lack of focus on energy savings from this sector.

This seems to be at least partly due to the fact that energy efficiency and transport policy are traditionally the responsibility of different government departments with little or no synergies in policymaking. Moreover, the required changes necessitates a multi-level

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56 Certain of these (parts of Article 15(5) and Article 15(8)) were removed in 2018 as part of the Clean Energy for All Europeans and replaced with consolidated provisions in the new Electricity Market legislation.

57 Identifying energy efficiency improvements and saving potential in energy networks, including analysis of the value of demand response; Tractebel Engineering, Ecofys; 2015

58 Eurostat 2019 data

59 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – Sustainable and Smart Mobility Strategy – Putting European transport on track for the future (COM/2020/789 final)

60 5% represent energy savings reported by Member States for 2014-2018

adoption (national, regional, provincial) of specific policy mixes to increase transport energy efficiency and to reduce transport energy, which is complex[61].

The PC results clearly support stronger action on transport energy efficiency as shown in Figure 5, with 62% of respondents stating that transport is a sector where extra energy efficiency efforts are most needed to achieve a higher energy efficiency ambition for 2030. In the case of public authorities this view is even stronger with 67% stating that more action is needed. It is therefore a legitimate question to explore whether there can be measures under the EED that foster energy efficiency improvements in transport in a manner complementary to the other existing policy instruments targeting the sector, including measures reducing the need to travel, shifting travel to more energy-efficient modes and/or improving the efficiency of transport modes.

Enabling and supporting measures – Consumers, financing, energy services and support schemes

Consumers & households

Table 1 shows the household sector makes up around a quarter of all EU FEC. The behaviour of consumers and citizens has an important impact on this energy consumption and the EED contains several provisions that support the empowerment of citizens and consumers, including:

- The establishment of more frequent and transparent billing regimes based on the actual consumption patterns at the end use level (Articles 9-11[62]);
- Information and empowerment programmes (Article 12), and;
- The exchange and dissemination of information and awareness raising (Article 17).

In addition, it contains provisions that aim to tackle long-standing socio-economic challenges like energy poverty (Article 7) and the split of incentives between tenants and owners or among owners (Article 19).

Despite these provisions, the evaluation has shown that Member States struggle to address consumer behaviour and consumer empowerment aspects in promoting energy efficiency, in particular at more local levels. This results in insufficient incentives for consumers to realise energy efficiency improvements and to tackle high upfront costs and the split incentives problem. This is compounded by a low level of awareness and lack of information among consumers about the potential of energy services and energy performance contracting.

Moreover, certain energy efficiency changes may involve significant hassle costs for those carrying out the investment, which increases the costs of the investment. For example, disruption caused by building works or the efforts needed to identify appropriate financial support schemes. In particular, if the estimated relative gain is

[61] Energy efficiency in the transport sector: policy evaluation and evaluation in some European countries. Eva Valeri, Amanda Stathopoulos, Edoardo Marcucci

[62] Please note that the metering and billing provisions on electricity were moved to the electricity Directive during the 2018 revision of the EED. Similar provisions related to gas are intended to be included in the ongoing revision of the gas legislation.

small, then the hassle costs can act as a significant barrier, especially if there is uncertainty around the benefits of the investment.

This is exacerbated by the fact that the additional benefits of energy efficiency measures – for example regards health, local air pollution, poverty alleviation, energy security, local job creation, etc. – are often not known or taken into account by economic operators or society. As a result of the pervasive externalities linked to these co-benefits, which are not priced, 'rational' economic operators do not take them into account when taking decisions. This results in an underinvestment in energy efficiency.

While the EED already provides some incentives for Member States to address energy poverty (e.g. Article 7), stakeholders consider energy efficiency as the most effective solution to alleviate energy poverty and suggested to use the revision to overcome some of the potential negative distributional impacts of pricing measures (see **Error! Reference source not found.** for a more detailed discussion of the link between energy efficiency and energy poverty).

Financing

Achieving energy savings requires investment in energy efficiency (such as insulation to reduce unwanted heat transfers or the acquisition of new equipment that requires less energy to operate). While investments are expected to be paid back over time through the avoided cost of the energy saved, bridging financing is often needed.

The CTP IA estimated that average annual energy system investments needs (excluding transport) in the period 2021-2030 to achieve the 55% level of ambition would be between €401 and 438 billion. Energy efficiency faces one of the largest investment gaps, estimated at around €165 billion. This is mostly due to higher rates and stringency of building renovation.

The problem is that, despite the profitability of investments, a complex set of market and regulatory barriers may limit the access to finance. Finance market imperfections, in particular at local and regional level, a fragmented market, complex procurement rules and decision making processes (e.g. multi-family apartment buildings), split incentives, scarcity of public funding and difficulty to combine different sources of financing or lending solutions not adapted to energy efficiency needs, are some of most important barriers.

Several pieces of EU legislation aim to address these barriers (over and beyond their impact on energy efficiency investments. The EED contain two specific provisions aimed at overcoming some of these barriers: Article 19 on split incentives and Article 20 on support for energy efficiency investments at Member State level by facilitating the establishment of national financing facilities for energy efficiency. However, the evaluation showed that this has only been partially successful. In addition, the lack of available data on the level of energy efficiency investments and financing in the Member States does not allow a comprehensive assessment of the magnitude of the financing measures put in place (and thus hampers a thorough evaluation of their effectiveness).

On the other hand, the evaluation found that the requirement for the Commission to assist the Member States in setting up financing facilities and technical support has been effective, due to its active role over the past years through EU funding programmes and support measures. This is expected to continue until 2030 and beyond, in particular under the NextGenerationEU recovery instrument (under which Member States have to ensure

that a minimum of 37% of actions included in their Recovery and Resilience Plans contribute to climate action), cohesion funding and InvestEU. In total, this would amount to around 12-14 billion per year in EU funds between 2021 and 2027[63].

About half of the PC respondents consider that Article 20 has contributed to facilitate access to finance for energy efficiency projects, although the impact of the specific provisions was often considered as moderate at best.

Certification, accreditation and qualifications

In the PC 92% of respondents said that they were aware of the certification, accreditation and qualification schemes for providers of energy services, energy audits, energy managers and installers in their Member State. Respondents' views on the benefits of qualification schemes vary as shown in Table 2 below:

Table 2 Stakeholder opinion on certification and accreditation scheme benefits

Benefits of certification and accreditation schemes	
Ensures availability of skills (providers of energy services, energy auditors, energy managers and installers)	26%
Ensures quality of energy services offered by energy service providers	17%
Increases confidence in the energy services sector	12%
Facilitates the development of the energy services markets	11%
Other	34%

In terms of effectiveness, most stakeholders (68%) thought the schemes were effective to some extent, with 22% saying they were fully effective and 10% finding them not effective.

Energy services, support schemes

The implementation of energy efficiency measures also requires a supporting structure, for example as regards the availability of a skilled workforce (e.g. installers, energy auditors) or energy services companies. The EED enables the establishment of such structures, in particular through obligations on the availability of qualification, accreditation and certification schemes (Article 16) and the promotion of the energy service market and energy performance contracting (Article 18).

With regard to energy services, 56% of PC respondents said that the EED had contributed to the development of the energy services market. Nevertheless, their effectiveness was uneven and diminished due to persistent barriers in the market. When asked for the important factors for the development of energy services the responses are shown in Table 3 below:

[63] For a more detailed overview of available instruments please see Commission Staff Working Document: "Support from the EU budget to unlock investment into building renovation" accompanying the Renovation Wave Communication (SWD(2020) 550 final)

Table 3 Stakeholder opinion on energy services market contributory factors

Important factors that contributed to the development of the energy services market	
Financing and support mechanisms have been made available	57%
Information about energy services has been made available to SMEs and consumers	55%
Certification and accreditation schemes ensured the needed skills are available	39%
Regulatory framework has been properly set	29%
Model energy performance contracts have been developed and deployed	14%
Other	20%

Of these, the most relevant (financing and information) are addressed elsewhere. The third most important factor, certification and accreditation, is discussed above and this supports the importance of its relevance for energy services.

2.2.3. Driver 3 - Lack of systematic information about the impacts of energy efficiency measures

Measuring the impacts of energy efficiency policies requires measuring the bottom-up impact from specific policies, measures and actions in many sectors. This is challenging and requires robust methodologies, which capture rebound effects, interaction or overlaps between the different measures, as well as 'additionality' compared to the situation where energy savings could have happened without a policy measure in place.

The evaluation shows that comprehensive information on the impacts of energy efficiency measures at national level is often lacking, except for measures reported under Article 7, which requires Member States to establish specific calculation methodologies for capturing energy savings per measure.

Due to the absence of reporting, information on the impact of several provisions is missing or uneven, for example as regards energy efficiency uptake in public procurement, energy transformation, transmission and distribution (Article 15) or national qualification, accreditation and certification schemes (Article 16), making it challenging to assess and compare the impacts of Member States' energy saving measures. As indicated above, this also applies to the impacts of financing measures.

Moreover, in some important sub-sectors, such as ICT, there is a lack of reliable, disaggregated information about energy consumption. The limited resources made available at Member States level to develop new high-quality European statistics for monitoring energy efficiency improvements in detail exacerbate this.

Due to lack of robust monitoring and measurement, expected energy savings from planned policies are often overestimated. The Member States' Task Force identified this as one of the reasons why progress towards achieving the energy efficiency targets is low.

These findings are supported by independent research[64] that also indicates the poor quality of underlying data, and that more resources are needed to enhance the availability and quality of data and reporting on demand side energy efficiency in all Member States,

[64] The Potential for Energy Efficiency in the EU Member States – A Comparison of Studies. 2017. Katharina Knoop and Stefan Lechtenböhmer. Research Group Future Energy and Mobility Structures, Wuppertal Institute for Climate, Germany.

which would highlight the large savings that addressing the causes of underinvestment in energy efficiency could deliver.

These concerns about the monitoring framework are supported by 72% of PC respondents, who indicated that the EED has not provided the right monitoring and enforcement mechanisms to achieve national energy efficiency targets.

2.3. How will the problem evolve?

The increased awareness of the importance of effectively addressing climate change, of the need to act swiftly and of the role that energy efficiency plays in that context are expected to drive policy makers, investors and the citizens at large to give a higher priority to energy efficiency.

However, the identified weaknesses in the existing legal framework, including the EED, and the underlying market failures and market barriers will not be solved autonomously. Member States' ambition, which has been insufficient so far, needs to be supported by strong and effective policies and measures at EU level.

Prior to the COVID-19 crisis, the EU was not on track to meeting its 2020 energy saving targets[65]. The above-mentioned Task Force reported in January 2019 that possible, and at least partial, explanations for this were good economic performance, low oil prices, and cold winter and warm summers during some years. The main increases in energy consumption were observed in buildings followed by transport and industry.

The latest EU27 energy consumption figures for 2019 showed that PEC was 1 352 million tonnes of oil equivalent (Mtoe), which is 3.0% above the 2020 target and 19.9% away from the current 2030 target. FEC was 984 Mtoe: 2.6% above the 2020 target and 16.3% away from the 2030 target. These are decreases of 2% in PEC and 1% in FEC compared with 2018.

The COVID-19 crisis has influenced energy demand, which might make the achievement of the 2020 targets possible. However, this impact is expected to be short-term, since it is not attributable to policies, measures and structural changes to increase energy efficiency[66]. With a possible rebound effect, it would still be hard to reach the current 2030 target.

While there might be some longer-term impacts of the COVID-19 crisis on energy consumption (e.g. remote working, video conferencing are likely to remain at higher levels than would previously have been expected), a number of energy consuming economic activities may simply have been postponed rather than cancelled. Therefore, the long-term energy impacts of these changes are at least uncertain, but more probably limited.

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65 Report from the Commission to the European Parliament and the Council – 2019 assessment of the progress made by Member States towards the national energy efficiency targets for 2020 and towards the implementation of the Energy Efficiency Directive as required by Article 24(3) of the Energy Efficiency Directive 2012/27/EU (COM(2020) 326 final)

66 The IEA (https://www.iea.org/reports/energy-efficiency-2020/covid-19-and-energy-efficiency) notes that the changes in primary energy intensity mainly reflect the pandemic's impact on the economy. Historical GDP and energy intensity data suggest that large falls in GDP, like those in 2020, tend to be followed by falls in the future energy intensity improvement rate.

The assessment of the Member States' energy efficiency contributions included in their NECPs has shown that the current EU energy efficiency targets for 2030 will not be achieved with the policies planned. The CTP IA concludes that it is unlikely that the necessary higher levels of energy efficiency needed would be achieved through market forces, current market organisation and technology development alone, meaning that further efforts are needed.

In conclusion, while the 2020 energy efficiency target may have been achieved due to exceptional circumstances, increased efforts are required to achieve a reinforced energy efficiency ambition level in line with the 55% GHG emissions reduction target as set out in the CTP.

3. WHY SHOULD THE EU ACT?

3.1. Legal basis

The EED was adopted under Article 194 of the Treaty on the Functioning of the European Union (TFEU) in 2012 as the key instrument for reducing the EU's primary and final energy consumption in 2020. In 2018, it was partially amended in view of the EU's 2030 targets.

Article 194 TFEU, paragraph 1, states that the aim of Union policy on energy includes ensuring security of energy supply and promoting energy efficiency and energy saving.

This provides the appropriate legal basis for further action to promote energy efficiency and energy savings.

3.2. Subsidiarity: Necessity of EU action

The underlying problems causing a shortfall in energy savings (compared to the optimal level from the perspective of society) are the same across the EU and are present everywhere.

In view of the external costs[67] of energy consumption (e.g. greenhouse gas emissions, air pollutant emissions, energy security), actions to increase energy efficiency and reduce energy use are likely to lead to benefits beyond national borders. For trans-boundary problems, Member State action is unlikely to lead to optimal outcomes.

In the presence of a higher climate target, which requires a higher energy efficiency target, EU action must supplement and reinforce national and local action. It is worth underlining that the Governance Regulation already foresees the obligation for the Commission to act in case of a lack of ambition by the Member States to reach the targets, thus *de facto* formally recognising the essential role of EU action in this context.

Coordination at the European level, in fact, enhances energy security and environmental and climate benefits, and EU action is thus justified on grounds of subsidiarity in line with Article 191 TFEU. In addition, the nature of the instrument and of the fact that the energy efficiency target is not binding at national level respects the principle of

[67] An external cost occurs when producing or consuming a good or service imposes a cost (negative effect) on a third party

subsidiarity. Member States retain the same level of flexibility in terms of selecting their policy mix, sectors and the approach to achieve the required energy savings by 2030, by taking into account the national context and specificities. However, energy is a policy field with high investment needs. A coordinated approach at EU level can create trust, reliability and continuity, increasing the likelihood of different actors investing and getting involved. Policies at EU level can also create a just and fair transition for countries and regions with economies that may be significantly impacted by changes in industrial structure or employment as a result of the energy transition towards decarbonisation. Coordinated action at the EU level, furthermore, enables fuller account to be taken of the different capabilities to act among Member States.

3.3. Subsidiarity: Added value of EU action

As discussed previously, energy efficiency policies are a crucial mechanism to reduce greenhouse gas emissions, something which is also highlighted in the evaluation of the EED and OPC. In this regard, coordinated EU policies have a better chance of transforming the EU to a climate neutral continent by 2050.

The EU's energy and climate targets for 2030 are collective targets. Nevertheless, many actions to reduce energy consumption are taken at Member States' level. In many cases, this is most appropriate. At the same time, action at the EU level can enable and enhance those efforts by ensuring a more coordinated and harmonised approach, for example by helping to create larger markets for European suppliers, and ensuring that they are under the same obligations and rules. This way consumers enjoy the same basic rights and be provided with comparable and recognisable information across the EU. Delivering on energy efficiency while empowering consumers requires meaningful, accurate and understandable information on energy use, related costs, and easy access to a competitive market of building construction materials (windows, insulation, etc.), heating and cooling solutions, and other products that help improve energy efficiency.

Effects on the single market concerning growth, investments and jobs creation can thus be considered when policies and measures are being decided and implemented. Moreover, the EU single market acts as a strong driver for cost-efficiency in achieving GHG emission reductions.

A common EU approach to energy efficiency also enables addressing the specific common challenges such as alleviation of energy poverty. The EED framework allows for the inclusion of targeted energy efficiency measures by Member States for certain income classes (for instance promote the achievement of the obligations in Article 7 of the EED by focusing on reducing energy bills of vulnerable consumers).

The experience from the implementation of the EED indicates that having a common EU framework is socially just, reduces costs, increases benefits from the internal market and allows national policy-makers to learn from each other. The EED effectively complements and catalyses other national and EU measures. Policies adopted at EU level reflect the close interrelation of the policy areas of climate change, security of supply, sustainability, environment, internal market, social and economic development. This was supported by the Task Force of mobilising Member States efforts to reach 2020 energy efficiency targets, which called for a strong, targeted and common energy efficiency policy framework to attract the necessary investments, ensure the energy savings are achieved in a just and fair way.

4. OBJECTIVES: WHAT IS TO BE ACHIEVED?

4.1. General objectives

In view of the above, the general objective of this initiative is to revise the EED to further promote energy efficiency and energy savings to contribute optimally to the cost-effective achievement of the EU 55% GHG reduction ambition for 2030, by achieving a 36-37% energy efficiency target as shown in the Climate Target Plan.

4.2. Specific objectives

Based on the considerations set out in chapters 2 and 3, the intervention has the following specific objectives:

- **Objective 1:** Strengthen incentives in support of ambition and efforts in the Member States to achieve a 36-37% energy efficiency target;
- **Objective 2:** Reinforce the EED to better address market barriers and failures;
- **Objective 3:** Improve understanding of impacts of energy efficiency measures taken by Member States, while optimising the administrative burden through the approach of the Governance Regulation.

The revision of the EED also needs to consider the broader objectives of the European Green Deal, which aims to leave no one behind and to deliver a sustainable economy.

Furthermore, as this is a revision of an existing Directive, the Better Regulation framework requires exploring the potential for simplification and improving the efficiency of the legislation (e.g. by reducing regulatory costs and administrative burden).

Table 4 sets out the relation between the problem, the problem drivers and the objectives.

Table 4: Problem, drivers and objectives

Problem	Current policies and measures are not sufficient to meet the 2030 energy efficiency target		
Problem drivers	Insufficient incentives to drive Member States' ambition and efforts	Continued existence of barriers to energy efficient behaviour, including for investments	Lack of systematic information about the impacts of energy efficiency measures
General objective	Promote energy efficiency to ensure a 36-37% energy efficiency target for final energy consumption to contribute optimally to achievement of the EU 55% GHG reduction ambition for 2030.		
Specific objectives	Strengthen incentives in support of ambition and efforts by Member States	Reinforce the EED to better address market barriers and failures	Improve understanding of impacts of energy efficiency measures taken by Member States, while optimising the administrative burden through the approach of the Governance Regulation

5. WHAT ARE THE AVAILABLE POLICY OPTIONS?

5.1. What is the baseline from which options are assessed?

All the 'Fit for 55' initiatives are considered as one package and share a common baseline. Concerning energy system modelling, the EU Reference Scenario 2020 (REF) is the common starting point for energy system modelling in the impact assessments for all the initiatives of the 'Fit for 55' Package). More details about the Reference scenarios (including assumptions and main results) is presented in **Error! Reference source not found.**. A separate publication dedicated to the Reference scenario contains complete information about preparation process, assumptions and results[68]. The most relevant information for this assessment is also presented in **Error! Reference source not found.**.

REF reflects the agreed 2030 EU climate and energy targets: at least 40% GHG reduction, at least 32% renewables share and at least 32.5% energy efficiency (energy efficiency target is, however, not achieved – see below). REF also reflects main policy tools at EU level to implement these targets as well as the aggregate ambition and, to the extent possible, the complete range of foreseen national policies and measures of the final NECPs that Member States submitted in 2019 according to the Governance Regulation[69]. In particular, at the EU level, the REF2020 takes into account the legislation adopted in the Clean Energy for All European package[70].

The REF also takes into account the energy system impacts of the COVID-19 crisis that already heavily impacted the EU and Member States' economies in 2020/2021. The Reference scenario does not assume intensification of any type of policies beyond what Member States have already implemented or committed to (including any intensification of non-regulatory instruments).

For 2030, REF projects that final energy consumption is 886 Mtoe, which is 29.3% below the trajectory of the 2007 Baseline and thus below the agreed 2030 energy efficiency target of at least 32.5%. Both projections are in line[71] with the Commission's assessment of final NECPs[72]. In REF, GHG emissions from the European Union in 2030 (including all domestic emissions & intra EU aviation and maritime) will be 43.7% below the 1990 level. An EU allowance price of 30 EUR/tCO_2eq. in 2030 drives emissions reduction in the ETS sector.

Primary energy consumption decreases by almost 17% in 2030, compared to 2015. Over the same period of time, final energy consumption decreases by almost 8%. Figure 6 shows final energy consumption by sector in the reference scenario.

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68 Link to webpage with publication – to be available in June

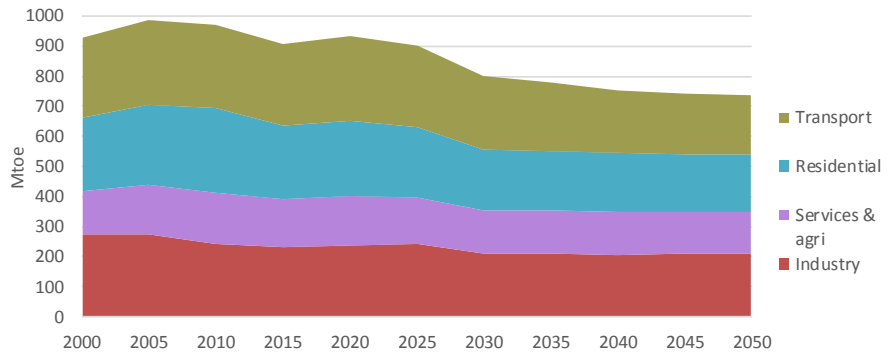
69 Regulation (EU) 2018/1999

70 COM(2016) 860 final. This legislation was adopted in 2019 and will be transposed within maximum two years' time in the Member States' legislation.

71 Primary energy consumption reduction projections in REF (32%) are, however, close to the agreed target for 2030. This is not in line with the Commission's assessment that indicates that the gap in final energy consumption is mirrored by the gap in primary energy consumption. The REF projections, however, capture the latest evolutions in the power generation, notably coal phase-out (not fully reflected in the NECPs) and the latest technology outlook for renewables in power generation (notably smaller role of biomass).

72 COM/2020/564 final

Figure 6: Final energy consumption by sector.



The reference scenario models the policies already adopted, but not the target of net-zero emissions by 2050. As a result, there are no additional policies driving decarbonisation after 2030. However, climate and energy policies are not rolled back after 2030 and several of the measures in place today continue to deliver emissions reduction in the long term. By 2050, GHG emissions in the EU are projected to be 60.7% lower than in 1990 and final energy consumption is projected at 792 Mtoe. These results fall short of the European goal of climate neutrality by 2050.

All the other scenarios used in this Impact Assessment are built on the REF scenario. The REF is similar to the Baseline used in the CTP Impact Assessment, however, it incorporates in much more detail Member States' policies and objectives as put forward in their NECPs and makes assumptions on the impact of the COVID crisis linked to recent macro-economic forecasts.

The projected energy use for 2030 in the baseline referred to above falls short of meeting the required level of energy savings as defined by the CTP.

5.2. Description of the policy options

Addressing the problems and drivers outlined in chapter 2, and meeting the objectives set out above, will require improvements to the EED across many areas. In this context, 63% of PC respondents support stronger implementation and enforcement, and 41% favour additional technical support for Member States. This was also acknowledged by the Member States themselves, which called for increased capacity building and exchange of best practices in view of meeting the 2030 targets. These general views have informed the measures explored.

Based on the evaluation outcomes, an assessment of the final NECPs, the support study, the results of stakeholder meetings and the PC, a broad set of potential measures was identified. These were then further assessed based on their pertinence, feasibility and coherence with the existing framework to produce a shorter set of retained measures, divided into 'intermediate' and 'higher' ambition packages. A distinction was also made between regulatory and non-regulatory measures.

5.2.1. Policy measures to address driver 1 – Insufficient incentives to drive ambition and efforts by Member States

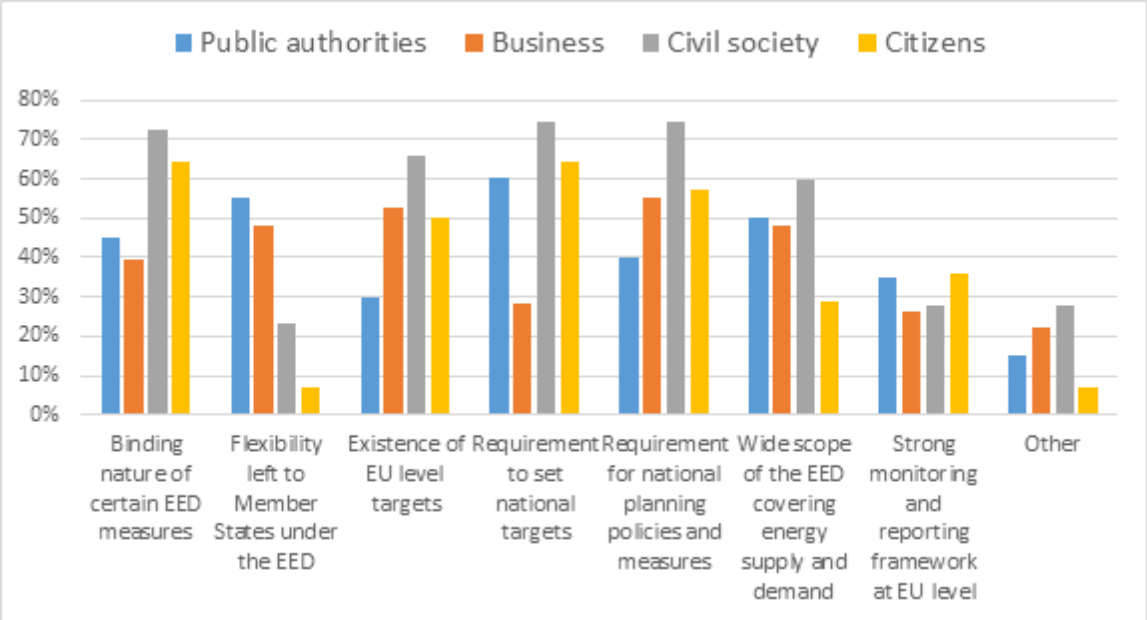
1. Energy efficiency targets at EU and Member State level

Under **BAU,** the EU level energy efficiency target set in the EED determine the overall level of energy efficiency efforts that Member States must collectively attain by 2020 and 2030. This target is expressed in the EED as a percentage of energy efficiency improvement (in Article 1) and as a maximum level of final and primary energy consumption (in Article 3). Although the Governance Regulation provides for a mechanism that allows for EU measures in case these targets are not met, they remain indicative, unlike the EU-level targets for GHG emissions reduction and the share of renewable energy.

Making the EU-level energy efficiency targets binding would align them with the other Green Deal targets and make it clear that they are of equal importance **(TARGET.1)**.

Although the Directive requires each Member State to set "*an indicative national energy efficiency target*", there is no indicator of how the efforts ought to be spread among the Member States and there may be reasons for some Member States to take more action than others.

Figure 7 Stakeholder views of the factors that most helped achieve the objectives of the EED

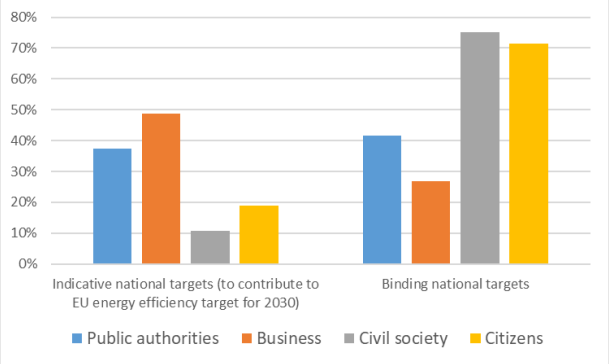


The evaluation of the EED showed that Member States have made efforts to promote energy efficiency and the EU energy efficiency target and the binding measures have contributed to this. Nevertheless, the efforts fell short of the required energy efficiency ambition in some Member States and for the EU as a whole. In the PC responses, as shown in Figure 7 above, 42% of stakeholders who thought the EED had helped to promote energy efficiency believed that the national targets had been important. Of those who believed the EED had failed to achieve its objectives, 57% indicated that the absence of binding national targets was one of the factors.

Whether or not Member States have a binding target can have an impact on the certainty with which the overall EU target will be achieved. This is likely to also have an impact on the degree of certainty for business operating in the field of supplying energy saving solutions. It also impacts on the scope for the Commission to effectively enforce compliance with these targets, e.g. through infringement action.

In view of these potential benefits, options are explored for targets for Member States. In their PC responses, overall 36% of responses favoured indicative national targets while 47% favoured binding national targets. The responses disaggregated by category of respondent are shown in Figure 8. It can be seen that public authorities' views are close to the average while businesses and civil society have opposing views that diverge from the average. In view of this, two further options are explored of setting indicative Member State targets **(TARGET.2)** or binding targets (**TARGET.3)**.

Figure 8 What should be the nature of the national targets



A further aspect that is important to explore is how the overall effort should be distributed across Member States. No indication is given in the current EED. However, in contrast, both the Effort Sharing Regulation and the Renewable Energy Directive have mechanisms to distribute effort based upon a set of parameters. In the case of the RED, this provides the basis against which Member State efforts are assessed, even though it does not have a mandatory effect. Having indicative benchmarks for Member States could facilitate more constructive dialogue on the level of ambition and the possible closing of any ambition gap by Member States (as shown by the experience with the collective ambition gap for RES in the draft NECPs). This aspect therefore is also explored.

As regards the way such indicative benchmarks would be established, the Commission is currently studying different alternatives but, following the experience gained with a similar approach for renewables, it is considering a formula based on a set of criteria taking into account national circumstances. Tentatively, this could be based on the following criteria (having an equal weight):

- Fixed rate (all Member States have to decrease their energy consumption – same rate as for the EU compared to REF2020 i.e. 9%);
- Energy intensity (EU ambition multiplied by intensity factor FEC/GDP);
- Wealth (EU ambition multiplied by wealth factor GDP/capita);
- Energy savings potential (it is associated with PRIMES MIX scenario results).

Other criteria and weightings are possible but these are still under consideration.

The approach to the definition of the target that currently uses both FEC and PEC remains unchanged in the absence of clear evidence of need for any change since the last revision of the EED in 2018.

Options:

Nature of the target.

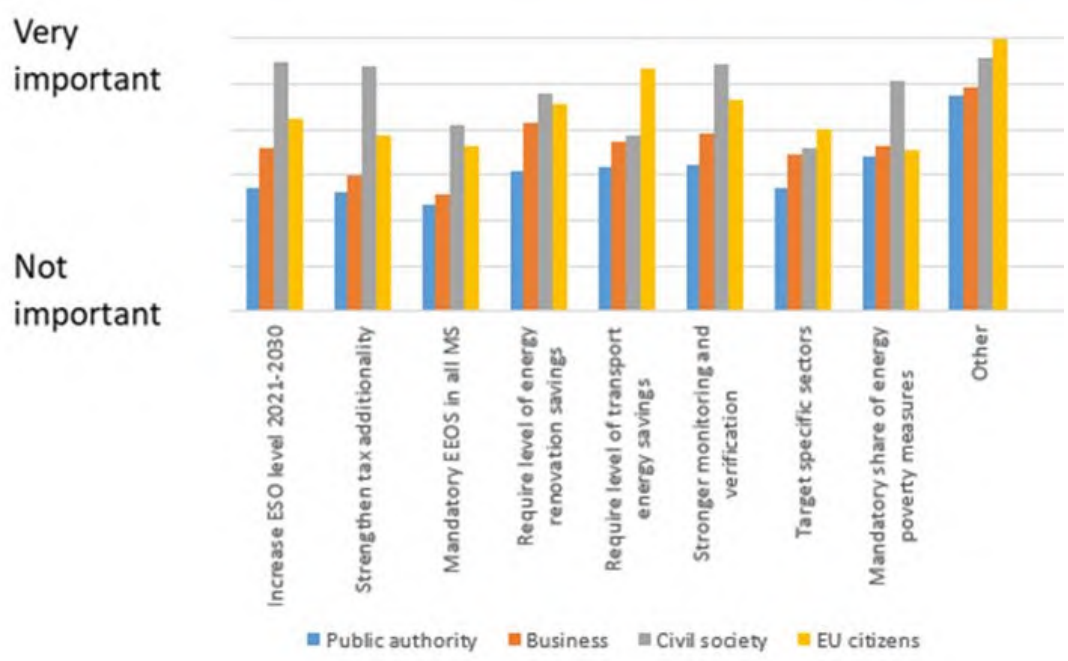
- **BAU**:
  EU-level target is not binding and Member States' voluntary contributions are delivered through NECPs
- **TARGET.1**:
  Binding EU-level energy efficiency targets
- **TARGET.2**:
  Indicative national benchmarks based upon a mechanism for distribution of effort taking account of relevant parameters
- **TARGET.3**:
  Binding national targets

2. Energy savings obligations

Article 7 is an important provision delivering around 50% of Member States' savings necessary to meet the overall EU energy efficiency target. It requires Member States to achieve a total amount of energy savings by the end of the obligation period and provides a specific rate for new annual energy savings to be achieved by Member States. A detailed description of how Article 7 works and the types of actions taken by Member States under it is set out in **Error! Reference source not found.**. Under **BAU** the requirements for Member States are not given any specific focus and they therefore have full flexibility how to target their efforts.

In the PC, 47% of respondents who believed that the EED had been important in promoting energy efficiency said that the binding nature of Article 7 was part of the reason for that as shown in Figure 7, with civil society thinking it much more important and business a bit less. The PC asked how Article 7 might be amended in view of the need for a higher level of energy savings. Figure 9 below show the responses by stakeholder group. Public authorities showed the least support for all aspects with businesses showing the second least support. Civil society and EU citizens were the most positive about almost all of the options.

Figure 9 Stakeholder views of the Article 7 elements to address for higher energy savings



On possible specific changes, in the PC 69% supported requiring a certain level of energy savings from building renovations and half the respondents supported requiring Member States to target specific (undefined) sectors. Some 60% of respondents supported requiring a certain level of energy savings in transport. As already noted, transport accounts for a third of all final energy use yet only 5% of the measures reported under Article 7 are transport specific. In the transport field it is acknowledged that it is necessary to follow an 'Avoid-Shift-Improve' methodology to address energy use and GHG emissions. While the EU addresses the 'Improve' element of vehicle efficiency through EU standards, there is limited action to address the other two legs. This is not because these actions are not cost-effective. Analysis shows that different types of actions can have high benefits[73].

An often encountered difficulty is that these benefits occur in different areas such as air quality, noise, health, and energy savings, and that hence they are not always seen holistically. There are therefore clear public policy benefits to encourage further intensification of measures in this area and this is explored further **(ESO.1)**. While the average of energy savings from the transport sector is 5%, some Member States such as Italy and Spain are planning to deliver respectively 23% and 38% of their savings in this sector.

The added value of a sub-target for transport in article 7 would be to focus attention and measures by Member States (as well as stakeholders) on a sector where energy consumption is still increasing and where energy efficiency improvements are long overdue. Also, such a target could be used for enforcement by the Commission.

[73] https://www.eutransportghg2050.eu/cms/assets/Uploads/Reports/EU-Transport-GHG-2050-II-Task-8-FINAL-29July12.pdf

The level of such a target would have to be above 5% and below what some Member States are planning to achieve (e.g. up to 40%). It can be achieved by a reinforcement of the proposed policies and actions in the Sustainable and Smart Mobility Strategy, which are expected to lead to tangible energy savings (such as modal shift, transport system optimisation, seamless mobility etc.), for example thanks to subsidy schemes, regulations and incentives that would ensure the assumed impact (i.e. energy savings) is delivered in reality. In view of the EU funding, which is being provided to support building renovation, it could be reasonable to ensure that a proportion of it is specifically targeted at addressing energy poverty, which has been identified as a major challenge for the EU, due to the fact that nearly 34 million Europeans are unable to afford keeping their homes adequately warm in 2019. Such a programme would contribute to the savings required by Article 7. Stakeholders have called for measures and requirements at EU level to accompany Member States' social safeguarding policies, whilst delivering targeted energy savings among energy poor households.

In workshops organised with stakeholders to discuss the energy saving obligations, a number of stakeholders identified energy efficiency measures as the most effective solution to alleviate energy poverty, and to mitigate social impacts from pricing measures, e.g. from carbon pricing under an extended ETS.

Stakeholders also stated that NECPs submitted by Member States failed to address a sufficient level of policy measures alleviating energy poverty. They called upon the Commission to ensure that energy efficiency improvement measures alleviating energy poverty are planned and implemented throughout the EU by all Member States and to ensure that vulnerable customers have access to technical and financial support. In total, 61% of respondents voiced some to a high degree of importance to requiring a specific share of measures to address energy poverty and this is explored further **(ESO.2)**.

This could be achieved by obliging Member States to deliver a certain percentage of the annual energy savings obligation to come from measures directed at energy poor and vulnerable households, to require a certain number of measures to address energy poverty, or to prioritise energy poor and vulnerable households when implementing energy efficiency measures. As energy poor households often live in poorly insulated housing, building renovation is a very cost-effective measure to address energy poverty and brings additional benefits in terms of increased job creation, skills improvement, comfort, air quality and health. Social policy, and therefore measures to address energy poverty, is primarily the responsibility of Member States. Nevertheless, supporting energy poor households to reduce their energy consumption through targeted funding programmes is a mechanism that can help to reduce their energy consumption and expenditure. The Commission has issued a Recommendation to Member States[74] and uses EU funding programmes to address the issue.

While sub-targets for other key sectors (e.g. heating and cooling) could also be considered, the specific nature of transport (i.e. large and increasing energy consumption; limited success of existing policies) and energy poverty (i.e. key to address for just transition and mitigating distributional impacts of ETS extension) make these sectors a priority for action under the EED.

[74] Commission Recommendation (EU) 2020/1563 of 14 October 2020 on energy poverty C/2020/9600, OJ L 357, 27.10.2020, p. 35–41.

In view of the need to accelerate the transition to electrification to reduce GHG emissions, for example through the promotion of heat pumps, and align the energy savings with the rapid need to decarbonise energy use, the option of excluding energy savings from fossil fuel using technologies being counted under the ESO will be explored **(ESO.3)**.

Finally, an alternative option **(ESO.4)** would be to replace the Article 7 scheme by an EU-wide scheme of tradeable certificates for energy savings often referred to as White Certificates. Such a scheme may present opportunities and also challenges[75] and further details are provided in **Error! Reference source not found.**.

Measures:

- **BAU**:
  Member States have flexibility on how to target their savings efforts under Article 7.
- **ESO.1 (Energy Saving Obligation.1)**:
  Require a share of the energy savings to come from transport.
- **ESO.2 (Energy Saving Obligation.2)**:
  Require a minimum share of energy savings to be achieved in vulnerable households to contribute to alleviating energy poverty.
- **ESO.3 (Energy Saving Obligation.3)**
  Exclude energy savings from measures promoting savings from fossil fuel using technologies.
- **ESO.4 (Energy Saving Obligation.4)**
  Replace the Article 7 scheme by an EU-wide scheme of tradeable certificates for energy savings.

3. Energy Efficiency First (EE1st) principle

Energy Efficiency First (EE1st) principle is a guiding principle of EU energy policy, already set out in the 2015 Energy Union Communication[76], and the need to prioritise energy efficiency is recognised in the European Green Deal. The principle is defined in the Governance Regulation as *"taking utmost account in energy planning, and in policy and investment decisions, of alternative cost-efficient energy efficiency measures to make energy demand and energy supply more efficient, in particular by means of cost-effective end-use energy savings, demand response initiatives and more efficient conversion, transmission and distribution of energy, whilst still achieving the objectives of those decisions."* Following strong support for this principle from the European Parliament, it was incorporated in the EED noting that it *"contributes to the implementation of the energy efficiency first principle"*.

However, limited progress has been made with applying the EE1st principle across sectoral policies and making it more operational. The feedback from national authorities and the experience from the NECPs show that the principle is still not fully understood

75 Tradable Certificates for Energy Savings (White Certificates) - Theory and Practice)

76 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank – A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy (COM(2015) 80 final)

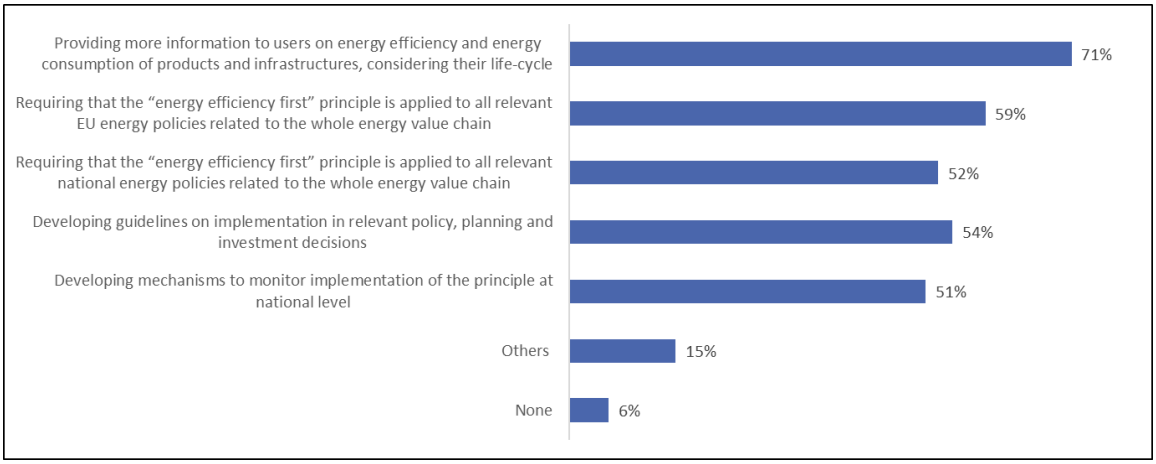
and needs to be better explained in specific contexts. This was confirmed by two specific expert meetings where stakeholders indicated that a specific cost-benefit analysis methodology, manuals and methodologies in line with the EE1st would be useful, as the application of the principle is quite complex.

At present, the precise application is less clear and the Governance Regulation merely requires Member States to *"take into account the interlinkages between the five dimensions of the Energy Union, in particular the energy efficiency first principle"*. This situation with the statements in the EED and Governance Regulations represents **BAU**.

The Commission, therefore, aims to adopt guidance on the application of the EE1st principle together with the 'Fit for 55' package so as to facilitate and clarify its use. This is included in the non-regulatory option (**EE1st.1**). The non-regulatory measures could also cover the development of a CBA methodology that includes the co-benefits from energy savings. However, their voluntary nature will mean that their implementation will largely depend on the willingness of Member States to apply them. Providing guidance and requiring application of EE1st are relatively well supported by stakeholders.

In view of this, as a cornerstone of energy policy and with the EED providing the framework for energy efficiency policy and measures for the EU, the EED would be the appropriate instrument to provide a legal basis for the practical application of the principle. In the PC 53% of respondents supported making the "Energy Efficiency First" principle a compulsory test in relevant legislative, investment and planning decisions in view of the higher energy savings target for 2030. This option is also explored (**EE1st.2**). Figure 10 below shows stakeholder views on which measures are needed to ensure it is consistently applied.

Figure 10 Stakeholder views on measures needed to consistently apply the EE1st principle



It is also possible to conceive of a stronger requirement for Member States to assess their legislation in key areas to identify measures that are contrary to EE1st principles. This could be accompanied by an obligation to set up a structure responsible for applying the EE1st principle and monitoring the impacts of policy and investment decisions on energy consumption **(EE1st.3**).

Measures:

- **BAU**:
  The EED and Governance Regulation do not provide clarity on the action Member States should take to implement the principle.

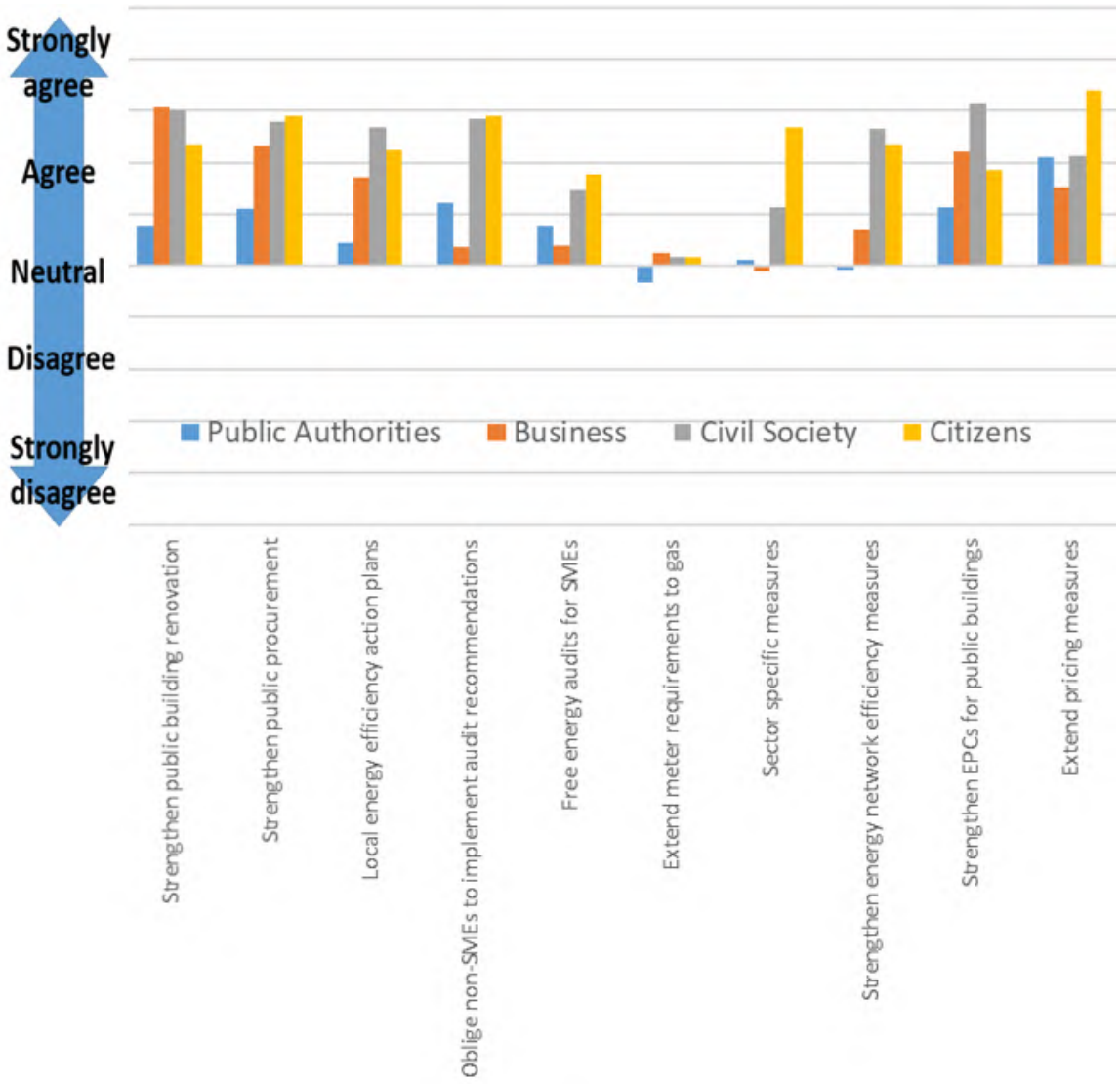
- **EE1st.1**:
  Provide Member States guidance on applying the EE1st principle and develop a CBA methodology including energy savings co-benefits.
- **EE1st.2**:
  Oblige Member States to implement the EE1st principle and test energy infrastructure projects or plans against alternative energy efficiency measures.
- **EE1st.3:**
  Member States would be obliged to review their legislation for coherence with the EE1st principle and establish a body for applying the principle.

5.2.2. Policy measures to address driver 2 – Continued existence of barriers to energy efficient behaviour, including for investments

4. Obligations for public sector buildings

In the Commission's original proposal for the EED, it envisaged that the public building renovation requirement would apply to all public buildings except social housing. It was estimated that the energy savings till 2020 would amount to 3.4 Mtoe. The final requirement only applies to central government buildings and these represent somewhat less than a quarter of all government buildings, and maybe only a tenth. This means that the energy saving potential from increased renovation rates for these buildings has not been realised (the underlying renovation rate was reported as around 1.5%). **BAU** therefore requires the renovation of 3% of central government building floor area annually. These buildings are required to be renovated in line with the minimum energy performance requirements set under Article 4 of the EPBD. PC responses show a considerable support, except among public authorities, for strengthening the public building renovation and energy performance contract (EPC) requirements as shown in Figure 11 below.

Figure 11 Stakeholder view whether these measures should be considered to strengthen the EED



In view of the lower energy savings as a result of the limitation to central government buildings, one option to realise greater energy savings is to increase the target annual renovation rate (**BUILD.2a)**.

An important reason for requiring public buildings to be renovated was because of the fact that they are visited by many people and would therefore play an exemplary role in demonstrating the potential for energy savings. The buildings that are likely to be most visited by the public are ones that are more a part of their daily life rather than central government buildings. Therefore, to address this while increasing overall energy savings, another option is to extend the scope of the requirement, for example to all government buildings(**BUILD.2b)**.

The energy savings from this provision of the EED depend not only on the renovation rate and the scope, but also on the depth of the energy renovation carried out. The EPBD requires all new public buildings to be nearly zero-energy buildings (NZEB) after the end of 2018 and all new buildings to be NZEB by the end of 2020. The 2018 cost-optimal reports developed by Member States show that the progressive tightening of the Minimum Energy Performance Requirements for existing non-residential buildings undergoing major renovation reveal that for many Member States these minimum requirements are already at a comparable level to NZEB requirements. While achieving

the NZEB levels may not be possible for every building due to technical or economic reasons, in general it could be considered feasible for major renovations. Already ten Member States have equal requirements for new and existing buildings in their national legislation transposing the EPBD.

According to the 2020 assessment of the progress made by Member States towards the implementation of the EED and towards the deployment of nearly zero-energy buildings and cost-optimal minimum energy performance requirements in the EU in accordance with the EPBD, the construction market is ready to take steps towards the improvement of the energy performance of the future building stock. A significant reduction of relevant technology costs is expected (e.g. in heat pumps, biomass boilers, heat recovery systems, solar thermal collectors, photovoltaics energy storage, etc.), which could make it possible to further increase the level of ambition for NZEBs.

A detailed assessment of the progress with energy renovations in buildings including to NZEB standards[77] illustrates that at present energy renovations represent only a third of expenditure on renovations. It also showed that at that time some non-residential buildings were being renovated to NZEB standards but that these were a small proportion of the total. No barriers to carrying out renovations to this standard are identified in the report. (**BUILD.3**)

The provisions on public buildings provide for many flexibilities and conditionalities **allowing Member States to choose alternatives that often result in a lower amount of energy savings**. While a certain level of flexibility is justified to account for national specificities, it also provides a way for Member States to avoid taking measures that are perceived to be too difficult despite their clear benefits. The feedback received in the targeted stakeholder workshop revealed that Article 5 is perceived as a crucial aspect of the EED, as they consider that the public sector should lead by example. At the same time, stakeholders expressed the view that because of the limited scope, the limitations of alternative approach and the absence of a clear link between the regulatory provisions and available funding, the results are insufficient. Stakeholders also stated that this made it hard to monitor and led in many cases to only short-term energy savings.

In this context, a recurrent issue is that a number of articles allow alternative ways of compliance, but these do not always result in the same level of energy savings. For example, the flexibility given to Member States in view of the renovation target limits its effectiveness, as it allows to renovate less buildings to the cost optimal level. In addition, the option of using alternative measures (instead of renovating 3% of building owned and occupied by central government) often results in energy savings measures (e.g. awareness raising) that tend to end after only a few years and are often not repeated. Research shows that individuals tend to slowly resume previous habits, if awareness raising campaigns are not repeated[78][79], and actions of this kind therefore have a limited effect compared to the actual renovation of a building.

The PC responses echo these findings. Some 47% of stakeholders identify the binding nature of the EED measures (including Article 5) as important with a majority indicating that existing flexibilities (e.g. alternative approach in Art. 5) does not allow these articles

[77] Comprehensive study of building energy renovation activities and the uptake of nearly zero-energy buildings in the EU; Ipsos and Navigant; 2019

[78] Information measures to promote energy use reduction across EU Member States. Analysis of information, empowerment and training measures in Member States National Energy Efficiency Action Plans. Silvia Rivas, Barbara Cuniberti, Paolo Bertoldi, 2016.

[79] Long term effects of an energy efficiency advertising campaign Klaus Wortmann and Werner Möhring-Hüser.

to fully achieve their objectives. Buildings are considered as one of the most important area for strengthening EED requirements as shown in Figure 5 for all stakeholder groups. Of the respondents, 85% agreed that strengthening the renovation obligation for public buildings should be considered to achieve a higher ambition, while 15% disagreed. Among public authorities 72% agreed and 28% disagreed. Moreover, 82% of respondents support strengthening the energy performance contracting requirements in the renovation of public buildings.

The evaluation therefore supports the need for strengthening the requirements to drive more, and more ambitious, renovations of public buildings. In view of this, a reduction of the flexibility available is therefore explored as an option through the removal of the alternative method (**BUILD.4**).

Measures:

- **BAU:**
  The public building renovation requirement applies only to central government buildings, requires 3% of the floor area to be renovated annually, only requires renovation to minimum energy performance requirements and allows for alternative approaches.
- **BUILD.1:**
  Provide further guidance and necessary tools to national authorities and procurement officials, and strengthen the existing support fora (e.g. Concerted Action) to guide Member States towards renovation and uptake of energy efficiency requirements in building procurement and management practices.
- **BUILD.2a:**
  Increase the overall ambition through an increased annual target.
- **BUILD.2b:**
  Increase the overall ambition through a wider scope.
- **BUILD.3:**
  Strengthen requirements to achieve the obligations, for example renovations to the Near Zero Energy Building (NZEB) standard.
- **BUILD.4:**
  Delete the alternative method in Article 5.

5. Obligations for public procurement

Under **BAU** the EED requires central governments to purchase only products, services and buildings with high energy-efficiency performance. This is limited by possible exclusions on grounds of cost-effectiveness, economic feasibility, sustainability, technical suitability and sufficient competition. There is no definitive information available about the impact of applying BAU as there are no reporting requirements for this.

In the PC, 85% of all respondents, and 63% of public authorities, agreed to some degree that strengthening the energy efficiency requirements for public procurement should be considered as a way to contribute to achieve a higher energy savings ambition. Figure 11 shows this support by stakeholder group.

The PC also asked whether the requirement for central governments to purchase only products, services and buildings with high energy-efficiency performance helped to develop a market for energy efficiency products and services. In response 64% said no.

They were then asked about the reasons for this and the options as well as the proportion supporting them are shown below in order of decreasing support:

Table 5 PC ranking of reasons why EED procurement measures have not developed a market for energy efficient products and services

It is too easy to evade the requirement to purchase highly energy efficient products, services or buildings on grounds such as cost-effectiveness, economic feasibility or technical suitability	67%
The scope is too limited as it applies only to the central government bodies	63%
It is too difficult for public bodies to identify energy efficient products in case they are not regulated under the EU Energy Labelling rules	49%
Public authorities lack specific guidelines to improve their purchasing practices	47%
There is no obligation to apply Green Public Procurement criteria	39%

Of these issues, there is clearly potential to reduce the conditionalities that are reported to be used to avoid the requirements as well as to extend the scope beyond central government. It is less clear what can be done to assist public bodies identify efficient products not covered by energy labelling, but it is in any case likely that these will be classes of products that are less energy using. This aspect might usefully be addressed in guidance that could be expanded and through the existing supporting fora.

Stakeholders in the targeted workshop on energy efficiency in the public sector and in the PC called for an extension of the scope to all public administration levels, and the need to raise awareness and capacity of public administrations for applying energy efficiency criteria in public procurement more systematically.

The aspect with the least support is to require Member States to take into account Green Public Procurement criteria, e.g. related to circular economy and climate resilience. While this might be desirable for wider reasons, and for example for public buildings above a certain threshold, this option is discarded since it would be outside the legal scope of the EED. Nevertheless, efforts could be made to encourage the use of such criteria.

Efforts could be made to do this through non-regulatory means. For example the Commission could provide further guidance and tools to national authorities and procurement officials. It can strengthen the existing support fora (e.g. Concerted Action) for Member States and to assist them in taking Green Public Procurement (GPP) criteria into account e.g. related to circular economy and climate resilience **(PROCURE.1)**.

Central government procurement is estimated to only account for about 16% of all public procurement. Therefore, extending the EED requirements to all public authorities would substantially increase their impact and has a high support among stakeholders and is therefore assessed **(PROCURE.2)**

Measures:

- **BAU:**
  Central governments to purchase only high energy-efficiency performance products, services and buildings subject to possible exclusions.

- **PROCURE.1:**
  Continue and expand support efforts to boost energy efficiency in procurement.
- **PROCURE.2**
  Extend the energy efficient procurement obligation to all public bodies.

Given the exemplary role of the public sector an overall obligation to save energy in the public sector would frame the specific obligations of energy efficiency procurement and renovation of public buildings. This obligation would ensures that the public sector contributes its fair share to the energy efficiency targets in particular and to the decarbonisation of the economy in general. It will also ensure that it is not left out from the efforts. This is particularly important as the public sector offers public services to all the population and thereby it will bring benefits to all in accordance with the Green Deal Objective of letting no one behind.

6. Industry

Industry can be addressed by the EED measures relating to energy efficiency obligations where Member States may choose to address specific measures to industry. There are also specific provision in the EED relating to the use of waste heat from industry and the use of cogeneration that are addressed under heating and cooling.

The other main avenue of action in the EED is through the promotion of energy audits and the obligation for non-SME enterprises to carry out an energy audit at least every 4 years (**BAU**). The evaluation identified important limitations in these provisions, such as the lack of monitoring requirements for energy audits, the absence of an obligation to implement audit recommendations, difficulties related to application of the SMEs definition, and missing incentives for implementing energy management systems.

In the PC, stakeholders indicated that industry was the third most important sector in terms of the impact the EED has had on promoting energy efficiency. They also indicated that the audit obligation for large enterprises was the second most important in terms of the EED's effect on energy savings (41% of all responses and 63% of public authorities). Support provided to SMEs to carry out energy audits, learn about their energy consumption and identify energy saving opportunities ranked fifth (26% of all responses and 33% of public authorities).

It has been observed that there is a low implementation of audit recommendations. While there are likely to be multiple reasons for this, one could be that the person responsible for the audit may not have any budget or power to have the findings implemented. Another is that the managers of the business may not be aware of the economic potential offered by energy savings in their business and therefore do not properly take this into account in their planning. An obligation for the results of the audit to be seen and approved by the management of the business could ensure that this is less likely to occur.

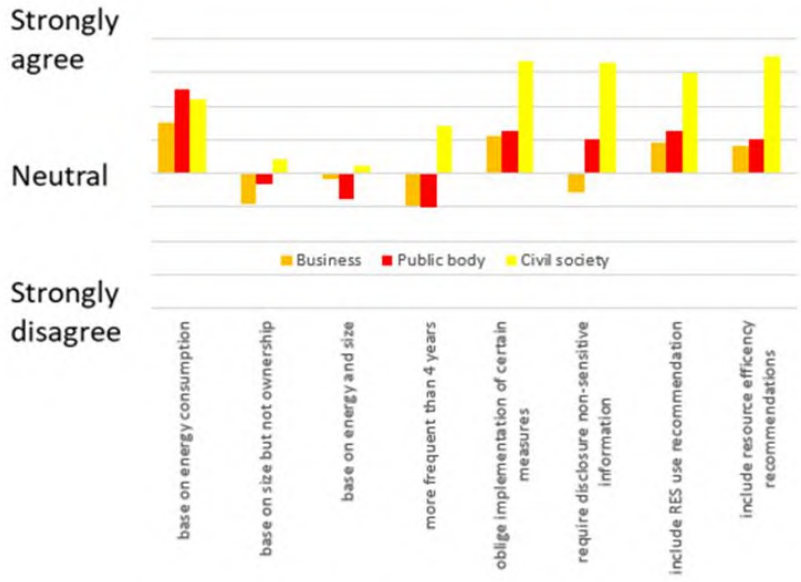
Other options to increase business awareness of energy saving potential may exist though benchmarking enterprises in a specific sector. This already happens through a private

sector imitative for the refining industry[80] (where energy use is a key parameter) and the IEA is also seeking to promote further benchmarking[81].

With regard to strengthening the EED, as shown in Figure 5, industry was indicated as the fourth most important area (52% of respondents) where more effort should be made to achieve the higher ambition for 2030. As shown in Figure 11 by stakeholder group, around 66% of respondents supported to some degree that an obligation to implement some audit recommendations was desirable. A slightly smaller proportion (59%) thought that that requiring free audits for SMEs should be considered. However, support for these options from business and public authorities was low.

Around 61% of all respondents thought that the current mandatory audit requirements should be changed. They were asked about a range of options. Figure 12 below shows that the option with the biggest support was for taking account of energy use, with overall five times as many respondents agreeing as disagreeing with this. Other options with strong support were including resource efficiency recommendations in audits with seven times as much support as opposition, including renewable energy potential with five times as much support and an obligation to implement certain recommendations with three times as much support. There is little support for a higher mandatory frequency or including size as a parameter.

Figure 12 Stakeholder views on options to amend the mandatory audit obligation



A detailed analysis of the difficulties that Member States experience with implementing the current non-SME definition has been carried out[82]. This also considers other options and the energy based options appear to have considerable benefits since they would require substantially fewer companies to be subject to mandatory audits while it is estimated that the energy savings could be of a similar magnitude.

80 Refining Benchmarking Study | Solomon (solomoninsight.com)
81 Expert Workshop on Industry Energy Efficiency Benchmarking - Event - IEA
82 Technical assistance on assessing the effectiveness of the implementation of the definition of small and medium-sized enterprises for the purposes of Article 8(4) of the Energy Efficiency Directive

The same study demonstrates the skewed nature of energy use across enterprises with a very small share of businesses accounting for by far the largest share. Given the importance of energy use in their business, these very largest energy users should already have more sophisticated energy management systems in place. In case they have not, it makes sense to replace the audit obligation for these businesses with one to have such a system. It is likely that most of these enterprises will be covered by the requirements of the Industrial Emissions Directive and the obligations through it to use Best Available Techniques. The use of an Environment Management System is a key obligation for them and this means that implementing an Energy Management System may require little or no extra effort.

The current requirement only applies to enterprises. However, there has been a growing interest in the energy-water nexus. Waste water treatment plants (WWTPs) are major energy users and account for around 0.8% of all electricity use. Recent analysis[83] shows that there is substantial potential to improve their energy efficiency yet because of their nature there may be limited market pressure for them to do so. Including them within the scope of the audit obligation would add no more than 1000 plants but cover about 40% of the sector's energy use.

A range of measures are therefore assessed to strengthen the current audit requirements. These range from non-regulatory measures exploring benchmarking (**IND.1**), through changes to the audit requirements to base it on energy use and include WWTPs (**IND.2**) to the most extreme of obliging companies to implement the most cost-effective measures identified in audits (**IND.3**).

Measures:

- **BAU:**
  Non-SME enterprises must have an energy audit at least every four years.
- **IND.1:**
  Promote energy benchmarking of significant energy using sectors.
- **IND.2:**
  i. Replace, for the largest energy users, the audit obligation with a requirement to put in place an energy management system.
  ii. Replace the non-SME definition as the basis for the energy audit obligation with one based on energy use and amend it to include waste water treatment plants.
  iii. Oblige the results of energy audits, including the recommendations, to be presented to the management of the company and be approved by them.
- **IND.3:**
  Require companies subject to audits to implement energy audit recommendations with a payback time of less than 2 years.

7. Heating and cooling

The EED requires Member States to carry out comprehensive assessments of the potential for high-efficiency cogeneration and efficient district heating and cooling. This should be based on cost-benefit assessment taking into account their specific

[83] https://iopscience.iop.org/article/10.1088/1748-9326/ab0b54/pdf

circumstances. They are required to encourage the use of high-efficiency cogeneration and efficient district heating and cooling. Comprehensive assessment should include information on the potential for new and renovated significant energy using installations for their cogeneration or district heating potential. These elements would continue under **BAU**.

In terms of the sectors where additional energy efficiency efforts are needed to achieve a higher energy efficiency ambition for 2030, as shown in Figure 5, 63% of PC respondents indicated heating and cooling making it the second most important after buildings.

The stakeholder consultation, including the workshop on heating and cooling, revealed that many Member States believe that Article 14 has contributed only to small efficiency improvements and that some key areas are left out such as data centres, higher system integration (use of waste heat, electrical and thermal efficiencies), building-level measures (heating systems and heat pumps) and local planning and development. Also, cooling has often not been addressed.

Furthermore, the comprehensive analysis has often not been followed up, i.e. the identified potential has not been captured by sufficient implementation of policies and measures, for example waste heat reuse not being sufficiently addressed and a lack of focus on local aspects of planning and development of heating and cooling.

These factors make it desirable to strengthen the existing provisions on the assessment of alternative energy supply options. The stakeholder workshop addressing heating and cooling was positive about the current measures but noted that there was insufficient implementation of policies identified in the comprehensive assessments. The cost-benefit analysis requirement was criticised because of a lack of appropriate follow-up.

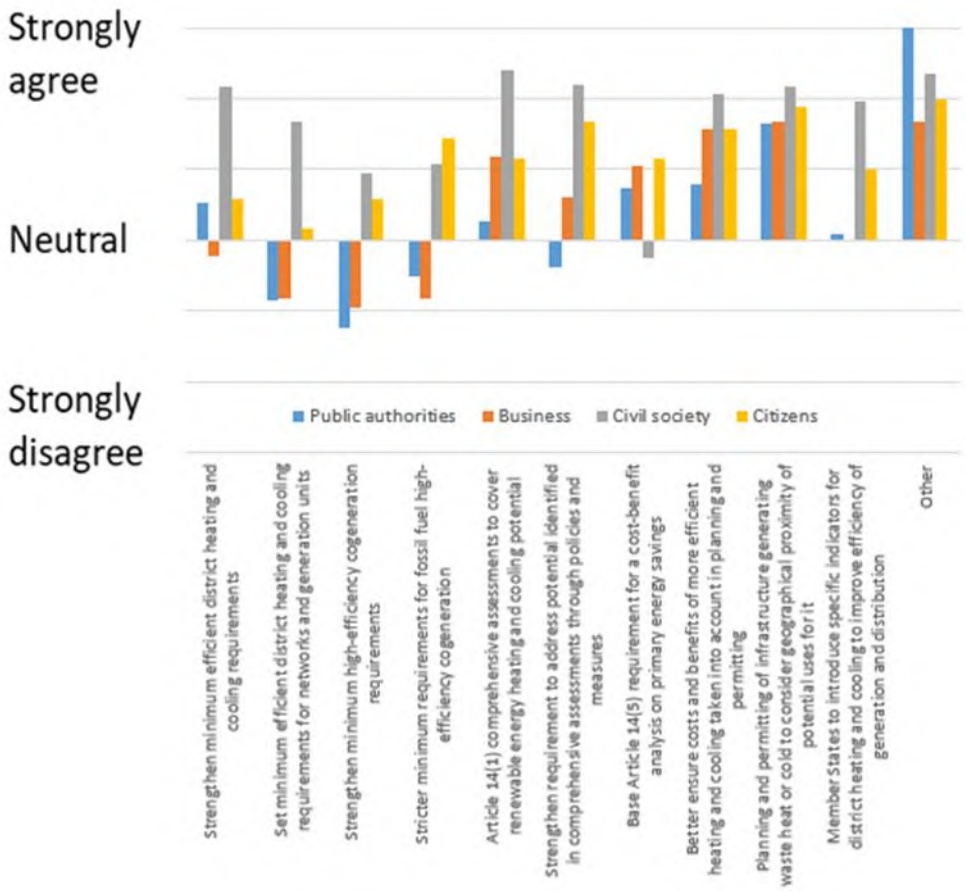
Table 6 PC responses to which heating and cooling measures should be considered

Statement	Overall view (1-strongly diagree, 5 strongly agree)
The recovery of waste heat from heating and cooling (air-conditioning) systems in individual buildings should be promoted	4.8
Member States should facilitate local and district approaches to policy and infrastructure planning and development in heating and cooling	4.8
Fossil fuels in heating systems (in buildings and district heating) should be gradually phased out with a faster phasing out of the most polluting ones	4.4
Requiring district heating and cooling operators to prepare long-term plans to improve their energy efficiency in terms of primary energy intensity energy	4.4
Fossil fuel heating system should be banned for new buildings whenever technical feasible	4.2
Allow public support for heating systems only to non-fossil fuel technologies	4.1
Member States should introduce specific energy efficiency targets for the heating and cooling sector to ensure that energy consumption in this sector is	4.0
Specific requirements for utilization of waste heat and waste cold should be set for industry and services	4.0
Member States should unbundle the management of the generation and distribution heat network	3.0

The PC asked stakeholders for their views on whether a series of possible measures should be considered in the heating and cooling policy area objectives. There was considerable support for most of these as shown in Table 6 above.

The PC also asked how the elements of the EED addressing heating and cooling (Article 14, the related Annexes and definitions in Article 2) could be made more effective. The results in Figure 13 below show differentiated views about strengthening the minimum requirements of the definition of efficient district heating and cooling. Civil society strongly support this change but public authorities and business are less positive. Most respondents are positive about measures relating to the planning of infrastructure, including those generating waste heat or cold. There is also quite strong support amongst stakeholders, except civil society, for a strengthen account of the benefits of the cost-benefit analyses, especially for the utilisation of waste heat.

Figure 13 PC response on measures to make Article 14 more effective



In view of these views, one step to improve efforts could be to make it mandatory to implement cost effective measures identified in Member States' comprehensive assessments. In addition, the larger local governments could be required to assess local heating and cooling supply options since they would be best informed of the local conditions and for example the availability of waste heat from business installations through permitting. It is also desirable to ensure that cost-benefit analyses of alternative heating and cooling supply options for individual installations with large energy consumption are made.

A further challenge arises because the definition of efficient district heating is used as a basis for assessing whether or not it is legitimate to grant state aid to installations. The current definition means that state aid can be granted to installations which will have lifetimes significantly beyond 2030 but which will be major emitters of greenhouse gases. This points to a need to revisit the definition so as to ensure coherence with wider policy goals.

Cogeneration or Combined Heat and Power (CHP) is another route to provide heating and electricity simultaneously, requiring less energy overall than for their separate supply. In 2018, CHP supplied 11.7% of EU27 electricity generation. It simultaneously supplied 2651 PJ of heat, which is 13.7% of the energy used for heating and cooling.

CHP also involves more complexity than just supplying heat on its own, which merits greater governmental intervention to ensure a larger share of the potential for this market is exploited. There is also an EU market for the supply of the equipment and it is desirable to ensure that the incentives are correct to encourage greater efficiency in the equipment supplied and fitted which might not happen were there not to be a governmental drive to do so. In view of this, it seems desirable to update the definition of high-efficiency cogeneration in the EED and to strengthen implementation of the comprehensive assessments.

However, as illustrated above, the PC showed conflicting opinions on the update of the definition of high-efficiency cogeneration. Public authorities and business do not support stricter minimum requirements or addressing fossil fuel use while civil society does. A revision of the definitions is assessed (**HEAT.2**).

While district heating and CHP account for significant shares of overall heat supply, the majority remain supplied by more standard equipment. There is a need for this to be fairly rapidly replaced by much more efficient equipment that causes much lower GHG emissions. The main option available for heating is heat pumps and the CTP modelling scenarios indicate a 12% year on year growth rate in their installation. It is unclear whether this will be achieved purely through market mechanisms and so consideration can be given to for example setting an end date for installing combustion boilers. This could be justified in the EED by the multiple times increase in overall energy efficiency that would be achieved (provided the primary energy factor of electricity supply is sufficiently low).

As illustrated in Table 6 above, there was strong support from the PC for phasing out the use of fossil fuels in heating. Set against this are the difficulties such an approach could cause in the single market, where other legislation is setting product standards, and subsidiarity questions. This is assessed as **HEAT.3**.

Measures:

- **BAU:**
  Retain existing definitions and assessment requirements
- **HEAT.1:**
  Promote energy benchmarking of significant energy using sectors.
- **HEAT.2:**
  i. Strengthen the definitions (‘efficient district heating and cooling’, ‘high-efficiency CHP’, and ‘energy losses’) in line with the pathway to overall decarbonisation.

ii. Strengthen the obligations to ensure a better implementation of the findings from comprehensive assessments and to require local heating and cooling plans.
iii. Strengthen obligations to ensure new or refurbished district heating facilities meet the 'efficient district heating and cooling' definition and that existing facilities that do not meet it establish an upgrading plan.

- **HEAT.3:**
  Require phasing out fossil fuel boilers.

8. Energy transmission systems

The EED requires tariff structures for gas and electricity infrastructures to be set in a way to encourage energy efficiency, assessment of the potential for efficiency improvements and development of a common methodology for assessing losses. It also encourages high efficiency co-generation and promotes the use of demand side response mechanisms (**BAU**).

Besides the EED, energy efficiency improvements on energy transformation and distribution are affected by a large number of EU legislative acts[84], in particular by the ETS, RED and ESR. The transformation and supply sectors should also react to changes in energy demand caused by competition with other energy supply options, new or relocated demand points and energy efficiency actions taken by consumers. To reflect energy system integration ambitions, energy distribution systems need to bridge energy suppliers and consumers and to provide new services.

In gas grids the largest energy losses occur in the form of methane leaking in the atmosphere (up to 98% in some systems)[85], and such leakages, already the object of stringent safety rules, will be further addressed by the follow-up to the Commission's Methane Strategy launched in 2020. In addition, while leakage is common in old gas pipes, often made of gas iron, it is rare in new gas pipes, which are made of high-density polyethylene. In the PC, 49% of stakeholders agreed that the wide scope of the EED, which includes energy supply and distribution as well as regulators, had helped to achieve its objectives. However, only 21% of stakeholders thought that measures stemming from the EED to increase efficiency in energy production, conversion, transmission and distribution had been the most successful in delivering energy savings and other benefits. Some 65% of stakeholders agreed to some degree that strengthening these requirements is important. However, when looking by stakeholder group, Figure 11 shows little support for this from public authorities or business. Despite this, 45% of respondents stated that electricity and gas networks do not operate in the most efficient way in their country. A first step to improve the effectiveness can be to consider enhancing comparison between networks through a benchmarking approach (**NET.1**).

The evaluation has shown that the lack of common definitions has hampered any meaningful comparison of overall energy efficiency between networks. Steps to address this seem a prerequisite to inform operators, regulators and Member States of the need

[84] For more details about this legislation, see https://ec.europa.eu/energy/topics/markets-and-consumers/market-legislation_en

[85] See Shrinkage Leakage Model Review, pages 13-17. Available at: https://www.gasgovernance.co.uk/sites/default/files/ggf/book/2017-12/Shrinkage%20Leakage%20Model%20Review%20-%20Final%20Report%202017%20%28Joint%20GDN%29.pdf

for further action. It is therefore envisaged to seek to address these weaknesses through common definitions and reporting (**NET.2**).

Stakeholders were asked what the main factors limiting energy efficiency improvements in networks and their responses in order of importance are shown below:

Table 7 PC ranking of the factors limiting energy efficiency of national energy networks

Which are the main factors limiting energy efficiency improvements of the networks in your country?	**Percentage agreeing**
Tariff structure is not conducive to minimise energy losses in the grid	42%
Permit authorisation takes too long	27%
Capital expenditure would lead to unacceptable network tariff increase for final consumers	22%
Regulatory authorities discourage investment by not accepting it in the Regulatory Asset Base	19%
Financing for investments is not easily available	18%
The efforts needed to upgrade the physical infrastructure of the grid would disturb households	8%
Environmental impact of infrastructure upgrading would be larger than that of the energy losses	6%

It can be seen that the most important relates to the incentive structure (which is also linked with the fourth most important). The second biggest reason slows upgrading but should not prevent it happening. The third and fifth most important relate to how the investments needed can be financed which is beyond what can be addressed in the EED.

As regards energy efficiency improvements for energy transmission and distribution, the potential for the transmission system appears limited, while it is more significant for distribution[86]. Provisions on energy efficiency are integrated into Directive (EU) 2019/944 for the internal market of electricity, as well as in the draft TEN-E Regulation, and there are plans for integrating such provisions into the future review of the Directive for internal market of natural gas (which should include hydrogen and biogas as well). Nevertheless, the EED could be further strengthened in this area.

Finally, stakeholder feedback suggests that the objectives of Article 15 may have not been fully appropriate and could better reflect how the different grid elements can contribute to the improvement of overall energy system efficiency, for instance in terms of smart grid deployment. In view of all these elements, it seems desirable to place a greater focus on ensuring that regulators ensure network operators have a sufficiently strong incentive to make energy saving investments (**NET.3**).

Measures:

- **BAU:**
  Continue to assess and promote efficiency in networks through tariffs and encourage co-generation and demand side response.
- **NET.1:**
  Promote benchmarking of energy transmission and distribution networks.
- **NET.2:**

[86] As already indicated in several available reports and studies drafted from JRC (electricity and natural gas), by Tractebel/Ecofys and limited to electricity grids from CEER

Develop (with Eurostat) a common definition of energy losses and require reporting by system operators on how they identify and reduce these through energy efficiency measures.

- **NET.3:**
  Require National Regulatory Authorities to monitor and incentive energy efficiency investments by system operators.

9. Transport

The EED does not directly address or have any specific requirements in relation to energy saving in transport. However, Member States around 5% of the energy saving measures reported under Article 7 (see **Error! Reference source not found.** for details) directly relate to transport and some proportion of the other combined measures may also relate to it (**BAU**).

As indicated in section 2.2, the transport sector is one of the few sectors that has seen an increase in energy consumption over the last decade (despite stricter vehicle CO_2 limits, which also improve energy efficiency). However, vehicle standards form only part of a successful strategy to address energy use in transport that, in addition to improving vehicles, should also look at avoiding transport through higher efficiency systems and shifting to less energy intense transport modes[87]. Transport is the largest energy-using sector where the EED does not contain any specific provisions. Stakeholders in the PC indicated that it is the sector where the EED has had the least impact on energy use (after agriculture). Linked to this, as shown in Figure 5, it is ranked as the third sector where stakeholders believe additional action through the EED is needed (after buildings and heating and cooling) with broad agreement from all stakeholder groups.

However, a particular challenge in the transport sector is that energy saving measures in vehicles, by reducing the cost often leads to a greater propensity to travel. It is therefore important to accompany measures addressing vehicles with ones that address overall energy use. This implies measures that are at the border of transport and energy policy and this may be one of the reasons why so little action has been taken. The EU specifically attempted to address the issue of energy use in transport through the STEER part of the Intelligent Energy Europe Programme.

The Smart and Sustainable Mobility Strategy lists many existing and planned policies that may lead to energy efficiency improvements in transport although there is no quantification of their contribution to saving energy. In view of this, the EED could complement these policies by providing a framework for stimulating the uptake of specific energy efficiency actions under other policy measures (e.g. promotion of modal shift, urban mobility planning).

Urban transport is estimated to use around 40% of all road transport energy[88]. It is therefore a key area to address and urban areas have the advantage of offering many potential alternative modes of transport (walking, cycling, public transport, shared mobility options). While there have been voluntary initiatives to encourage the development of Sustainable Urban Mobility Plans (SUMPs) these rarely place much emphasis on energy use although they are likely to bring some energy saving benefits.

87 https://www.sutp.org/publications/sustainable-urban-transport-avoid-shift-improve-a-s-i-inua-9/
88 https://ec.europa.eu/transport/themes/urban/urban_mobility_en

Such schemes bring wide multiple benefits for health and local environment in addition to energy savings.

However, the coordination challenges and ensuring that all the benefits are taken into account calls for strong incentives to take action. Urban areas have widely varying populations. Nevertheless the bulk of energy use occurs in the larger ones and those over 1 million inhabitants are reported to account for 60% of urban transport energy use[89] and therefore would still cover a significant amount of overall transport energy use. In view of this, legal requirements to address transport energy consumption could be envisaged in the largest urban areas and also the largest transport generating sites within them. Since these both offer the largest share of potential while providing many alternative mobility options it would be most appropriate to include specific transport energy saving obligations for them (**TRANS.1**).

Internal combustion engines typically have an energy efficiency of 15 to 25% and no means to recuperate kinetic energy when braking. As vehicles have started to be electrified, through hybridisation and full battery electric vehicles, the efficiency of the powertrain increases and larger shares of kinetic energy can be recuperated. Typically a fully electric vehicle will use only a quarter of the energy to travel the same distance as an internal combustion engine one.

Measures to require the phase out of internal combustion engine cars are gaining momentum across the EU and neighbouring countries as shown in Table 8 below. These are likely to lead to a patchwork of dates and differing requirements. A transition from internal combustion engines to electric propulsion with a motor efficiency around 90% implies very substantial energy savings. This is illustrated by the fact that while cars use around 20% of all FEC at present it has been estimated that if they were all electrified it would probably add only around 10% to total electricity demand.

Table 8 Overview of reported ICE phase out intentions in Member States

European countries with indications of the scope, date and appicability of their plans to ban internal combusiton engined cars				
Country	**Start year**	**Status**	**Scope**	**Applicability**
EU Member States				
Austria	2027	government plan	Non-electric	Newly registered taxis, car shares and hire cars
Belgium	2026		Diesel, petrol	New company cars
Denmark	2030–35		Diesel, petrol	New vehicle sales (2030), all vehicle use (2035)
France	2040	climate plan	Diesel, petrol	New car sales
Germany	2030	Bundesrat decision	Emitting	New car sales
Ireland	2030	government plan but dropped from Bill	Diesel, petrol	New car sales
Netherlands	2030	coalition agreement	Diesel, petrol	All cars
Slovenia	2030	emission limit of 50 g/km	Diesel, petrol	New car sales
Spain	2040		ICE	New vehicle sales
Sweden	2030	coalition agreement	Diesel, petrol	New car sales
EEA and neighbouring countries				
Iceland	2030	climate plan	Diesel, petrol	New car sales
Norway	2025	tax and usage incentives	Diesel, petrol	All cars
United Kingdom	2030, 2035 (PHEV)		Non-electric	New car sales

Source: https://en.wikipedia.org/wiki/Phase-out_of_fossil_fuel_vehicles

[89] International Transport Forum

In view of the substantial energy savings and the benefits of providing greater certainty for the automotive industry on the transition to electrified vehicles it could be desirable to set a requirement to set an end date for the sales of internal combustion engine cars linked to the primary energy factor (PEF) for electricity generation. The link to the PEF would ensure that the transition was only required once it is clear that it will lead to primary energy savings. This should be coherent with EU legislation on the CO_2 performance of passenger cars which has a high equivalence to energy consumption (**TRANS.2**).

Measures:

- **BAU**
  No specific measures but some transport energy savings reported under Article 7.
- **TRANS.1**:
  Mandatory requirements in line with the Sustainable and Smart Mobility Strategy to require urban areas over 1 million inhabitants without a sustainable urban mobility plan to establish a plan covering energy use in passenger and freight transport and identifying and implementing measures to improve transport energy efficiency.
- **TRANS.2:**
  Require Member States to set a date for the end of sales of new internal combustion engine cars within ten years of the value of the national electricity PEF going below a threshold.

10. Enabling and Supporting measures – Consumers, energy services, support schemes, financing

Enabling and supporting measures under the EED are aimed at creating the right conditions in Member States to facilitate the implementation of energy efficiency measures, and putting in place the necessary mechanisms, such as financing incentives or instruments, in view of achieving the energy efficiency targets in an optimal way. These measures aim to strengthen the provisions on energy services and energy performance contracting, to ensure an appropriate level of qualifications and certifications of energy services providers, and ensure that information and appropriate technical advice is available on energy efficiency to different market actors and energy consumers (**BAU**).

Consumers

The PC and the consumer information and empowerment workshop confirmed the relevance of the EED provisions and showed that it was considered to have made a moderate contribution (65% moderate contribution, 25% small contribution) to informing and empowering (small) energy consumers. Respondents and participants mentioned the broad formulation of Article 12 as a key reason for its moderate impact. Next to that, respondents stressed the difficulty to estimate the effectiveness of information measures towards consumers.

Stakeholders offered a variety of ways to reinforce the provisions. These include:

- Stronger engagement of consumers which consume small amounts of energy;
- Stronger support to enable consumers to actively participate in the energy market;
- More detailed guidelines for Article 12 implementation, and sharing of good practices at EU level;
- Strengthened Articles 12 and 17 to further empower citizens, and consumers, but also their associations and energy cooperatives;

- Measures targeting households in energy poverty;
- Access of consumers to independent and qualitative advice on energy efficiency improvements, such as Building Renovation Passports, One-Stop-Shops.

Finally, the Member States' Taskforce identified the insufficient consideration of the impact of behavioural aspects such as the rebound effect as one of the reasons for increased energy consumption. This is reinforced by the fact that 60% of PC respondents believe that more effort is needed on awareness raising and behavioural change.

Energy services

When asked for their views on what can be done to improve the functioning of energy services and energy performance contracting the prioritisation of stakeholders is shown in Table 9 below:

Table 9 PC prioritisation of elements to improve energy services and performance contracting

Elements to improve the functioning of energy services and energy performance contracting	
Strengthen requirements on independent market intermediaries, facilitators, one-stop shops to increase trust	58%
Introduce requirement for independent monitoring and verification of energy performance contracts	37%
Introduce Member State reporting on certified energy services providers and number of energy performance contracts concluded in the public sector	34%
Other	44%

Options to strengthen non-regulatory efforts would continue the existing Concerted Action dedicated to supporting Member States in the implementation of the EED. Member States would also continue information campaigns to increase awareness and change behaviour of consumers and market actors to make energy saving decisions as well as to provide guidance and support to market operators and intermediaries (**SUPPORT.1**).

It is therefore clear that stakeholders find that there is value from the accreditation and certification schemes but that these could be enhanced. To do this it may be useful to require minimum quality criteria and the regular assessment of the schemes (**SUPPORT.2**).

There appears to be support to strengthen oversight of intermediary businesses in the field of energy services and performance contracting. There is also some support for a better monitoring of the availability of energy service providers and the degree to which the public sector uses energy performance contracting (**SUPPORT.3**).

Measures:

- **BAU**
  Continuation of existing support, information and enabling measures.
- **SUPPORT.1:**
  Concerted Action dedicated to supporting Member States in the implementation of the EED will be continued. At Member State level continue information campaigns to increase awareness and change behaviour of consumers and market

actors to make energy saving decisions as well as to provide guidance and support to market operators and intermediaries.

- **SUPPORT.2:**
  i. Establish minimum quality assurance criteria for energy services providers;
  ii. Require periodic assessment of qualification and certification schemes
  iii. Strengthen quality and oversight of energy services market intermediaries.
- **SUPPORT.3:**
  i. Stricter requirements for uptake of energy performance contracts and measurement and verification requirements for the public sector,
  ii. Require Member States to assess barriers to dissemination of information and investments
  iii. Require establishment of project development assistance mechanisms.

5.2.3. Policy measures to address driver 3 – Lack of systematic information about the impacts of energy efficiency measures

11. Measures to improve measuring and monitoring

The assessment of the achievement of the EED's overall energy saving target is based purely on the actual energy used which is data gathered and reported by Eurostat. This data is also broken down into main sectors and so provides insights on which sectors are increasing or decreasing their consumption. Member States also report on progress under the Governance Regulation and on their savings achieved under Article 7. However, this aggregated data is of little use to understand what is driving the changes observed and how well the specific measures required in the EED are working (**BAU**).

As described in section 2, a large share of stakeholders think that EED did not provide the right monitoring and enforcement mechanisms. This weakness hampered the evaluation where it was extremely difficult to establish what impact had been achieved by different measures due to the lack of solid information for many aspects. It is not surprising that only 27% of OPC respondents thought that a strong monitoring and reporting framework at EU level had been important in achieving the EED's objectives which was the lowest of the 7 factors. However, it is important to note that among public authorities, slightly more (35%) found it important. Only 38% of respondents said that the lack of effective monitoring had been a factor in not realising the EED's potential, which was among the bottom 3 of 9 factors.

There are already some monitoring and reporting requirements in place in the EED, but there is no detailed information on how much effort is currently required to carry out these tasks. One factor to consider is that increasing digitalisation of data gathering may make it easier to transfer or make available data that is already gathered by Member States. As an example, monitoring of actual energy savings from renovations has been demonstrated and basing Article 7 savings on this would avoid uncertainty over estimates and rebound effects.

At the same time it is clear that to systematically gather the information that would enable better monitoring of whether the required actions are being taken, progress made and assessment of whether the available potentials are being fully exploited, would require additional effort by different stakeholders. In view of this additional effort, it is not surprising that there is limited support for the need for enhancing monitoring and reporting.

Stakeholders were asked in relation to specific aspects of the EED whether they thought a strengthening of monitoring requirements was desirable. In the case of the Energy Saving Obligation, strengthening the monitoring and verification rules was the second most supported measure (67%). Also in relation to enhancing public procurement provisions, the second most important measure was considered to be improved reporting of lifecycle energy use by 45% of all respondents and 29% of public authorities. In contrast, in relation to enhancing the provisions on energy services, enhanced reporting requirements was the least supported of all measures by 34% of all respondents and only 15% of public authorities.

A non-regulatory approach to increase the quality and amount of data available would be to expand the use of surveys, studies and other sources of analytical data to gather more data on actions taken by different actors and Member States. This is considered as **MONITOR.1.**

A further step to improve information availability in certain areas can be taken by strengthening the existing reporting requirements. Because of the existing structures this should involve little further effort or burden and is considered as **MONITOR.2.**

However, in certain areas there are currently no monitoring and reporting requirements and this creates considerable uncertainty over the impact and effectiveness of the measures. To address this, additional requirement are considered on how energy efficiency requirements are taken into account in public procurement and on public sector energy efficiency investments and energy performance contracts concluded above a threshold **(MONITOR.3).**

Measures:

- **BAU**
  Continue with existing monitoring mechanisms.
- **MONITOR.1**
  Expand the use of surveys, studies and other sources of analytical data to gather more data on actions taken by different actors and Member States.
- **MONITOR.2**
  i. Strengthen monitoring and verification including on additionality for counting energy savings in Article 7.
  ii. Strengthen monitoring and reporting of public building renovations.
- **MONITOR.3**
  i. Additional monitoring and reporting requirements on how energy efficiency requirements are taken into account in public procurement.
  ii. Reporting on public sector energy performance contracts concluded above certain threshold and energy efficiency investments.

Table 10 below provides an overview of the link between the problem, drivers and the above outlined policy options.

Table 10: Overview of the link between the problem, drivers and policy options

Problem: EU will not be able to decarbonise sufficiently to achieve the higher 55% GHG emission reduction ambition in a cost-effective way without capturing the remaining energy savings potential
Driver 1: insufficient incentives in support of Member States' ambition and efforts

	Policy packages and measures		
	Non-regulatory	**Regulatory** **Intermediate ambition**	**Regulatory** **Higher ambition**
Nature of EE targets		TARGET.1: Binding EU-level target TARGET.2: Indicative national benchmarks	TARGET.3: Binding national targets
Energy Savings Obligations		ESO.1: Transport sub-target ESO.2: Energy poverty sub-target ESO.3: Exclude fossil fuel technologies	ESO 4: Replace article 7 obligation with white certificates scheme
EE1st	EE1st.1 Guidance on application of EE1st principle Development of CBA methodology	EE1st.2 Obligation to implement EE1st principle Obligation to test energy infrastructure projects against EE1st principle	EE1st.3 Obligation to review legislation for EE1st coherence and establish 'application' body
Driver 2: continuous existence of barriers and weaknesses in main intervention areas			
	Policy measures		
	Non-regulatory	**Regulatory** **Intermediate ambition**	**Regulatory** **Higher ambition**
Public sector buildings	BUILD.1 Guidance in support of public building renovation	BUILD.2 a) and b): increased annual target and extend scope to all public bodies BUILD.3: strengthen requirements	BUILD.4 Delete alternative method
Public sector procurement	PROCURE.1 Guidance in support of energy efficient and green public procurement	PROCURE.2 Extend scope to all public bodies	
Industry	IND.1 Promote benchmarking of energy using sectors	IND.2 Strengthen audit requirements	IND.3 Require implementation of certain audit recommendations
Heating & Cooling	HEAT.1 Promote benchmarking of energy using sectors	HEAT.2 Strengthen certain definitions and obligations	HEAT.3 Phase out of fossil fuel boilers
Energy networks	NET.1 Promote benchmarking of networks	NET.2 Develop common definition of energy losses and require reporting by system operators	NET.3 Require authorities to monitor and incentivise implementation
Transport		TRANS.1	TRANS.2

		Mandatory mobility planning for certain urban areas	Require phase-out of internal combustion engine cars
Support measures	SUPPORT.1 Further capacity building, guidance and awareness campaigns	SUPPORT.2 Strengthen requirements for energy service providers, intermediaries and qualification & certification schemes	SUPPORT.3 Require MS to take up energy performance contracting, address barriers and establish project assistance.
Driver 3: Lack of sufficient information			
	Policy measures		
	Non-regulatory	**Regulatory** **Intermediate ambition**	**Regulatory** **Higher ambition**
Monitoring	MONITOR.1 Expand use of surveys, studies, etc.	MONITOR.2 Strengthen monitoring and reporting on article 7 and public building renovations	MONITOR.3 Additional monitoring and reporting requirements for public buildings, procurement and energy performance contracting

5.3. From options to scenarios that build on the Climate Target Plan

The Commission adopted the CTP in September 2020. It showed that the achievement of increased climate target of at least 55% net GHG emissions reduction is feasible, enables a smoother trajectory to climate neutrality in 2050, but requires that all sectors contribute to the increased effort.

With the energy sector contributing currently to just over 75% of GHG emissions, the clean energy transition in the current decade plays a central role. This transition has to accelerate significantly compared to scenarios leading to the previously agreed climate target of at least 40% GHG reduction in 2030. In the CTP, the increase of efforts needed for the GHG 55% target was illustrated by policy scenarios showing increased ambition (or stringency) of climate, energy and transport policies and, consequently, leading to a significant investment challenge.

The CTP made use of a several policy scenarios illustrating, in particular, the fundamental interplay between the strength of the carbon pricing and intensity of regulatory measures. The results obtained with these scenarios were convergent. All CTP policy scenarios that achieved 55% GHG target showed very similar level of ambition for energy efficiency, renewables (overall and on sectoral level) and GHG reductions across the sectors. More details about the key finding of the CTP (and how the scenarios have been updated in the current impact assessment) are presented in **Error! Reference source not found.**.

The results is that three common scenarios are used as the basis for all the FF55 package which are:

- REG (intensification of energy and transport policies in absence of carbon pricing beyond the current ETS sectors);

- MIX (relying on both carbon price signal extension to road transport and buildings and intensification of energy and transport policies).
- MIX-CP, lower ambition energy policies with a strong role for carbon pricing for road transport and buildings.

For this Impact Assessment, in addition to these common policy scenarios, some variants were developed to address – to the extent possible given the nature of energy efficiency – specific energy efficiency policies and measures. Table 11 gives an overview of how the policy options and 'packages' are applied to the scenarios underpinning them. More details on the specification of each option can be found in **Error! Reference source not found.**.

Different packages of measures were tested against the common 'fit for 55' scenarios, reflecting greater or lesser energy efficiency requirements. The elements included are shown by row. Except for the baseline, all scenarios assume an intensification of non-regulatory measures (as described in Section 5.1, the baseline does not assume intensification of policies beyond what Member States have already implemented or committed to. The 'MS target' indicates whether national targets are indicative or mandatory. The 'ESO' row refers to the level of Energy Savings Obligations in Article 7[90]. For a number of scenarios, the intermediate ambition measures are deployed in addition to the non-regulatory ones. For a limited set of scenarios, high ambition measures are also added. Two scenarios, MIX-FLEX and REG-CERT deviate from this model to test specific elements.

Table 11 Overview of scenarios

Scenarios									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Name	**REF**	**NON REG**	**MIX-CP**	**MIX-FLEX**	**MIX**	**MIX-MAX**	**REG**	**REG-MAX**	**REG-CERT**
MS target	NECP[i]	NECP	IND	MAN	IND	IND	IND	MAN	IND
ESO[ii]	0.8%	0.8%	1.4%	1.5%	1.5%	1.5%	1.6%	1.6%	
Non-regulatory measures	None	✓	✓	✓	✓	✓	✓	✓	✓
Intermediate ambition measures				Only EE1st	✓	✓	✓	✓	✓

[90] Article 7 (energy efficiency obligation schemes and alternative policy measures) is a key measure of the EED, estimated to contribute by about half of energy savings to the overall EU energy efficiency target for 2020 and 2030. See **Error! Reference source not found.** for more detailed information on this article.

Higher ambition measures						✓		✓	White certificate

i) NECP – ambition in line with National Energy and Climate Plans
ii) ESO – level of Energy Saving Obligations

The scenarios shown in the table are briefly described below.

Scenario 1: No policy change (baseline scenario)

The baseline scenario assumes continued implementation of the existing framework without changes to the EED.

Enforcement takes place through established methods, including the annual monitoring of Member States' performance under the Governance Regulation, continuous dialogue with Member States where necessary supported by further Commission recommendations to Member States, and infringement proceedings where relevant.

Guidance has been provided on specific provisions including amended Article 7 on energy efficiency obligations[91], Articles 9 to 11[92] on access to metering and billing information for consumers, and Article 14[93] on heating and cooling. It also assumes the adoption of guidance on the application of the EE1st principle, which is planned to be adopted as part of the 'Fit for 55' package.

Scenario 2: Non-regulatory measures

This option involves the use of non-regulatory measures alone, as identified under the different policy options. These offer the possibility to enhance the correct implementation of the EED in a more harmonised manner.

A certain amount of guidance has already been published and support measures, such as Concerted Actions are undertaken. Expanding these activities could help to address some weaknesses identified, for example on lack of capacity at Member State level, further improve implementation and monitoring, and the application of the EE1st principle.

As such, this scenario goes beyond what is already included in the baseline.

Scenario 3: EED – MIX-CP

As indicated above, the MIX-CP scenario was added to the "Fit for 55" core scenarios to explore a dedicated ETS for buildings and transport, with higher prices than the main ETS. This results in a lower-ambition revision of energy policies and CO_2 standards for vehicles.

[91] Commission Recommendation on transposing the energy savings obligations under the Energy Efficiency Directive (COM(2019)6621)

[92] Commission Recommendation on the implementation of the new metering and billing provisions of the Energy Efficiency Directive 2012/27/EU (COM(2019)6631)

[93] Commission Recommendation on the content of the comprehensive assessment of the potential for efficient heating and cooling under Article 14 of Directive 2012/27/EU (COM(2019)6625)

Consequently, under this scenario, changes to the EED are minor; the overall target is increased, but by less than other scenarios, and the only other change to the EED is to introduce the EE1st principle in the legal text. Non-regulatory measures are also part of this scenario.

Scenario 4: EED – MIX-FLEX

Under this scenario, the major change to the EED is the level of the overall EU target and that targets are made mandatory at Member State level.

The only other change is to introduce the EE1st principle in an article, but no other changes are made, thereby leaving the maximum of flexibility to Member States as to how they achieve their target.

Scenario 5: EED – MIX

Under this scenario, intermediate ambition changes are proposed to address the identified weaknesses. The overall target is increased in line with the CTP but the target remains indicative for Member States. Also, the level of ambition of Article 7 is increased.

Scenario 6: EED – MIX-MAX

Under this scenario, the revision of the EED includes all elements of option 5, but additionally aims to strengthen other aspects of the Directive where high ambition options were identified. These include *inter alia* aspects related to buildings, transport and the phasing out of gas boilers and combustion engines.

Scenario 7: EED – REG

The three REG scenarios are based upon the corresponding CTP IA scenarios, which assumed the maximum regulatory effort to achieve the 55% GHG reduction in 2030. Under this option, the main change is the increase in the level of energy efficiency obligations under article 7, as well as the intermediate ambition changes to address weaknesses. The overall target is increased but remains indicative for Member States.

Scenario 8: EED – REG-MAX

Compared to scenario 7, this option introduces mandatory energy efficiency targets at Member State level and strengthens other aspects of the Directive where high ambition options were identified. These include new aspects related to transport and measures related to phasing out of gas boilers and combustion engines.

Scenario 9: EED – REG-CERT

The main characteristic of this scenario compared to the other REG ones is to replace the energy efficiency obligations under Article 7 with an EU-wide white certificates scheme (see **Error! Reference source not found.** for further details about such a scheme). The other changes include the intermediate ambition measures.

5.4. Scenarios discarded at an early stage

Scenario 2: Non-regulatory measures, which envisages only non-regulatory action, has been discarded as a stand-alone option. This is because it cannot resolve a number of the underlying problems. In particular, Member States are unlikely to increase their overall

level of energy savings, which is crucial to delivering the 55% GHG reduction, purely in response to a request from the Commission since they have not done so voluntarily so far.

As regards the other identified problems, while some could be addressed through further guidance, this will provide less certainty than improving the legal text and will not address situations where the Directive allows for weaker alternatives or there is insufficient reporting. However, as such measures are in any case beneficial in support of energy efficiency, all other scenarios include the non-regulatory measures identified in section 5.2.

6. WHAT ARE THE IMPACTS OF THE SCENARIOS AND POLICY OPTIONS?

It is necessary to carry out an assessment of the individual detailed measures to determine whether they make sense in terms of their contribution to the effort needed from the EED as well as whether they might result in an excessive administrative effort or they are no justified in view of subsidiarity or coherence with other EU legislation. Those measures that would be retained also need to be assessed for coherence with each other as a package.

A separate assessment is needed of whether the whole package of EED measures works appropriately with the other FF55 proposals to deliver the CTP ambition. That assessment is necessary to ensure that the FF55 package is coherent in view of the interactions between its elements and that its overall impact on factors such as energy prices, ETS prices and economic activity is considered acceptable.

6.1. How the assessment is carried out

The assessment of whether the package of EED measures works appropriately with the other FF55 proposals to deliver the CTP ambition is necessarily carried out using an energy system model. To take account of the fact that other proposals are simultaneously under consideration, the approach uses the three core scenarios used for all the 'Fit for 55' initiatives determine the boundary conditions for all policy options. The key difference between the three core scenarios (MIX-CP, MIX and REG) that is pertinent for the EED assessment is the extent and nature of pricing measures for GHG emissions.

As previously explained, certain outcomes of the CTP define the framework within which the current assessment is taking place. In particular this includes the overall level of the energy saving target set by the EED and as a consequence the level of the Article 7 ambition.

The measures implemented to promote energy efficiency in each scenario will have the effect of facilitating investments in energy efficiency and therefore lead to more energy savings than without them, all else being equal. Conversely they will result in lower emission prices to achieve the same level of savings. Nevertheless, the results of these scenarios establish the range of expected impacts of all 'Fit for 55'initiatives acting together. Consequently, the quantitative impacts are also the result from the overall combined effects of all the 'Fit for 55' initiatives and not just those from the EED.

The key question that the modelling needs to answer for this impact assessment is whether the assessed packages of EED measures are adequate to ensure that the FF55 policy package achieve the CTP parameters, in particular for the EED the energy savings needed. This is assessed for all the retained scenarios.

Using an energy system model does not allow for a granular analysis by policy measure. In view of this inability to provide such a detailed quantitative analysis of many of the individual policy options, section 6.3 therefore provides a detailed qualitative assessment of the different policy options against the objectives of the review as well as administrative burden and coherence.

6.2. Summary of quantitative results

The projections obtained from scenario modelling provide quantitative elements for analysis. Models necessarily are limited in the granularity to which they can illustrate the complexity of the real world. All models require large amounts of data and assumptions as inputs and yet there may not be precise econometric data for all variables needed. In addition, because of their forward looking nature it is necessary to assume how all these variables may change in the future. These features mean that model outputs are necessarily uncertain. Efforts are made to reduce this uncertainty for example by trying to tune the outputs to observed outcomes, but it must be understood that the outcomes are not a precise prediction.

A detailed presentation of the modelling results is provided in **Error! Reference source not found.**. This also describes the assumptions underpinning the scenarios (in particular regarding projected economic activity and fuel prices). Scenario results are reported in this Impact Assessment only at EU level, but impacts on Member States will be reported in the forthcoming technical publication. Figure 14 shows the reduction in Final Energy Consumption in the different scenarios and variants. Scenarios with higher intensification of policies (e.g. MIX-MAX and REG-MAX) show slightly higher energy savings. These scenarios also reach very slightly higher emissions reduction (for example, -54.3% GHG emissions for MIX-MAX and -54.4% for REG-MAX in 2030[94]). Furthermore, the MIX-CP is the only scenario that does not reach the level on energy savings analysed in the CTP Impact Assessment. In 2030 FEC in the MIX-CP scenario is 34.2% below the 2007 baseline projections while the CTP scenarios all reached reductions between -36 and -37%.

As discussed in the CTP Impact Assessment, projections for the different scenarios are remarkably close. In particular, the climate impact of all scenarios and options is very similar. There are small differences between scenarios in GHG emissions by sectors. Scenarios based on carbon pricing (e.g. the MIX scenario) tend to reduce supply side emissions more and in particular emissions from power generation (up to 3% points more). However, scenarios based on bottom up policies (e.g. the REG scenario) compensate with higher reduction in the residential sector.

[94] Excluding intra EU aviation and maritime, and LULUCF

Figure 14: Final energy savings in 2030 (with reference to PRIMES 2007 baseline projection).



Looking at these changes by main sectors (Table 12 below) shows that the energy savings in each sector increase progressively through the options. The main exception to this is MIX-MAX for industry and residential, where the energy savings are higher than in all other options.

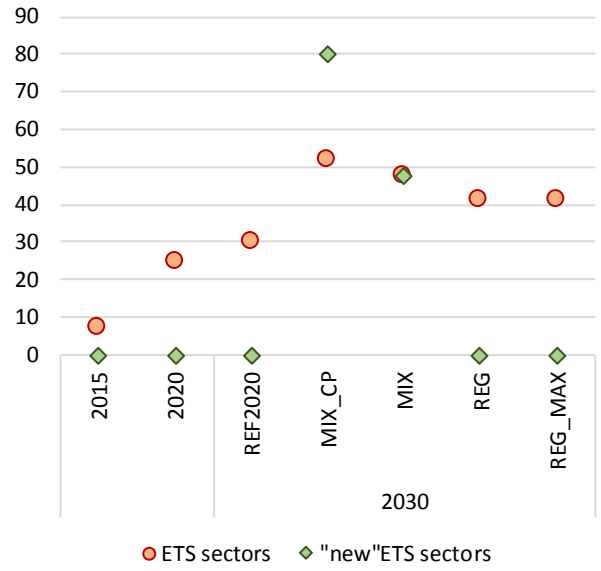
Table 12: Final energy use by sector.

		Services & agriculture	**Industry**	**Residential**	**Transport**
2000		144	272	248	263
2005		163	275	267	282
2030	REF	143	244	215	280
	MIX-CP	132	228	191	269
	MIX	129	226	182	269
	MIX-MAX	128	224	181	269
	REG	124	221	197	267
	REG-MAX	124	219	197	267

6.2.1. Economic impact

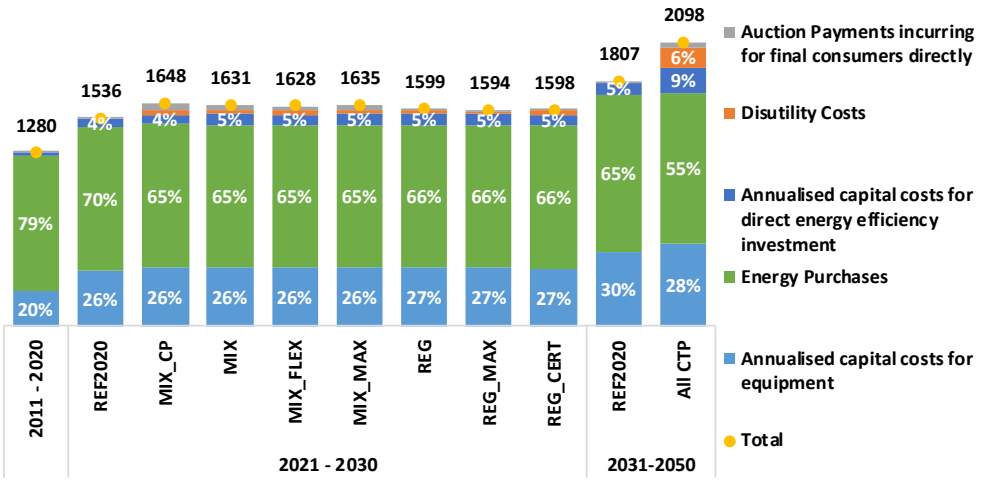
Figure 15 shows the ETS carbon price in the different scenarios including for the transport and building sectors in the scenarios with extension of ETS (the results for MIX-MAX are the same as in MIX).

Figure 15: Carbon price ETS sectors (€'15/ t of CO2).



System costs, including auction payments and disutilities, measure the policy costs for the final consumers. As shown in Figure 16, the costs for consumers increase significantly compared to the previous decade and are also higher than in the reference scenario. At the same time, total system costs are remarkably close in all scenarios.

Figure 16: average annual cost over 10-year periods, in billion € '15.



Because of the increased system costs, electricity costs also increase as shown in Figure 17. The average electricity cost increase up to 2030 and then tends to decrease due to decreasing technology costs. Moreover, scenarios with high carbon price (like MIX-CP) tend to have slightly higher electricity prices due to pass-through of carbon cost to final consumers.

Figure 17: Average electricity price (€'15/MWh).

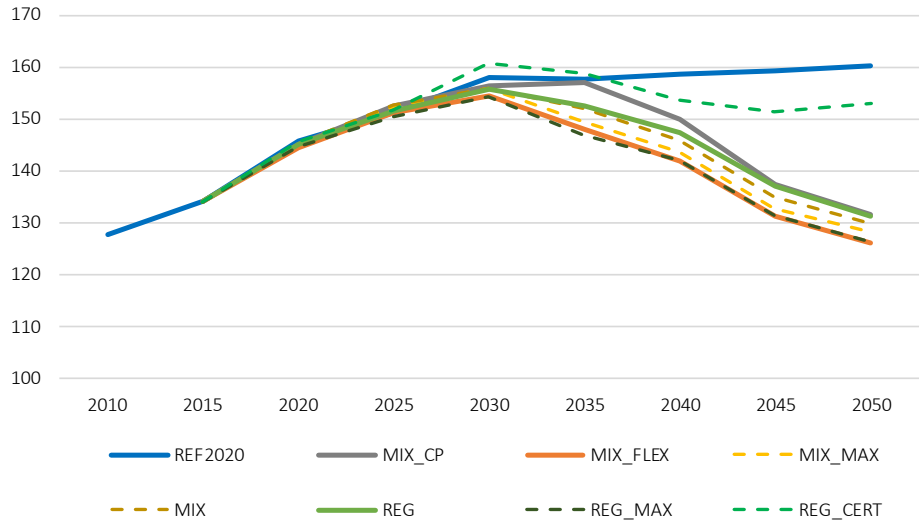


Table 13 below compares the change in the cumulative energy system costs over ten years for each of the three main sectors against the change in their final energy consumption in 2030. This is to provide a measure of the cost-effectiveness of the different scenarios. For comparison, the change in cost in the ten years before and after 2030 are shown.

The system costs including auction and disutility are a measure of the costs for final consumers. However, as public policies recycle carbon auction revenues in the economy, the indicator of total energy system cost excluding auction payments is the appropriate indicator for comparing the macroeconomic impact of different scenarios. Moreover, the disutility costs are not meaningful from a macroeconomic perspective.

Table 13 shows the system cost excluding auction payments and disutilities expressed as % of GDP. Very small differences can be observed between scenarios and the increase compared to the reference scenario is also limited. Therefore, this alone does not provide a key determining factor in selecting a preferred approach.

Table 13: Total system costs excluding auction payments and disutility as % of GDP.

	2010	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
REF	11.7	10.5	9.7	10.9	11.6	11.0	10.5	9.8	9.4
MIX-CP		10.5	9.6	11.3	12.4	12.3	12.6	12.3	11.7
MIX		10.5	9.6	11.3	12.4	12.2	12.4	12.1	11.5
MIX-FLEX		10.5	9.6	11.3	12.3	12.0	12.2	11.9	11.4
MIX-MAX		10.5	9.6	11.4	12.4	12.2	12.4	12.2	11.6
REG		10.5	9.6	11.3	12.4	12.0	12.0	12.0	11.5
REG-MAX		10.5	9.6	11.3	12.4	11.8	11.8	11.7	11.2
REG-CERT		10.4	9.6	11.4	12.2	11.5	11.6	11.7	11.7

6.2.2. Investment, GDP and employment effects

Table 14 below indicates the levels of investment by sector for the period 2026-30 for each option.

Total investment expenditures in final energy consumption sectors (demand sectors) in the Reference scenario increase in the 2021-2030 decade by 41% compared to 2011-2020. In the decade 2021-2030, the investment expenditures in the demand sectors in the policy scenarios increase between 6.9% and 11.8% relative to the Reference scenario. The REG scenarios project slightly higher investment expenditures in demand sectors compared to the MIX scenario (an increase from Reference of 11.8% instead of 9.7%).

Investment expenditure increases considerably above business as usual also in supply sectors (including power and heat production, grids, and production and distribution of alternative fuels). In the Reference scenario, investment expenditures in the supply sectors increase by 45.2% in the decade 2021-2030, cumulatively, compared to the previous decade. The policy scenarios involve 28.7% to 30.7% higher supply sector investment expenditure above the Reference in the decade 2021-2030. The increase in the policy scenarios is much higher after 2030 and is on average 80% higher than Reference in the period 2031-2050.

Table 14: Investment expenditures (in billion € '15).

				Demand side		
		Industry	**Residential**	**Tertiary**	**Total excl. transport**	**Transport**
	2011-2020	9,4	81,8	45,4	136,6	476,4
2021-2030	REF	17,0	125,5	74,6	864,5	647,4
	MIX-CP	24,1	157,6	94,5	924,3	648,2
	MIX	24,7	180,1	94,2	948,2	649,3
	MIX-MAX	26,7	185,8	95,1	956,8	649,3
	REG	23,6	194,4	97,5	966,2	650,6
	REG-MAX	25,9	189,0	98,3	963,9	650,7

				Supply side	
		Grids	**Power and heat plants**	**Total**	**New fuels**
	2011-2020	21,0	33,8	54,8	0,0
2021 - 2030	REF	35,1	44,4	79,6	0,0
	MIX-CP	43,9	58,8	103,3	0,6
	MIX	43,8	58,5	103,0	0,7
	MIX-MAX	43,6	58,4	102,7	0,7
	REG	44,3	58,6	103,7	0,7

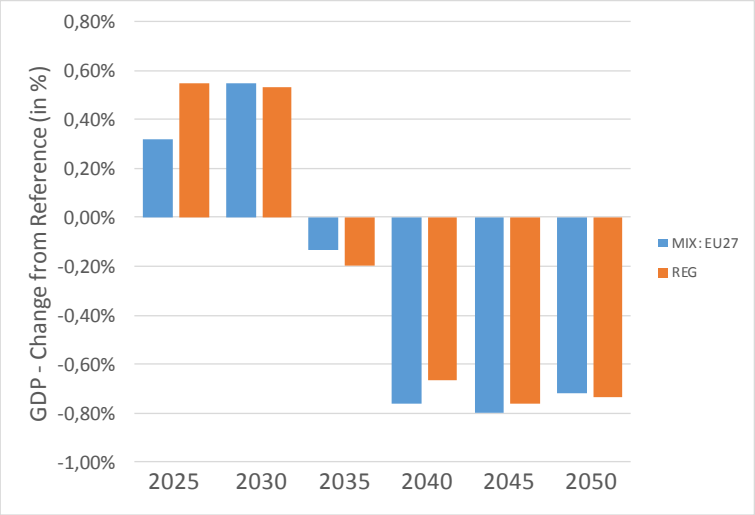
REG-MAX	44,9	58,7	104,4	0,7

The increase in investments has a critical impact on the cost of the transition. If financing is available to fund capital costs, additional investments can generate a significant multiplier effect. It is estimated that around 9-20 jobs in manufacturing and construction are created for every million dollars invested in retrofits or efficiency measures in new builds in the EU. Construction jobs would mostly be local, while manufacturing jobs in the industrial sector would be created by increased demand for building materials and equipment such as insulation, efficient glazing and heat pumps.

If financing is not available, however, the additional expenditures divert productive resources (either capital or labour) from other productive uses. Such crowding out results in scarcity conditions that have adverse effects on the entire economy.

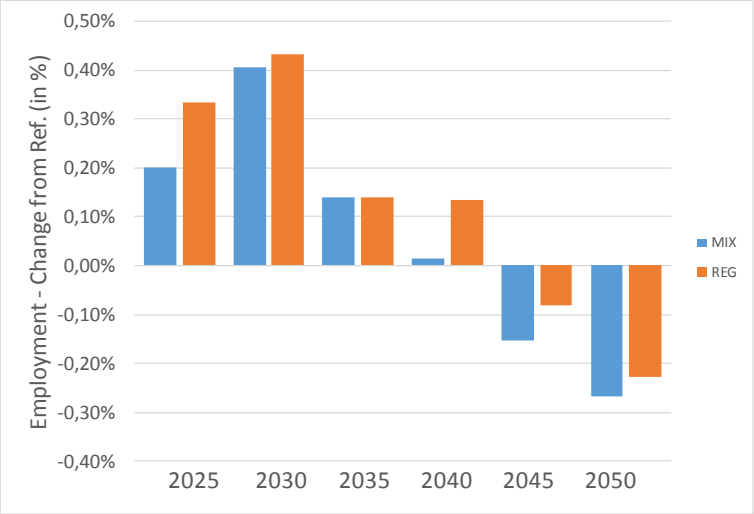
Analysis with macroeconomic models confirms the results obtained in the CTP impact assessment. The impact on the European GDP and employment of the climate targets is small in any of the cases assessed. Projections obtained with the GEM-E3 macroeconomic model indicate a small positive effect on GDP and employment with favourable financing conditions. Compared to Reference projections, GDP is 0.52% higher in 2030 and employment is 0.36% higher. Assuming crowding out of investments, however, GDP and employment in 2030 are 0.2% and 03% below the Reference level respectively. In line with previous findings, result for the MIX and REG scenarios are very similar. It is likely that the conditions for investments will lie in between the two cases of favourable financing and crowding out. Uncertainty on other parameters such as baseline economic growth is expected to have smaller impacts on macroeconomic aggregates[95]. The difference between the favourable financing and crowding out conditions can be interpreted as a measure for the uncertainty in the outcome of the policies proposed. Figure 18 and Figure 19 show the economic impact of the core policy scenarios on GDP and employment in case with no crowding out of investments.

Figure 18: % change of GDP in volume from Reference.



[95] The CTP baseline, for example, had higher economic growth, but the macroeconomic impact of increasing climate ambitions was comparable.

Figure 19: % change of employment from Reference.



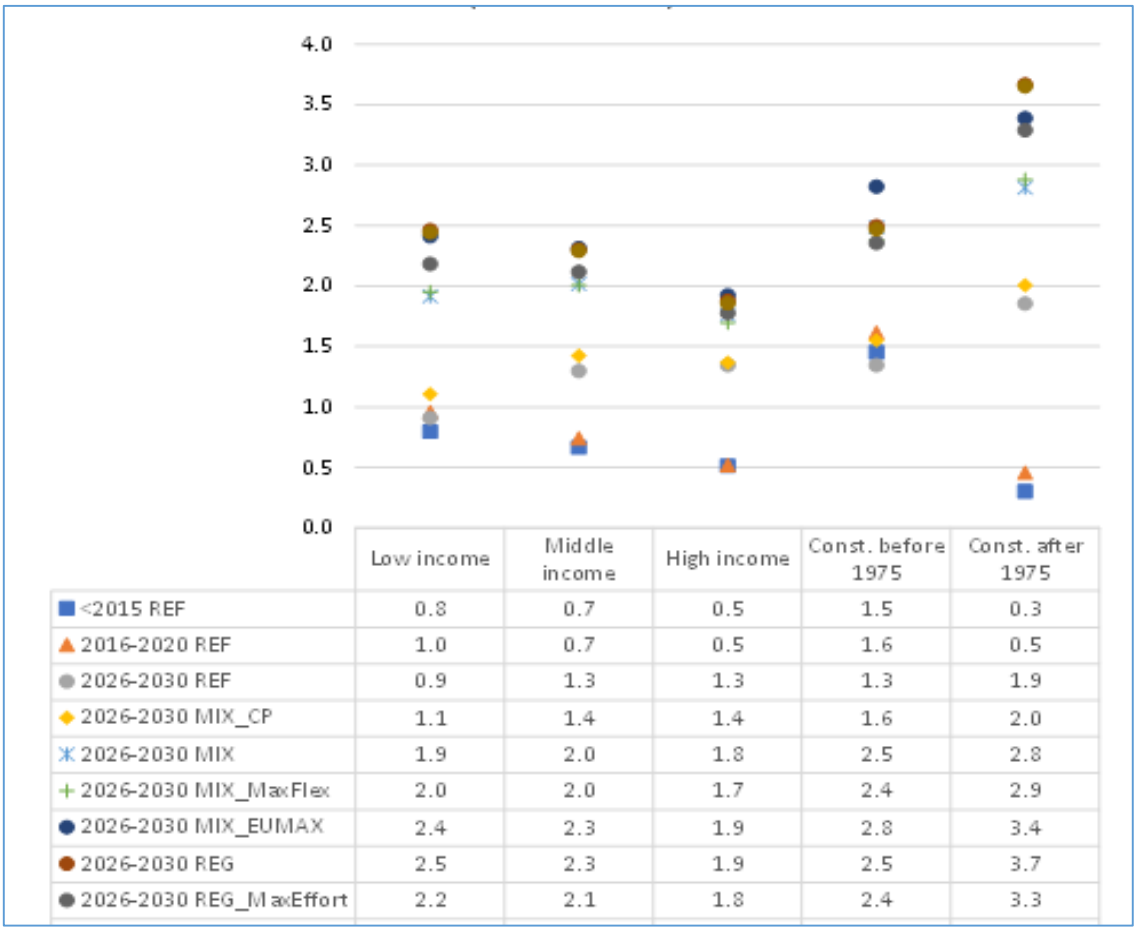
Investments in energy efficiency measures cause positive GDP impacts for the entire economy through multiplier effects assuming that crowding out effects are not present. Accounting only for multiplier effect, but ignoring wider macroeconomic effects (*i.e.*, via the readjustment of wages, interest rates, prices and the financial closure for funding) GDP would be approximately 0.5% and 1.1% higher in 2025 and 2030 respectively. Similarly, accounting for multipliers only, employment would be approximately 0.25% and 0.5% higher in 2025 and 2030. If the extra investment in energy efficiency and renewables included in the MIX and REG scenario were to be implemented without secondary and indirect effects in the macro economy, they would have a significant positive growth inducement impact.

6.2.3. Social impacts

All policy options are characterised by an increase in investments and in particular increase in energy efficiency investments. The CTP Impact Assessment showed that, in the absence of mitigating measures, climate policies could have a regressive impact affecting negatively vulnerable consumers. However, not all policies have equal social impacts. Policies based on carbon prices tend to promote fuel switch by increasing the cost of fuels. This could have negative effect for vulnerable consumers, as lower income households tend to spend a larger share of income on energy services such as heating and electricity consumption. Bottom up energy efficiency measures, on the other hand, tend to promote investments and renovations. Energy savings eventually repay capital investments. Assuming that financing is available, energy efficiency investments result in lower total costs.

Figure 20 shows the average renovation rate over the 2016-2030 period by household income for the different scenario. Scenarios with higher energy efficiency ambition tend to have significantly higher renovation rates. Because of the policies included in the scenarios' specification, renovation rates are higher in particular for low income households.

Figure 20: Annual renovation rate of dwellings' building envelope (in percentage of stock).



	Low income	Middle income	High income	Const. before 1975	Const. after 1975
<2015 REF	0.8	0.7	0.5	1.5	0.3
2016-2020 REF	1.0	0.7	0.5	1.6	0.5
2026-2030 REF	0.9	1.3	1.3	1.3	1.9
2026-2030 MIX_CP	1.1	1.4	1.4	1.6	2.0
2026-2030 MIX	1.9	2.0	1.8	2.5	2.8
2026-2030 MIX_MaxFlex	2.0	2.0	1.7	2.4	2.9
2026-2030 MIX_EUMAX	2.4	2.3	1.9	2.8	3.4
2026-2030 REG	2.5	2.3	1.9	2.5	3.7
2026-2030 REG_MaxEffort	2.2	2.1	1.8	2.4	3.3

The CTP Impact Assessment (under comparable modelling assumptions) explored a lump-sum redistribution of carbon revenue at the national level (i.e. additional revenues relative to baseline are recycled within country). It was shown that this approach based on household size could generate a positive welfare impact on the bottom expenditure decile of the EU population as a whole under MIX, and sharply reduce the negative impact on all other expenditure. The nature of such a redistribution mechanism can affect the overall welfare impact.

6.2.4. Coherence

Any changes to the policy architecture, which are under consideration in this Impact Assessment would not take place in a policy vacuum, but would interact with existing and planned policies and measures of a different nature to reach the 55% climate target, including pricing and non-pricing mechanisms and measures, and policies promoting renewables.

Assessing the interplay between each of the various elements of an extended and deepened policy architecture, and the interaction with existing related EU-level and national level policies is fundamental. The revision of the EED is a key element in achieving the increased 2030 EU climate target in a cost-efficient manner, while helping to address existing market barriers and redress distributional impacts. Most of the relevant EU policies are under review in the 'Fit for 55' package.

Policy interactions are already manifold between existing climate and energy policies. Two areas worth mentioning in this respect are the buildings and transport sectors, which are covered by horizontal legislation on energy efficiency (EED and EPBD), renewables (RED), GHG emissions (ESR) and fuel infrastructure (Alternative Fuels Infrastructure Directive), but not by the EU ETS (except for aviation). In addition, several pieces of sector specific EU legislation apply.

Therefore, in view of a possible scenario extending the ETS to buildings and transport, as regards energy efficiency the most relevant interactions are with the EED and the EPBD.

Having in mind existing market barriers hampering energy efficiency, striking a balance between carbon pricing and the policies in the MIX scenarios would help the 'Fit for 55' package achieve the increased climate target in a cost-efficient manner, without excessive increases of the carbon prices and mitigating their impacts in particular on vulnerable consumers.

There are some interaction differences which depend on, or link with, the choice of the carbon pricing instrument (i.e. ETS or carbon taxation), which are analysed in the IA accompanying the revision of the ETD.

Interactions with the ESR are different in nature. Its binding national emission reduction targets mainly function as a safeguard to ensure the intended energy-related emission reductions through the specific policies are achieved, incentivising Member States to effectively implement policies and mitigate distributional effects between Member States, while ensuring that also in the ESR sectors not addressed by renewables and efficiency policies (currently around 40% and in 2030 around 45% of ESR emissions) sufficient emission reduction policies are implemented at the national level. EU energy efficiency policies can also lower the need for national emission reductions in other effort sharing sectors.

The different combinations of policy instruments considered in the scenarios achieving the 55% GHG target deliver only limited differences in energy savings and renewable energy shares. This confirms the findings in the CTP Impact Assessment: the ambitious targets require significant contributions from all sectors and all policy instruments. Without the possibility of deploying new technologies, the cost-effective solutions converge to very similar pathways.

All scenarios show that final energy consumption should be further reduced by 35% (MIX-CP) to 37% (REG) compared to the 2007 baseline used as a business as usual trajectory for the EU energy efficiency targets. Moreover, increased ambition in the MIX-MAX scenario results in slightly lower energy consumption and a further reduction of 0.3% GHG emissions compared to 1990.

Although achieving 55% with lower levels of energy efficiency has not been analysed in detail, it can be assumed that it would either require increasing other targets (RED, ESR) beyond their cost-efficient levels or it would rely on a very high carbon price. However, without an appropriately targeted energy efficiency policy, a high carbon price would increase costs for consumers, in particular low and medium income households and vulnerable consumers, and exacerbate distributional effects.

Indicative national targets could provide a further instrument to ensure delivery of the Fit for 55 package. However, indicative national targets will have to be reconciled with an equitable distribution of effort and with the options considered for burden sharing in the

ESR revision. The option of proposing a binding EU level target would reduce the risks of non-compliance at the expense of flexibility. The risk of overlap with other policy initiatives is limited since the range for the possible energy efficiency target under the CTP is narrow.

In the transport sector, the energy efficiency measures could complement the existing and planned policies under the Smart and Sustainable Mobility Strategy. Options set the level of ambition for transport measures. New measures and requirements for urban mobility and transport could help reducing energy consumption in one of the few sectors that has seen an increase in energy consumption over the last decade. However, overlaps with the SSMS and added administrative burden should be carefully considered.

For the remaining options described in Section 5.2, the risk of overlap with other policy areas is limited. These options deal mainly with the level of ambition required in different sectors for reaching either 36% or 37% energy savings (and are thus coherent with the pathways proposed in the core policy scenarios). Options discussing scope extension of existing measures are generally limited to specific sectors (e.g. public buildings) with little risk of overlap with other policy initiatives.

Based on considerations above, there are a number of arguments in favour of combining elements from both policy mix approaches, which is already the case in several Member States. Economic incentives are important, but so are specific measures targeted to address either specific barriers or addressing cost-effective untapped potentials related to specific alternatives to fossil fuel use. Specific energy efficiency policy (as well as renewable and transport policies) will continue to address the split-incentive dilemma in building renovation, increase coherence of energy infrastructure planning, support licensing and certification procedures or ensure better available information for energy consumers.

For further discussion on the interactions between the EED and the ETS, ESR, RED, ETD, see the instrument-specific Impact Assessments.

6.2.5. Implications of the modelling results for the assessment of measures

The majority of additional actions (beyond the EU-level actions) that will be taken to achieve the necessary energy savings will be at Member State level. This means that the distribution between sectors remains uncertain. Nevertheless, based upon the parameters in the model, this results in a certain distribution of efforts. The overall economic and environmental impacts are largely driven by the aggregate energy savings that result from the design of the whole package of measures, in particular those elements determined from the CTP as regards the level of the overall EU energy saving target and the energy savings obligation in Article 7.

In view of this, the economic and environmental impacts are discussed only in relation to the policy scenarios rather than in relation to each of the policy options. Similarly, with regard to social impacts, these relate to a large degree to jobs and energy poverty. Employment impacts are estimated based on the overall packages. However, energy poverty impacts will largely be a result of Member State choices about how to support building renovations. Realistic choices have been made in the modelling, but the measures of the EED in those areas are not expected to have major direct impact and so these impacts are only presented in relation to the overall packages. Coherence with the other instruments in the 'Fit for 55' package is assessed in section 6.2.4.

It can be seen that the modelled packages of measures are of the right order of stringency to deliver energy savings within the CTP range. In view of the high level of the modelling, it is not possible to draw conclusions form it about the desirability of the specific measures. In view of that, it is necessary to assess these against the objectives and wider policy considerations before concluding on the most appropriate overall package. This assessment is carried out in the following section.

Comparing the scenario results between MIX and MIX-MAX or REG and REG-MAX shows the impact of a change from the intermediate to higher ambition package of energy efficiency measures within that policy environment. As shown in Figure 14 the difference between these scenarios that results from the alternative packages is 0.5% in MIX (from 35.8 to 36.3%) and 0.1% in REG (from 36.7 to 36.8%).

6.3. Assessment of policy options

Next to the quantitative analysis of the scenarios above, the following sections provide a qualitative assessment of the different policy options presented in section 5.2 against the objectives identified in section 4.2 and the Better Regulation criteria, compared to the baseline:

1. Effectiveness;
2. Administrative burden and compliance costs;
3. Coherence: coherence of each option with the overarching objectives of EU policies, and the 'Fit for 55' package in particular;
4. Subsidiarity and proportionality.

To simplify the assessment, the effectiveness criterion has been assessed against the three specific objectives of the initiative (where appropriate), i.e. strengthen **incentives**, addressing **barriers** and improve **understanding of impacts**. This assessment aims to identify those measures that would most cost-effectively contribute to achieving the energy efficiency target established by the CTP.

Effort has been made to quantify the administrative burden but there is limited understanding of this burden due to the current legislation. The absence of this baseline makes any estimate of the additional burden due to a strengthening of the provisions difficult. In an attempt to remedy this situation a short survey was organised addressed to all the participants in the stakeholder workshops. This survey sought their views on the current administrative burden and the probable increase that the types of provisions under consideration could cause.

The survey resulted in a relatively limited number of responses that could not be considered as being sufficiently representative of the EU as a whole. Within the estimates of the existing administrative burden there were significant variations that may have multiple causes that could not be verified. The questions about increased burden were of the nature of percentage increase and actual FTE increase. It is not possible to reconcile these two parameters with the range of existing burden indicated. In view of these problems with the data it was decided that the quantification of the increase in administrative burden for all the measures would be misleading and therefore this assessment is qualitative. A quantitative estimate is provided for the elements of the preferred option.

6.3.1. Energy efficiency targets

6.3.1.1.Effectiveness

Under **BAU** there is an insufficient obligation to ensure that Member States take sufficient and effective energy saving actions.

TARGET.1 would make the EU-level target binding, which would increase its effectiveness as an instrument incentivising energy efficiency efforts, in combination with the mechanisms under the Governance Regulation.

Under **TARGET.2**, the EU would define national benchmarks based upon an appropriate distribution mechanism. Such benchmarks for Member States would give clarity about the expected level of national efforts and facilitate better monitoring, which would encourage Member States to achieve the optimal level of ambition in energy efficiency.

Under **TARGET.3**, the EU would define binding national targets. This would give greater certainty that they would be achieved since there would be a potential recourse to enforcement (e.g. through infringement procedures). As such, **TARGET.3** would be more effective than **TARGET.1** and **TARGET.2** in achieving the necessary ambition and efforts at Member State level.

TARGET.3 would also provide more incentives to Member States to address existing market barriers and failures as a binding target would presumably create more pressure to achieve the necessary savings in a cost-effective manner.

6.3.1.2.Administrative burden and compliance costs

The administrative burden for **TARGET.2** and **TARGET.3** is estimated to be low, as the national indicative energy efficiency benchmarks or binding targets can be monitored through official statistics, which are readily available at national level and from Eurostat. Besides, these data have been collected and reported by Member States for quite some time and no new actions would be needed.

Compliance cost, e.g. for industry, would not be expected to change significantly as a result of the three options.

6.3.1.3.Coherence

TARGET.1 is fully coherent with the other actions in the 'Fit for 55' package, in particular the GHG emissions reduction and the renewables target, as both are binding at EU level. **TARGET.2** is similar to the approach for renewables, while **TARGET.3** would diverge from this approach.

6.3.1.4.Subsidiarity and proportionality

In particular **TARGET.3** impinges on subsidiarity as it provides for a mandatory national target that Member would have to meet.

TARGET.2 and **TARGET.3** are both considered proportional, in view of the importance of meeting the 55% GHG target and of the contribution of energy efficiency.

In summary:

Criteria		Comparison of options against the baseline			
		BAU	TARGET.1	TARGET.2	TARGET.3
Effectiveness	Incentives	0	+	+	++
	Barriers	0	0	+	+
	Understanding impacts	0	0	0	0
Administrative burden/compliance costs		0	0	-	-
Coherence		0	+	+	-
Subsidiarity and proportionality		0	0	-	--

6.3.2. Energy Savings Obligations

6.3.2.1.Effectiveness

BAU leaves full flexibility to Member States. This may have the weakness of not delivering energy savings in areas where they may be feasible but simply require more coordination to achieve.

ESO.1 appears effective. It supports the European Green Deal objectives by a broader coverage of sectors. It would also be the most effective way to ensure the transport sector will contribute to the decarbonisation target of at least 55%. Achieving a certain amount of energy savings in the transport sector would create synergies with a revised ETS on transport, the ESR and the Sustainable Mobility Action Plan, and unlock additional energy savings achievable in the transport sector.

ESO.2 would remove the flexibility of Member States whether to implement policy measures alleviating energy poverty or not. Member States would be required to implement such measures in any case to fulfil their energy savings obligation. The COVID-19 crisis has highlighted the urgency of addressing energy poverty if we are to create a social Europe that caters for the needs of all citizens. Energy poverty levels across Member States will be in the spotlight as more Europeans may struggle to afford access to essential energy, particularly with rising unemployment. Also medium income households should be considered as the COVID-19 crises has increased the risk of energy poverty in such households. Against this background, this option would be very effective to achieve the European Green Deal objective of ensuring a just transition. The assessment of the progress of Member States towards the alleviation of energy poverty shows that Article 7 with its flexibilities as it stands does not drive sufficient action.

Excluding the possibility for Member States to count energy savings from measures promoting the use of fossil fuels under option **ESO.3** would be an effective way to contribute to the energy efficiency target and the objectives of European Green Deal. The decarbonisation target of at least 55% implies a rapid movement away from fossil fuel use, particularly in buildings. It also reflects that public policy should not reward marginal energy savings gains that lead to stranded assets and slowing down the energy transition.

ESO.4 would be effective as it would create an EU-wide white certificate scheme that could result in cost optimisation to achieve energy savings, open the energy savings markets to third parties, provide price signals to market actors and give a formal value to energy savings. Modelling shows that this would result in a lower overall cost of achieving the energy saving goal, provided there is effective implementation.

6.3.2.2.Administrative burden and compliance costs

ESO.1 and **ESO.2** would see a moderate increase of administrative burden and higher compliance costs. Member States would have to plan and implement additional measures or revise existing measures to ensure the achievement of the sub-targets for transport and energy poverty.

ESO.3 would not have an impact on administrative burden or entail any additional compliance cost.

ESO.4 would raise significant complexities and may require a complex administrative scheme to be put in place. As such it would create a high additional administrative burden and high compliance costs to implement.

6.3.2.3.Coherence

Requiring a certain percentage of Article 7 savings to come from transport under option **ESO.1** would be fully coherent with existing measures in the transport sector. In fact, under Article 7 Member States can already count measures targeting the transport sector towards their annual savings obligation, e.g. through scrapping schemes, modal shift and higher efficiency of vehicles, behavioural measures (e.g. eco-driving), and environmental taxes on transport fuels.

This would stimulate Member States to take further action on transport, which is needed because the transport sector has been identified in the European Green Deal and the Climate Target Plan 2030 as one of the key sectors for lowering GHG emissions and reducing energy consumption. There would therefore not be regulatory overlap but rather synergies with the measures of the Sustainable and Smart Mobility Strategy, as the EED would establish a result-oriented obligation while leaving it to Member States which measures they would like to use for achieving the reduction in energy use in transport.

The strengthening of Article 7 as regards energy poverty under option **ESO.2** would contribute to making the energy transition just and inclusive, by obliging Member States to address vulnerable, energy poor households, low- or medium income households and homeowners.

Discouraging the promotion of combustion fossil fuel technologies under Article 7 (**ESO.3**) would be fully coherent with all measures in the 'Fit for 55' package and the European Green Deal. It would also mirror the possible extension of ETS on buildings and transport.

ESO.4 would most likely create undesirable results if applied together with the EU ETS and in particular an ETS extension to buildings and transport. Both schemes are based on the principle of passing on the costs to the consumer. On the one hand, this could financially overextend consumers in some Member States and increase the risk of energy poverty, unless additional, well-balanced actions would be taken to counterbalance these effects. On the other hand, the co-existence of both schemes could potentially lead to a

significant imbalance in some countries between the costs being borne (and passed through to energy consumers) and the benefits received.

6.3.2.4.Subsidiarity and proportionality

ESO.1, ESO.2 and **ESO.3** have an impact on subsidiarity as they limit (to some extent) the freedom of Member States to decide in which sectors they would achieve the necessary energy savings. Moreover, **ESO.2** would require Member States to substitute the savings from the replacement of fossil fuel technologies with savings from other measures, which may be harder.

ESO.4 causes the most problems for subsidiarity, as an EU-wide scheme would require Member States to align their calculation methods and monitoring requirements.

In addition, its implementation would be incompatible with the existing Article 7. This would therefore require Member States to change the approach they have put in place half way through the compliance period until 2030, which could be considered disproportionate.

In summary:

Criteria		**Comparison of options against the baseline**				
		BAU	ESO.1	ESO.2	ESO.3	ESO.4
Effectiveness	Strengthen incentives	0	+	+	+	++
	Address barriers	0	+	+	+	+
	Understanding impacts	0	0	0	0	+
Administrative burden		0	-	-	0	--
Coherence		0	0	++	++	--
Subsidiarity and proportionality		0	-	-	-	--

6.3.3. EE1st principle

6.3.3.1.Effectiveness

BAU continues the situation where the EED states that it contributes to implementation of the energy efficiency first principle but gives no indication of what Member States should do to implement this.

EE1st.1 would provide much-needed guidance on how different players and different sectors could apply the EE1st principle. It would address the lack of clarity and details on how the principle could be applicable in specific contexts and provide some tools for proper cost-benefit analysis, which is at the core of the principle. This option, however, would not ensure that the principle or the guidelines are applied.

EE1st.2 would ensure that the principle is applied in decisions where it could have the biggest impacts. By setting appropriate legal requirements, Member States would be obliged to provide the right conditions for enabling the application of the principle. Together with the guidelines, Member States would be able to properly apply the

principle, including by specifying in which areas the principle would need to be applied. Reporting requirements would help verify if the principle is applied, but enforcement and verification of whether it is applied properly would be difficult.

In principle, **EE1st.3** would be the most effective, as it requires specific actions that could ensure incorporation of the principle in all relevant legal acts. A dedicated body would ensure that the principle is properly implemented. However, its effectiveness would depend on Member States' administrative performance and might require deployment of dedicated administrative resources to a newly created structure and tasks. These elements should be weighed against any benefits in terms of verification and enforcement compared to option EE1st.2.

The increased stringency of the options would have an increased, albeit moderate, positive impact on the need to address the barriers to an effective implementation of the EE1st principle.

6.3.3.2. Administrative burden and compliance costs

EE1st.1 is voluntary and so any burden and compliance costs would be limited.

EE1st.2 would require application of the principle, which is linked with data collection and analysis. However, these actions should normally be part of existing impact assessments and cost-benefit analyses (CBAs), so the compliance costs are not expected to be high. Nevertheless, additional reporting by Member States would increase the administrative burden even if it would be part of other reporting obligations.

EE1st.3 would impose compliance checks, which could be burdensome unless accompanied with a regular revision of legislative activities, which tends to be relatively infrequent. Establishing a monitoring structure would have some compliance costs, which could be minimised if done by the existing energy regulatory authorities, which already undertake monitoring actions.

6.3.3.3. Coherence

All options would be coherent with other initiatives and objectives, as the application of the principle (even if mandatory) does not limit the possibilities of other objectives and actions not aiming at energy efficiency to be pursued. Strengthening of the EE1st principle would also support the objective of prioritising energy efficiency set in the Green Deal Communication.

6.3.3.4. Subsidiarity and proportionality

As a voluntary option, **EE1st.1** fully reflects the subsidiarity principle. **EE1st.2** imposes more obligations on Member States as regards the implementation of the EE1st principle, while **EE1st.3** goes even further, imposing compliance checks and requiring the establishment of a specific national monitoring structure.

While **EE1st.1** and **EE1st.2** could be considered proportionate in view of the expected benefits, **EE1st.3** would impose significant additional costs which may not be justified by the expected benefits in comparison with **EE1st.2**.

In summary:

Criteria		Comparison of options against the baseline			
		BAU	**EE1st.1**	**EE1st.2**	**EE1st.3**
Effectiveness	Strengthen incentives	0	+	++	+++
	Address barriers	0	+	+	++
	Understanding impacts	0	0	+	+
Administrative burden		0	0	-	--
Coherence		0	+	+	+
Subsidiarity and proportionality		0	+	-	--

6.3.4. Public sector buildings

6.3.4.1.Effectiveness

BAU continues the situation where the energy renovation obligation only applies to central government buildings and to the minimum energy performance levels described in Article 4 of the EPBD.

BUILD.1 would increase to some extent the rate and depth, and hence the effectiveness, of public building renovation at national level thanks to increased knowledge and capacity to act in this area. As such, it would also help in addressing certain market barriers and failures due to increased awareness.

BUILD.2a and 2b would address the issue of low renovation rates in the public sector. This would significantly increase the energy savings in the public sector[96] and contribute to faster decarbonisation of the public building stock which could reach decarbonisation earlier than in 2050 when the entire EU building stock is to be decarbonised. In addition, it would extend the market volume of renovations and attract capital, workforce and innovation to the renovation sector.

BUILD.2a would double the renovation rate for Member States or energy savings in public buildings. The extension of the scope to all public buildings under **BUILD.2b** would allow covering about four times more buildings. Extending the scope to both owned and occupied buildings (by public bodies) would further increase the extent of renovations and linked benefits to all regions and citizens, and would contribute to Green Deal's no-one-left-behind objective. While some municipalities and regions already have a strong internal drive for renovation, **BUILD.2b** would ensure that this is extended throughout the EU.

[96] According to the technical assistance study on assessing energy efficiency policies (Fraunhofer 2020), an extension of the obligation to all public buildings at the rate of 3% would allow reaching 2,6 Mtoe energy savings by 2030 compared to 0,6 Mtoe if targeting only central government buildings.

BUILD.3 would increase the renovation standards, and thereby the multiple benefits and energy savings, to the Near Zero Energy Building standard, which is the current cost effective standard. In some Member States this is the same standard as for the minimum requirement under Article 4 EPBD, in other Member States this standard is higher.

By deleting the alternative approach to renovations, **BUILD.4** would further drive renovations, which would result in durable measures with multiple benefits. It would also limit the risk of using only space optimisation to achieve energy savings in the public sector. With wider use of teleworking, instead of renovating, public authorities could have opted to give up a significant part of their administrative buildings. Member States will retain all the flexibility concerning choosing, which 3% of the public building stock will be renovated every year. This means that they can chose not to renovate up to 70% of the building stock over a period of 10 years.

6.3.4.2. Administrative burden and compliance costs

Feedback received from stakeholders, as part of the PC, suggests that the costs and benefits of implementing Article 5 are well balanced. Stakeholders also highlighted that the benefits arising from energy efficiency measures in public buildings include other benefits that are not always factored into cost-benefit analyses, e.g. improved indoor air quality, increased comfort, better lighting, etc.

As regards the cost effectiveness of the investments, the DEEP database[97] shows that the median avoidance costs (average cost in Eurocent for each kWh energy saved over the lifetime of the measure) of energy efficiency projects is 7.89 c/kWh (75% percentile is 12.24 c/kWh) in public buildings, 2.53 c/kWh (75% percentile is 8.05 c/kWh) in health care buildings and 2.77 c/kWh (75% percentile is 7.71 c/kWh) in educational buildings. In 2018, the price of electricity for industrial consumers was 11.49 c/kWh excluding taxes and levies[98]. As a consequence, when renovating, in most circumstances, investing into energy efficient measures pays off.

Doubling the renovation rate under **BUILD.2a** would double the overall costs of renovation. The usual buildings renovation cycle is 30 years, which corresponds to a 3% renovation rate, at which point general renovation costs are incurred anyway and the dedicated energy efficiency costs are only a part of the overall costs. When buildings are renovated predominantly for energy efficiency purposes, sooner than is usually required, a higher share of the renovation costs would be attributable to the energy performance improvement and the relevant energy efficiency measures would therefore trigger higher costs. In Member States, where there is a renovation back-log, a higher renovation rate than 3% would remain cost effective.

The extension of renovation obligation to 3% of all public buildings under **BUILD.2b** remains cost effective.

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97 https://deep.eefig.eu/. In the DEEP database, public buildings, health care buildings and educational buildings best correspond to the public bodies' buildings among the 13 categories that those who fill in their projects can choose. The DEEP database includes a large number of building projects (7767), of which 239 are public buildings, 219 healthcare and 592 educational buildings.

98 European Commission, EU energy in figures, Statistical pocketbook 2019, p. 134.

Increasing the standard of the renovations to the Nearly Zero Energy Buildings standard under **BUILD.3** may increase the costs of renovation in some Member States, but remains cost effective as this is the new cost-effective standard.

Deleting the alternative approach under **BUILD.4** will increase the renovation costs of those Member States that were relying on other measures than renovations. Member States that were so far relying on low-cost optimisation of building use or behavioural measures to fulfil Article 5 obligations would incur additional renovation costs to achieve the required savings by renovations. However, these costs would remain proportionate to the expected benefits of the renovations.

6.3.4.3.Coherence

BUILD.2 and **BUILD.3** would strongly support the aim of the Renovation wave to double the overall renovation rate by 2030 thanks to the increased annual obligation rate and strengthening of other requirements. **BUILD.4** would go even further by deleting the alternative method, thereby forcing public bodies to undertake actual renovations.

6.3.4.4.Subsidiarity and proportionality

BUILD.1 and introducing the NZEB standard under **BUILD.3**do not have major impact on subsidiarity beyond the baseline. NZEB standards are defined based on common criteria by the Member States taking into account particular national circumstances. Some Member States have recently adjusted their NZEB standards to correspond to cost-optimal levels of renovations. Increasing the renovation rate under **BUILD.2a** and extending the scope under **BUILD.2b** are more prescriptive about what Member States should do to achieve additional savings from building renovation. In particular in Member States with small back-log of public buildings renovations, BUILD.2a may lead to higher costs of energy efficiency measures and limit the MSs capacity to invest into more cost-effective renovations. BUILD.2b would ensure that in the public sector as a whole a minimum of cost effective renovations takes place. It is proportionate to its aims of energy savings and multiple benefits, while keeping the specific costs of renovation low. **BUILD.4** goes even further as it removes the option of alternative measures and forces Member States to undertake actual renovations. In all options, as every year only a small portion of the public building stock shall be renovated, Member States and the sub-national administration retain the a significant flexibility to direct the renovations to specific levels of public administration or to specific sub-sectors, where the renovation will correspond best to the local circumstances.

In summary:

Criteria		**Comparison of options against the baseline**					
		BAU	**BUILD.1**	**BUILD.2a**	**BUILD.2b**	**BUILD.3**	**BUILD.4**
Effectiveness	Address barriers	0	+	++	++	++	+++
	Understanding impacts	0	0	0	0	0	0
Administrative Burden		0	+	-	-	0	0

Coherence	0	+	++	++	++	++
Subsidiarity and proportionality	0	0	-	-	0	--

6.3.5. Public procurement

6.3.5.1.Effectiveness

Under **BAU** the requirement to procure only products, services and buildings with high energy-efficiency performance only applies to central government.

The effectiveness of **PROCURE.1** would be limited by its reliance on guidance and the fact that it would be up to Member States to decide whether to make use of tools and best practices.

The extension of the procurement obligation to all public bodies under **PROCURE.2** would be more effective in spreading energy efficient procurement to all levels of government (e.g. regions, municipalities and other public bodies) and increase the value of energy efficient procurement by six times.

6.3.5.2.Administrative burden and compliance costs

The implementation of the EED as regards public procurement (Article 6) is based on the principle that, even if the initial purchase cost for energy efficient products, services and buildings may be higher, those extra costs usually are paid back over the lifetime of products, buildings or services, thanks to lower energy consumption during use. This principle also underpins the Ecodesign Directive and the Energy Labelling Regulation appliances covering appliances[99].

PROCURE.1 would induce small administrative costs in terms of providing additional guidance for public authorities in the area of public procurement. It would be more cost-efficient to do this at EU level, than if national or sub-national authorities would have to prepare their own guidance.

There would be additional costs in Member States for disseminating the guidance and training procurement experts. Existing monitoring and compliance mechanisms could be used with no additional costs. Some costs would result in the private sector for adapting existing processes to the new procurement requirements.

Under **PROCURE.2**, additional administrative costs may occur with those public bodies covered by the extended obligation (although many such organisations already practice 'green' procurement). In addition the option would entail an increase of initial investment, which would be offset by lower costs of use or balanced by multiple benefits of the procured buildings, services and products.

[99] https://ec.europa.eu/growth/industry/sustainability/product-policy-and-ecodesign_en

6.3.5.3.Coherence

PROCURE.1 would increase synergies with the existing green public procurement guidelines, thanks to better guidance on energy efficiency and lifetime costs of procured buildings, services and products.

PROCURE.2 would extend the scope of the requirements to all public bodies but would remain coherent with, and complementary to, the general Public Procurement Directive[100] (notably Articles 67 and 68), which sets the procedures for the award of public works contracts, public supply contracts and public service contracts above certain thresholds, and allows for including environmental considerations. Since the requirements will lead through energy savings to environmental benefits and public sector cost savings it can be considered to increase coherence with other objectives.

6.3.5.4.Subsidiarity and proportionality

PROCURE.1 would fully respect the subsidiarity and proportionality principles as it only focuses on increased guidance and support for Member States in applying relevant procurement practices.

PROCURE.2 would extend the energy efficient procurement obligation to all public bodies, but it would be proportionate with the requirements of the public procurement Directives. It is considered proportionate as it would push public procurement at all levels towards a focus on 'total cost of ownership' which ultimately benefits the public purse.

In summary:

Criteria		**Comparison of options against the baseline**		
		BAU	**PROCURE.1**	**PROCURE.2**
Effectiveness	Address barriers	0	+	++
	Understanding impacts	0	0	0
Administrative burden		0	0	-
Coherence		0	0	+
Subsidiarity and proportionality		0	0	-

6.3.6. Industry

6.3.6.1.Effectiveness

With **BAU** the difficulties of identifying companies required to carry out energy audits due to the non-SME definition would remain and the current low level of implementation of recommendations would not be expected to change.

[100] Directive 2004/18/EC of the European Parliament and of the Council of 31 March 2004 on the coordination of procedures for the award of public works contracts, public supply contracts and public service contracts

Under **IND.1**, a voluntary scheme for energy benchmarking would mirror an existing private sector initiative for oil refining. It would be important to gain sufficient interest and ensure that industry is ready to participate. The approach would need to be well designed and ensure confidentiality. This approach would be expected to increase interest in implementing energy efficiency measures since it would demonstrate the level of performance achievable in a particular sector. As such, its effectiveness would depend on uptake of the scheme.

IND.2 would ensure that efforts are focussed on larger energy users and should lead to proportionately higher energy savings. The obligation to implement energy management systems for the largest energy users is likely to already largely be followed. For those which are required to implement it there should be a larger take up of energy saving measures.

IND.3, while appearing to offer a route to ensure a greater take-up of energy saving measures, it would also run the risk of undermining the quality of energy audits. This is because energy auditors have a commercial relationship with the business being audited. This risk meant the measure was somewhat controversial in discussions with stakeholders.

6.3.6.2.Administrative burden and compliance costs

IND.1 would be voluntary and so a burden would only arise where businesses believe they will overall benefit. **IND.2** would result in a substantial reduction in burden for businesses with a lower energy use as well as simplifying the burden on public administrations, since they would have a simpler criterion to assess the need for audits as well as a smaller number of businesses to verify. The increased compliance costs for those businesses remaining under the scope of the provision would be expected to be paid back through increased uptake of cost-effective improvement measures. **IND.3** would require a mechanism to verify that recommendations were implemented, which would create a moderate additional burden.

6.3.6.3.Coherence

Encouraging further energy saving in industry is fully coherent with all measures in the 'Fit for 55' package and the European Green Deal. In particular, there are synergies with resource efficiency and circular economy policies since reductions in use of other resources often also lead to energy savings. The possible introduction of renewable energy aspects to the current requirements would also align with renewable energy policy. Therefore all options are considered to increase coherence with other policies.

6.3.6.4.Subsidiarity and proportionality

None of the options has a major impact on subsidiarity and are proportionate since they identify cost-effective energy savings. **IND.3** may be considered least proportionate as it would intervene in the business processes of companies, even though it would drive cost-effective energy savings.

In summary:

	Comparison of options against the baseline			
Criteria	**BAU**	**IND.1**	**IND.2**	**IND.3**

Effectiveness	Address barriers	0	+	++	++
	Understanding impacts	0	0	0	+
Administrative burden		0	0	+	-
Coherence		0	+	+	+
Subsidiarity and proportionality		0	0	0	-

6.3.7. Heating and cooling

6.3.7.1.Effectiveness

Under **BAU** the existing requirements for assessments and promotion of cogeneration and district heating would continue.

HEAT.1 would have limited value added compared to existing measures in the directive. It can help businesses in heating and cooling compare their performance with others. Benchmarking data are useful for regulatory authorities in the evaluations linked with tariff setting for district heating and cooling services. The data should be regularly updated and for heating and cooling, they could be useful at regional level for companies with similar features.

HEAT.2 would stimulate Member States, local governments and companies to identify and implement sectoral greening activities leading to decarbonisation of heating and cooling. Instruments proposed for EED focus on the planning of heating and cooling systems with an aim to encourage deployment of solutions leading to decrease of GHG emissions of heating and cooling.

Alternatives for fossil fuel based heating and cooling supply should be explored at all levels: at national level in Comprehensive Assessments, at the level of local governments in local heating and cooling plans and at the level of individual installations in Cost-Benefit Analyses. These planning instruments would need to be backed up with provisions on appropriate follow-up.

Continuous attention to decarbonisation would be particularly relevant for district heating and cooling to maintain its competitiveness and to meet expectations consumers have for contemporary energy services. Stricter criteria for high-efficiency cogeneration would facilitate better targeting of support measures for cogeneration that could make substantial contribution to decarbonisation of energy supply. For planned cogeneration installations, criteria should discourage the development of installations that do not contribute to long-term decarbonisation goals.

HEAT.3 would have direct implications of fuel mix used in heating and cooling. With this option, Member States would be forced to adopt phase out dates for combustion boilers when PEF goes below a certain threshold.

6.3.7.2.Administrative burden and compliance costs

HEAT.1 would be voluntary and any resulting administrative burden would only appear if businesses will join the initiative. For the public administration, the resulting workload would be large during the start-up phase of the initiative, later on it will be relatively small.

Compared to the baseline, **HEAT.2** would potentially cause significant additional administrative burden to affected local governments. For the Member States, tightened requirements for the Comprehensive Assessments trigger negligible administrative burden in planning phase, but depending on the outcome of the Comprehensive Assessments, the obligation to implement the measures could lead to new administrative burden and compliance costs. However, these measures could be tightly interlinked with an obligation arising from the Article 23(1) of the RED, which requires increasing the share of renewable energy in heating and cooling.

Administrative burden arising from **HEAT.3** is mostly dependent on the need to ensure compliance with the phase-out legislation. Compliance costs for the heating and cooling suppliers would be much higher than for the baseline.

6.3.7.3.Coherence

The measures planned for heating and cooling under **HEAT.2** are fully coherent with other measures in the 'Fit for 55' package. This is particularly the case for the link with the RED. The EED sets the framework for heating and cooling planning in terms of identifying the energy efficiency potential and requires the Members States to implement policies and measures to exploit this potential. These policies and measures directly support the achievement of the heating and cooling sector target under Article 23 of RED. For example, a revised definition of efficient district heating and cooling (Article 2(41) of the EED) would directly promote the deployment of renewable energy in district heating and cooling. Vice versa, these sub-targets would contribute to the achievement of the energy efficiency objectives of the EED.

However, the more stringent **HEAT.3** of phasing-out fossil fuel boilers is less coherent with the ecodesign Directive and energy labelling Regulation, and could lead to a fragmentation of the internal market.

6.3.7.4.Subsidiarity and proportionality

HEAT.1 has no impact on subsidiarity. The definitions established in the EED for district heating and cogeneration are important in terms of the granting of State aid. In view of this there is a clear need for EU level harmonisation. These definitions need to be made stricter in view of the overall decarbonisation trajectory under **HEAT.2**. As regards **HEAT.3**, this limits the freedom of Member States to choose the optimal mix of heating technologies given their national circumstance (e.g. in some countries it may still be more cost-effective to replace e.g. oil heating with gas condensing boilers). This risks not being proportional in certain Member States.

In summary:

Criteria		**Comparison of options against the baseline**			
		BAU	**HEAT.1**	**HEAT.2**	**HEAT.3**
Effectiveness	Address barriers	0	+	+	++
	Understanding impacts	0	+	++	0
Administrative burden		0	0	-	--
Coherence		0	+	+	--
Subsidiarity and proportionality		0	0	-	--

6.3.8. Energy transmission systems

6.3.8.1.Effectiveness

Under **BAU** problems will remain over unclear definitions preventing effective comparison of energy losses across networks.

NET.1 is useful and would steer the expected evolution of the electricity grid. The normal upgrading of the electricity grid will determine the improvement of its efficiency, as many old (sometimes very old) transformers will be replaced with new ones, which will be compliant with the Ecodesign Directive.

NET.2 is mainly based on the engagement of system operators; the adoption of uniform definitions and the reporting obligation for trade association will facilitate communication and exchange of good practices. A knowledge base will gradually develop, and could represent the foundation for subsequent actions, should they become necessary.

Under **NET.3** National Regulatory Authorities are able to play a stronger role, if they are given a strong and clear mandate. They master the granularity of the national energy system and have developed over time an advanced technical and administrative capacity. As the revenue of the system operators depends on the service tariffs, which are fixed by NRAs, these have a powerful and direct instrument to lead the operators towards higher efficiency.

6.3.8.2.Administrative burden and compliance costs

NET.1 is voluntary and so a burden will only arise where businesses believe they will overall benefit. **NET.2** will result in an additional burden for trade associations and system operators, which could be mitigated by an obligation to report every three or five years instead of each year. **NET.3** will require a significant effort from NRAs, who are generally well equipped for these tasks. A twinning system might be considered to help the smallest and weakest NRAs.

6.3.8.3.Coherence

System operators and NRA already effectively implement the principle of 'cost efficiency'; enhancing the importance of that of 'energy efficiency' under **all three options** is coherent with all measures in the 'Fit for 55' package and the European Green Deal.

6.3.8.4.Subsidiarity and proportionality

Being voluntary, **NET.1** is not expected to have an impact on subsidiarity and proportionality. **NET.2** will have some impact as it would force a harmonisation of definitions. In particular **NET.3** intervenes more strongly in the national framework for grid management, but is still considered proportionate due to the strong impact it would have on grid efficiency.

In summary:

Criteria		Comparison of options against the baseline			
		BAU	**NET.1**	**NET.2**	**NET.3**
Effectiveness	Address barriers	0	+	+	++
	Understanding impacts	0	+	++	++
Administrative burden		0	+	0	-
Coherence		0	+	+	0
Subsidiarity and proportionality		0	0	-	--

6.3.9. Transport

6.3.9.1.Effectiveness

Under **BAU** the EED will have limited impact on energy use in transport.

TRANS.1 would increase the effectiveness by ensuring that specific attention is paid to energy consumption in the transport sector and that relevant measures to improve energy efficiency are taken in urban contexts. A requirement to set objectives and plan energy efficiency improvements will lead to additional energy savings in transport. It would also increase the information about the energy efficiency of local transport.

TRANS.2 would be the most effective because in addition it would lead relatively quickly to a ban of combustion engines and the deployment of more energy efficient solutions.

6.3.9.2.Administrative burden and compliance costs

TRANS.1 would impose additional requirements on local authorities, which could be burdensome in the absence of previous experience or lack of information on energy consumption in local transport, and there would be additional compliance costs.

TRANS.2 would also lead to additional compliance costs, because it would require the purchase of more expensive vehicles, at least in the short term. Moreover, it could be quite costly for manufacturers and component suppliers of combustion vehicles, because of the need to change their business model.

6.3.9.3.Coherence

TRANS.1 would create a set of requirements to support what is to be presented in the upcoming Urban Mobility Package. This risks an incoherent approach however, the aim of the measures is to support transport authorities address energy use.

TRANS.2, which includes a proposed ban on combustion engines, would risk overlap with existing (and to be revised) rules, including Euro 7, CO_2 emission standards and AFID. Moreover, leaving a phase out of combustion engines to individual Member State action may hamper the free movement of vehicles in the internal market. Therefore, this measure is considered less coherent with the other measures affecting the transport sector.

6.3.9.4.Subsidiarity and proportionality

Both options have a negative impact on subsidiarity as they oblige national and local governments to take action in an area largely under their control.

In summary:

Criteria		Comparison of options against the baseline		
		BAU	**TRANS.1**	**TRANS.2**
Effectiveness	Address barriers	0	+	++
	Understanding impacts	0	+	0
Administrative burden		0	--	--
Coherence		0	-	--
Subsidiarity and proportionality		0	-	-

6.3.10. Enabling and supporting measures

6.3.10.1. Effectiveness

Under **BAU** the EED enabling and supporting provisions would continue to have only a moderate impact.

SUPPORT.1 is useful and would mirror the existing framework. While guidance and further financing support could contribute to the implementation of the existing framework, the option would most likely not be effective without changes in the legislation given the numerous weakness identified in the evaluation.

SUPPORT.2 is aimed at ensuring that the necessary efforts are made by Member States to improve the framework for greater uptake of energy performance contracting thanks to the minimum quality requirements for energy services providers and regular assessments made of the certification and qualification schemes for energy services professions. This in turn would increase the trust to energy services providers and could provide a significant contribution to doubling the renovation rates by 2030. In addition, energy performance contracting is expected to fulfil the obligation for energy management systems for large non-residential buildings undergoing renovations. In addition, requirements to strengthen the role of intermediaries would help to overcome the market barriers to energy performance contracting and bring down the transaction costs. Reporting on energy efficiency investments would allow assessing the scale of energy efficiency investments in different sectors.

On consumer information and empowerment, **SUPPORT.2** is expected to reinforce access of consumers to information and technical help related to energy efficiency, which in turn will result in behavioural change, better uptake of energy-related renovations, and the ensuing leverage of private funds towards energy efficiency. By strengthening these provisions, two points that were prominent in the stakeholder consultation can also be tackled. The first point is the need to strengthen the existing measures in dealing with energy poverty, for example by targeting behavioural changes towards low or medium income households, by providing incentives to low- or medium income homeowners for energy efficiency renovations, or by removing barriers for raising capital for financing

energy efficiency measures for households facing energy poverty. The second point is to take advantage of the bottom-up, local level initiatives and activities (e.g. owners' cooperatives, energy communities, consumer associations, and local and regional authorities) in meeting the national targets.

SUPPORT.3 would be even more effective thanks to a higher ambition ensured through independent verification of energy performance projects to ensure the quality of the works performed. In addition, setting up project development assistance mechanisms at national, regional and local levels would increase the number of energy performance contracts and renovation projects blending public money with private funds.

6.3.10.2. Administrative burden and compliance costs

SUPPORT.1 would result in a short-term increase of administrative burden and costs as the different information campaigns, knowledge exchanges or support schemes would have to be set up. However, in the mid-term, these measures are expected to be cost effective, as they would have contributed to energy savings and several wider positive results like job creation, increased productivity and reduced healthcare costs. Indications for the cost effectiveness of energy efficiency can be found, among others in the IEA and the BPIE studies[101]. There would be no additional compliance costs.

SUPPORT.2 would result in some additional administrative burden for Member States, as they would need to invest in increased oversight and assessment of quality schemes and market actors. However, this is expected to be limited as it would be based on existing verification structures.

SUPPORT.3 would entail additional administrative burden as Member States would have to make more efforts to create incentives to stimulate further investments. This will however depend on the extent to which Member States already have existing measures in this area that they could build on.

6.3.10.3. Coherence

SUPPORT.2 and SUPPORT.3 are developed to address weaknesses in legislation and create stronger synergies with the EPBD, and contribute to implementing the Renovation Wave that stressed the need for greater uptake of energy performance contracting, boosting skills and facilitate access to financing.

The measures would also aim to improve and reinforce the provisions helping consumers, which face a wide selection of options pertinent to energy efficiency, renovation of buildings, introduction of renewables, new mobility solutions, etc., to take decisions and invest private capital in a way that is not only cost optimal but also can result in the best wider impact. In addition, increased coherence between EED and EPBD can help tackle more efficiently social challenges like energy poverty, development of the necessary skills in relevant professions, faster recovery from the current health crisis, etc.

[101] https://www.iea.org/reports/energy-efficiency-2020 and https://www.bpie.eu/publication/building-4-people-valorising-the-benefits-of-energy-renovation-investments-in-schools-offices-and-hospitals/

6.3.10.4. Subsidiarity and proportionality

SUPPORT.2, and to a larger extend **SUPPORT.3**, require more action by Member States to address the underlying drivers in these areas. This is considered proportionate as a higher uptake of energy efficiency investments is necessary for the higher targets to be met.

In summary:

Criteria		Comparison of options against the baseline			
		BAU	**SUPPORT.1**	**SUPPORT.2**	**SUPPORT.3**
Effectiveness	Barriers	0	+	++	++
	Understanding impacts	0	0	+	+
Administrative burden		0	-	-	-
Coherence		0	0	0	0
Subsidiarity and proportionality		0	0	0	0

6.3.11. Measuring and monitoring measures

6.3.11.1. Effectiveness

Under **BAU** there would continue to be limited understanding of what is driving the changes in energy use observed and how well the specific EED measures are working.

The implementation of **MONITOR.1** would not in itself lead to improved energy performance. The purpose of obtaining better data is to ensure that the measures put in place are delivering the savings envisaged. In this regard, they enable comparison between authorities and Member States and the sharing of good practice where this is identified. The growth in remote monitoring should make it increasingly easier to gather information on actual energy savings and so reinforce the knowledge of actual benefits of policies and programmes.

Clarifying and strengthening the existing provisions on monitoring and verification of energy savings under option **MONITOR.2** would ensure a more reliable achievement of the required energy savings obligation, and would increase the acceptance of policy measures since their effectiveness can be shown to market actors and citizens.

Adding further monitoring and reporting requirements under **MONITOR.3** would be even more effective, as it would result in a better understanding of the impacts of public procurement and energy performance contracting.

6.3.11.2. Administrative burden and compliance costs

MONITOR.1 would lead to some increase in costs due to the need to undertake studies and surveys**,** and in administrative burden due to the need to respond to requests for information.

MONITOR.2 would result in an increase in burden for businesses and public authorities. Some reporting requirements already exist and therefore these changes would only represent an enhancement of those requirements. Further digitalisation should help to reduce the administrative burden and costs.

MONITOR.3 would lead to a higher administrative burden due to additional requirements.

6.3.11.3. Coherence

Enhanced monitoring and reporting requirements are aimed at supporting improved implementation of the EED and increased energy savings. If the options achieve those objectives then they would be coherent with other EU objectives.

6.3.11.4. Subsidiarity and proportionality

MONITOR.2 would require additional monitoring and reporting by Member States. If this would lead to a better understanding of the impact of energy efficiency measures and hence increased savings, this would be proportionate (depending on the balance between increased cost and savings achieved).

MONITOR.3 requires more efforts by Member States compared to **MONITOR.2**, and while this would result in an even better understanding of impacts, proportionality is more difficult to establish.

In summary:

Criteria		Comparison of options against the baseline			
		BAU	**MONITOR.1**	**MONITOR.2**	**MONITOR.3**
Effectiveness	Address barriers	0	+	++	++
	Understanding impacts	0	+	++	+++
Administrative burden		0	0	-	--
Coherence		0	+	+	+
Subsidiarity and proportionality		0	0	0	-

7. HOW DO THE OPTIONS COMPARE?

As indicated in section 6.1, the outcome of the scenario analysis shows that both intermediate and higher ambition policy packages would allow the 36-37% target to be met. Section 6.3 therefore assessed the impacts of the individual policy measures against the better regulation criteria.

7.1. How do the policy options compare?

Table 15 summarises the outcome of the qualitative assessment in section 6.3:

Table 15: Overview of the assessment of policy options.

Objectives / Policy options	Effectiveness			Admin. burden	Coherence	Subsidiarity/ Proportionality
	Incentives	Barriers	Impacts			
TARGET.1	+	0	0	0	+	0
TARGET.2	+	+	0	-	+	-
TARGET.3	++	+	0	-	-	--
ESO.1	+	+	0	-	0	-
ESO.2	+	+	0	-	++	-
ESO.3	+	+	0	0	++	-
ESO.4	++	+	+	--	--	--
EE1ST.1	+	+	0	0	+	+
EE1ST.2	++	+	+	-	+	-
EE1ST.3	+++	++	+	--	+	--
BUILD.1	n.a.	+	0	+	+	0
BUILD.2a	n.a.	++	0	0	++	0
BUILD.2b	n.a.	++	0	0	++	+
BUILD.3	n.a.	++	0	0	++	-
BUILD.4	n.a.	+++	0	+	++	--
PROCURE.1	n.a.	+	0	0	0	0
PROCURE.2	n.a.	++	0	-	+	-
IND.1	n.a.	+	0	0	+	0
IND.2	n.a.	++	0	+	+	0
IND.3	n.a.	++	+	-	+	-
HEAT.1	n.a.	+	+	0	+	0
HEAT.2	n.a.	+	++	-	+	-
HEAT.3	n.a.	++	0	--	--	--
NET.1	n.a.	+	+	+	+	0
NET.2	n.a.	+	++	0	+	-
NET.3	n.a.	++	++	-	0	--
TRANS.1	n.a.	+	+	--	-	-
TRANS.2	n.a.	++	0	--	--	-
SUPPORT.1	n.a.	+	0	-	0	0
SUPPORT.2	n.a.	++	+	-	0	0
SUPPORT.3	n.a.	++	+	-	0	0
MONITOR.1	n.a.	+	+	0	+	0
MONITOR.2	n.a.	++	++	-	+	0
MONITOR.3	n.a.	++	+++	--	+	-

= non-regulatory = intermediate ambition = higher ambition = preferred option

Given that the policy options in the different 'intervention areas' of the EED have limited interaction with each other, there is no substantial benefit in comparing them. However, it is important to understand whether the effectiveness of the options within each

intervention area outweighs the additional burden and cost, and impacts on subsidiarity and proportionality. The following sections, therefore, discuss this for each of the policy options.

7.1.1. Targets

Making the EU level energy efficiency target binding (TARGET.1) would contribute to its achievement, if only by raising its political importance to the same level as the GHG and renewables targets. This has no direct administrative and compliance cost, and little or no impact on subsidiarity and proportionality.

Indicative national benchmarks (TARGET.2) would further increase the effectiveness of the energy efficiency targets by bringing clarity about the expected level of national efforts, and would still not significantly impact on subsidiarity, as the national benchmarks would not be binding. Additional administrative and compliance cost would also be limited.

Mandatory national targets (TARGET.3) would be most effective, but would have a more substantial impact on subsidiarity and would not be coherent with the approach taken for renewables. It would also entail a somewhat higher administrative burden.

7.1.2. Energy savings obligations

Imposing a sub-target for measures in the transport sector under Article 7 (ESO.1) would be an effective way to stimulate Member States to achieve more energy savings in this sector. It would be coherent with existing policies for the transport sector and proportionate, given the importance of reducing transport GHG emissions. At the same time, it would result in a moderate increase of administrative burden and somehow higher compliance costs. It would also have an impact on subsidiarity, as it limits to some extent the freedom of Member States to decide in which sectors they would achieve the necessary energy savings.

Requiring Member States to put in place measures to combat energy poverty under Article 7 (ESO.2) would contribute to making the energy transition just and inclusive. Similarly, ESO.1 would have some impact on subsidiarity, administrative burden and compliance cost. It is considered proportionate, also in view of the need to address distributional impacts from a possible extension of the ETS in particular to buildings.

Excluding the possibility for Member States to count energy savings from measures promoting the use of fossil fuels (ESO.3) would be an effective way to contribute to the energy efficiency target. It would be coherent with other EU policies and have no administrative burden or compliance costs. However, similar to ESO.1 and ESO.2, it would have some impact on subsidiarity.

While being potentially very effective, the implementation of an EU-wide white certificate scheme (ESO.4) would, however, create a high additional administrative burden and high compliance costs to implement an EU-wide white certificate scheme. It would also raise coherence questions with respect to the interaction with an extended ETS to buildings and transport. Furthermore, it would also cause problems for subsidiarity, as an EU-wide scheme would require Member States to align their calculation methods and monitoring requirements.

7.1.3. EE1st principle

Providing further guidance to Member States and economic actors on the application of the EE1st principle (EE1st.1) would effectively address the lack of clarity and details on the use of the principle in specific contexts and provide some tools for proper cost-benefit analysis. As a voluntary measure, it would have little impact on administrative burden, compliance cost and subsidiarity.

Obliging Member States to provide the right conditions for enabling the application of the principle **(**EE1st.2), would ensure that the principle is applied in decisions where it could have the biggest impacts. At the same time, the accompanying reporting requirements would increase the administrative burden and there would be additional compliance costs.

Imposing compliance checks and requiring a monitoring structure (EE1st3) would be the most effective, but would have a stronger impact on subsidiarity and would entail significant additional costs, which may not be justified by the expected benefits.

7.1.4. Public buildings

Providing further guidance and necessary tools to national authorities to guide Member States towards renovation and uptake of energy efficiency requirements in building procurement and management practices (BUILD.1) would increase to some extent the rate and depth, and hence the effectiveness, of public building renovation at national level. At the same time, it would not have a major impact on subsidiarity or administrative burden.

Increasing the overall ambition through an increased annual target (BUILD.2a) and through a wider scope (BUILD.2b) would significantly increase the long-term energy savings in the public sector and contribute to faster decarbonisation of the public building stock. It would also increase administrative burden and costs of renovation, and impacts on subsidiarity. While extending the scope to all public buildings BUILD.2b remains cost-effective, doubling the renovation rate would trigger higher costs per renovation in Member States, where there is not a corresponding back-log in renovations..

Strengthen other requirements to achieve the necessary energy savings (BUILD.3) would increase the minimum standard of the renovated buildings, while it would remain cost-effective.

Deleting the alternative method in Article 5 (BUILD.4) would go even further by removing the option for Member States to use alternative measures to achieve equivalent savings, thereby forcing public bodies to undertake actual renovations. This would also lead to increased energy savings and multiple benefits. As such, it would further limit the flexibility of Member States and, when combined with the higher renovation rate, it could be less proportionate in view of the different situation in Member States.

7.1.5. Public procurement

Providing more guidance and tools to national authorities and procurement officials (PROCURE.1) would be somewhat effective in further guiding Member States towards the uptake of energy efficiency, and broader resource efficiency, requirements in procurement practices. It would have limited additional administrative and compliance cost and fully respect the subsidiarity and proportionality principles.

Extending the procurement obligation to all public bodies (PROCURE.2) would be more effective in spreading energy efficient procurement to all levels of government (e.g. regions, municipalities and other public bodies). This would result in additional administrative burden, but this is considered proportionate in view of the expected lower costs of use and the multiple benefits of the procured buildings, services and products.

7.1.6. Industry

Promoting a voluntary scheme for energy benchmarking (IND.1) would be somewhat effective depending on its uptake. However, compliance costs would only accrue to participating companies and it would have no impact on subsidiarity.

Ensuring that audit efforts are focussed on larger energy users (IND.2) should lead to proportionately higher energy savings. It would result in a substantial reduction in burden for businesses with a lower energy use, as well as simplifying the burden on public administrations, since they would have a simpler criterion to assess the need for audits as well as a smaller number of businesses to verify. The increased compliance costs for those businesses remaining under the scope of the provision would be expected to be paid back through increased uptake of cost-effective improvement measures.

Requiring businesses to implement a certain number of audit recommendations (IND.3) would be most effective in terms or achieved energy savings. However, it would require a verification mechanism, which could create a moderate additional burden. Moreover, it could be considered less proportionate as it would intervene directly in the business decision processes of companies.

7.1.7. Heating and Cooling

Promoting a voluntary scheme for energy benchmarking (HEAT.1) would be somewhat effective depending on its uptake. However, compliance costs would only accrue to participating companies and it would have no impact on subsidiarity.

Further strengthening definitions and obligations, and extending them to local levels (HEAT.2), would be effective in addressing remaining barriers in the heating and cooling sector. However, it would potentially cause significant additional administrative burden, in particular at local level. While this has an impact on subsidiarity, it is considered proportionate to the additional savings that could be achieved in this sector.

Requiring Member States to phase out fossil fuel boilers (HEAT.3) would be very effective in driving energy savings and lowering GHG emissions. However, it limits the freedom of Member States to choose the optimal mix of heating technologies given their national circumstance which risks not being proportional in certain Member States. It would also be less coherent with products legislation, and could lead to a fragmentation of the internal market.

7.1.8. Energy networks

Promoting a voluntary scheme for energy benchmarking (NET.1) would be somewhat effective depending on its uptake. However, compliance costs would only accrue to participating companies and it would have no impact on subsidiarity.

Developing a common definition of energy losses and requiring reporting by system operators (NET.2) would be more effective as it would facilitate a common

understanding in the sector and the exchange of best practices. At the same time, it would result in an additional burden for trade associations and system operators, and have some impact on subsidiarity as it would force a harmonisation of definitions.

Requiring National Regulatory Authorities (NRAs) to monitor and incentive energy efficiency investments by system operators (NET.3) would be most effective in driving the sector to higher energy efficiency. However, it would require a significant effort from NRAs, and would intervene more strongly in the national framework for grid management. Nevertheless, it is still considered proportionate due to the strong impact it would have on grid efficiency.

7.1.9. Transport

Requiring Member States to require urban areas over 1 million inhabitants to establish an urban mobility plan covering transport energy efficiency (TRANS.1) would increase effectiveness by ensuring that specific attention is paid to energy consumption in the transport sector and that relevant measures to improve energy efficiency are taken in urban contexts. However, this would impose additional requirements on local authorities, which could be burdensome in the absence of previous experience or lack of information on energy consumption in local transport, and there would be additional compliance costs. It has to be noted, however, that some experience has been gained via the activities of the Covenant of Mayors.

Requiring Member States to set a date for the end of sales of new internal combustion engine cars (TRANS.2) would be effective because it would lead relatively quickly to a ban of combustion engines and the deployment of more energy efficient solutions. However, it would run the risk of overlap with existing (and to be revised) rules, including Euro 7, CO_2 emission standards and AFID, and may hamper the free movement of vehicles in the internal market. It could therefore be considered disproportionate.

7.1.10. Support measures

Providing further guidance and support in view of Member States' actions, e.g. on awareness raising (SUPPORT.1), is useful and would extend the existing approach. It would result in a short-term increase of administrative burden, as the different information campaigns, knowledge exchanges or support schemes would have to be set up, but this is expected to be cost-effective in the medium term due to increased energy savings.

Strengthening the requirements for energy services and qualification and certification schemes (SUPPORT.2) would improve the framework for greater uptake of energy performance contracting. It would result in some additional administrative burden for Member States, but this is expected to be limited. It would require more action by Member States but this is considered to be proportionate.

Stricter requirements for energy performance contracting, assessment of barriers and establishment of project development assistance mechanisms (SUPPORT.3) would be more effective in facilitating energy savings, but would entail additional administrative burden as Member States would have to make more efforts to create incentives to stimulate further investments. As such, it would have a stronger impact on subsidiarity.

7.1.11. Monitoring and reporting

Expanding the use of surveys, studies and other sources of analytical data (MONITOR.1) would not in itself lead to improved energy performance, but would allow a better assessment of the effectiveness of implemented measures. It would have limited additional administrative burden and impact on subsidiarity.

Strengthening the existing monitoring and reporting requirements regarding Article 7 and building renovations (MONITOR.2) would ensure a more reliable achievement of the different provisions, but would also result in higher administrative burden for businesses and public authorities. However, it would lead to a better understanding of the impact of energy efficiency measures and hence increased savings, and is therefore considered proportionate.

Requiring additional monitoring and reporting requirements on public procurement and energy performance contracting (MONITOR.3) would further improve the effectiveness but would further increase administrative burden. Whether this is proportionate depends on the balance between increased cost and savings achieved due to a better understanding of the impacts of relevant measures.

7.2. Conclusion

In view of this analysis, the options TARGET.2 (binding national targets), ESO.4 (EU wide white certificate scheme), BUILD.4 (deleting alternative method), IND.3 (require implementation of audit recommendations), HEAT.4 (banning fossil fuel boilers), NET.3 (stricter requirements on NRAs) and TRANS.2 (banning internal combustion engines) are considered too intrusive or burdensome to be proposed for the preferred option.

For SUPPORT.3 (stricter requirements for EPC, addressing barriers and PDA) and MONITOR.3 (additional monitoring and reporting), it is less clear whether the benefits outweigh the increased burden.

This analysis points to a preferred option consisting of a combination of policy measures as outlined in the next section.

8. PREFERRED OPTION

When proposing its updated 2030 greenhouse gas emissions reduction of at least 55%[102], the European Commission also described the actions across all sectors of the economy that would complement national efforts to achieve the increased ambition. A number of impact assessments have been prepared to support the envisaged revisions of key legislative instruments.

Against this background, this impact assessment has analysed the various options through which a revision of the EED could effectively and efficiently contribute to the delivery of the updated target as part of a wider “Fit for 55” policy package.

Methodological approach

[102] Communication on Stepping up Europe’s 2030 climate ambition - Com(2020)562

Drawing conclusions about preferred options from this analysis requires tackling two methodological issues.

First, as often the case in impact assessment analysis, ranking options may not be straightforward as it may not be possible to compare options through a single metric and no option may clearly dominate the others across relevant criteria. Ranking then requires an implicit weighting of the different criteria that can only be justifiably established at the political level. In such cases, an impact assessment should wean out as many inferior options as possible while transparently provide the information required for political decision- making. This is what this report does for the possible revision of the EED.

Secondly, the 'Fit for 55' package involves a high number of interlinked initiatives underpinned by individual impact assessments. Therefore, there is a need to ensure coherence between the preferred options of various impact assessments.

Policy interactions

Given the complex interdependence across policy tools and the interplay with the methodological issue outlined above, no simultaneous determination of a preferred policy package is thus possible. A sequential approach was therefore necessary.

First, the common economic assessment[103,104] underpinning the "Communication on Stepping up Europe's 2030 climate ambition" looked at the feasibility of achieving a higher climate target and provided insights into the efforts that individual sectors would have to make. It could not, however, discuss precise sectoral ambitions or detailed policy tools. Rather, it looked at a range of possible pathways/scenarios to explore the delivery of the increased climate ambition. It noted particular benefits in deploying a broad mix of policy instruments, including strengthened carbon pricing, increased regulatory policy ambition and the identification of the investments to step up the climate ambition.

An update of the pathway/scenario focusing on a combination of carbon pricing and medium intensification of regulatory measures in all sectors of the economy, while also reflecting the COVID-19 pandemic and the National Energy and Climate Plans, confirmed these findings.

Taking this pathway and the Communication on Stepping up Europe's 2030 climate ambition as central reference, individual impact assessments for all 'Fit for 55' initiatives were then developed with a view to provide the required evidence base for the final step of detailing an effective, efficient and coherent 'Fit for 55' package.

At the aggregate level, these impact assessments provide considerable reassurances about the policy indications adopted by the Commission in the Communication on Stepping up Europe's 2030 climate ambition. This concerns notably a stronger and more comprehensive role of carbon pricing, energy efficiency and renewable energy policies, and the instruments supporting sustainable mobility and transport. These would be complemented by a carbon border adjustment mechanism and phasing out free allowances. This would allow reducing, in a responsible manner, the risk of carbon leakage. It would also preserve the full scope of the Effort Sharing Regulation for achieving the increased climate target.

Various elements of the analyses also suggest that parts of the revenues of a strengthened and extended ETS should be used to counter any undesirable distributional impacts such

[103] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020SC0176
[104] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020SC0331

a package would entail (between and within Member States). While the best way to do this is still to be determined, this would seem a superior alternative to foregoing the relevant measures altogether or simply disregarding the uneven nature of their distributional impacts. Under both these alternatives, the eventual success of any package proposed would be at risk.

Preferred policy option

Preliminarily assuming this fact and the analysis above as the framework for the aggregate 'Fit for 55' package, the specific analysis carried out in this impact assessment comes to the following main conclusions as regards the key elements of the preferred policy option for the revision of the EED:

1) EU energy efficiency target

As already indicated in the CTP, the EU energy efficiency target should be increased in the range of 36-37% for 2030 for final energy to achieve the overall 55% GHG target for 2030. The target should be a binding target at EU level (TARGET.1).

2) Benchmarks for national energy efficiency contributions

To achieve the overall climate ambition in an optimal manner, it would be desirable for Member States to be guided towards the level of ambition needed to achieve the EU energy efficiency target in a fair manner. In view of this, the assessment points to indicative national benchmarks for Member States' contributions, based on a formula that takes into account a range of criteria related to Member States' national circumstances (TARGET.2)[105]. While in response to the PC, 36% of stakeholders favoured indicative national targets and 47% favoured binding national targets, indicative benchmarks are more aligned with the subsidiarity principle.

Combining a binding EU-level energy efficiency target with national indicative contributions would be fully coherent with the other climate and energy targets, and is in line with the approach followed in REDII and the Governance Regulation.

3) Energy savings obligations (Article 7)

The level of annual energy savings would be increased to approximately 1.5% per year in line with the outcomes of the CTP IA.

Moreover, Member States would be required achieve a certain amount of savings in the transport sector (ESO.1) and amongst energy poor households (ESO.2), and would no longer be able to count energy savings from measures promoting the use of fossil fuels (ESO.3). These measures were supported by around 60% of the PC respondents.

4) Other elements of the preferred option

The other elements of the preferred option would aim at providing further incentives to increase Member States' ambition and efforts, to address remaining barriers and to improve the understanding of the EED's impact. This would cover:

[105] The Commission is currently developing such a formula in line with what is in place for the REDII.

a) **Energy Efficiency First:** Further guidance on the application of the EE1st principle (EE1st.1) and a new article (building upon the Governance Regulation), with an obligation for Member States to ensure its application, while minimising administrative burden (EE1st.2). This was supported by around half of the PC respondents.

b) **Exemplary role of the public sector:** Further guidance for authorities in support of building renovation (BUILD.1). Expanded scope for renovations to cover all public buildings, while maintaining the same renovation rate of 3% (BUILD.2b), improved monitoring and undated renovation standards to nearly zero energy buildings (BUILD.3) and the removal of alternative measures (BUILD.4).

   Further guidance to authorities, including on circularity and GPP aspects (PROCURE.1). Extend public procurement provisions to all public administration levels (PROCURE.2).

   A large majority of stakeholders, including public authorities, supported the strengthening of the requirements for public buildings renovation and procurement.

c) **Industry:** Focus energy audits on larger energy users and require energy management systems for largest users (IND.1 and IND.2).

d) **Heating and cooling**: Benchmarking (HEAT.1), improved definitions and strengthened obligations for cost-benefit analysis and local cooling and heating planning (HEAT.2).

e) **Energy networks:** Benchmarking (NET.1), enhanced definition of losses and reporting (NET.2).

f) **Transport**: Include energy efficiency elements in line with the EE1st principle and the Sustainable and Smart Mobility Strategy, including, for example, in urban mobility policy planning (TRANS.1).

g) **Support measures:** Strengthening provisions on skills, energy services and financing mechanisms, consumer empowerment, addressing split incentives and the alleviation of energy poverty (SUPPORT.1; SUPPORT.2; and possibly SUPPORT.3).

h) **Monitoring and reporting**: Reinforcement of requirements (MONITOR.1; MONITOR.2 and possibly MONITOR.3), building on the integrated approach under the Governance Regulation.

The above elements would strengthen the EED and help ensure that, also with the support of the EPBD (to be revised by the end of 2021) and other parts of EU policies and measures, it continues to ensure that energy efficiency makes the necessary contribution towards a more ambitious GHG target, as defined in the CTP. Because of this, it would also be complementary to, and fully consistent with, the strengthening of other legislative initiatives that contribute to the same objective, in particular the RED II, the ETS, and the forthcoming revision of the EPBD.

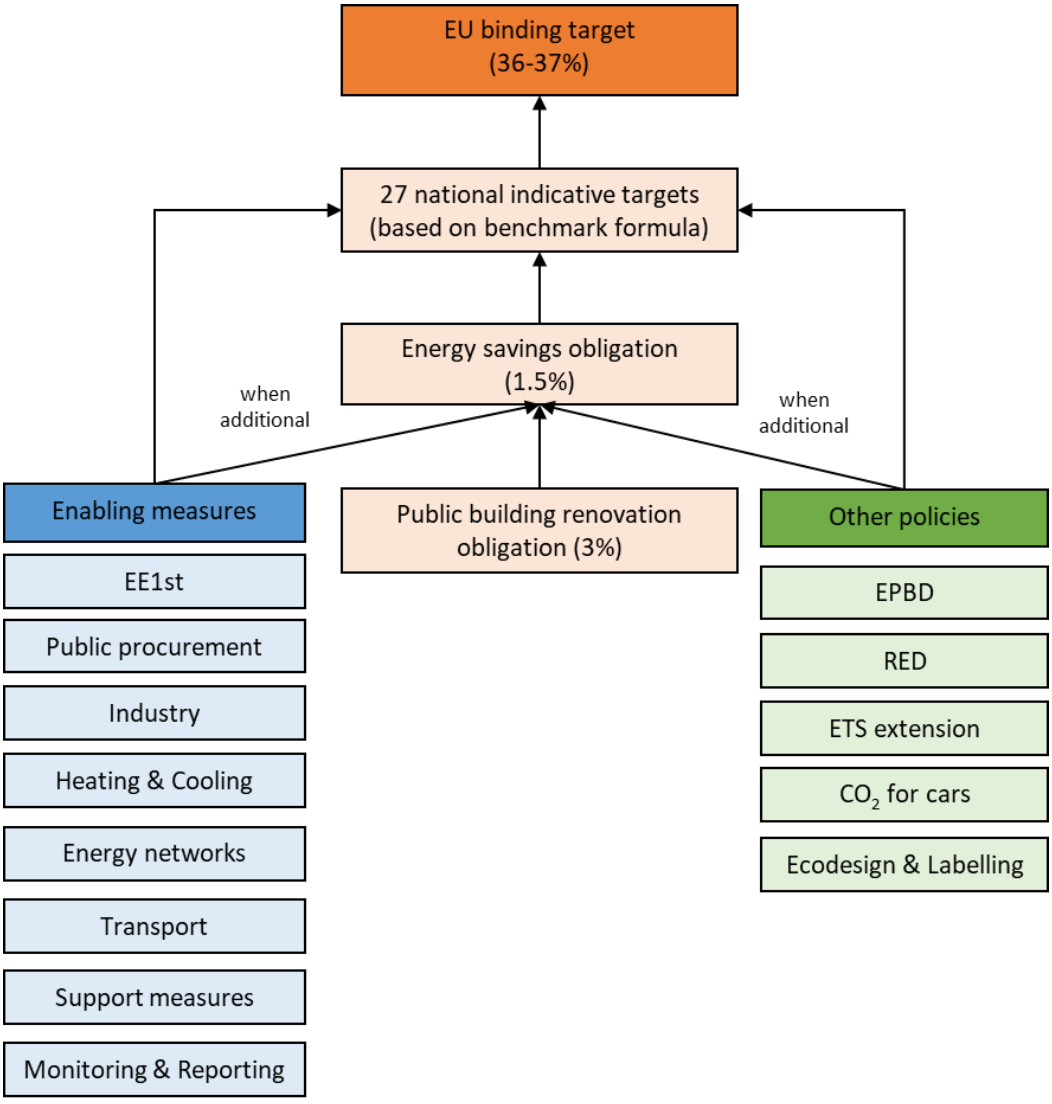
Administrative burden of the preferred policy option

The administrative burden arising from information requirements of the individual measures of the preferred policy option is estimated in **Error! Reference source not found.**. The results show that, overall, there would be an estimated net increase in administrative burden of €5.5 million per year. The burden on the private sector is increased by €0.3 million per year, and there is an increase in the burden for the public sector of €5.2 million per year.

Internal coherence of the measures within the preferred policy option

The preferred policy option is based on a clear hierarchy of measures, with the binding EU level target on top, supported by the indicative national benchmarks that would add up to the EU target, and all other measures contributing to its achievement. Figure 21 provides an overview of these interlinkages.

Figure 21 Interlinkages between elements of the EED and other instruments



The Member States' obligation to achieve 1.5% annual energy savings would constitute an important contribution to reaching their national indicative benchmark. While this obligation is estimated to deliver around 50% of the overall EU target, this will differ per Member State, depending amongst others on their indicative benchmark and the robustness of national energy savings measures.

As regards the EE1st principle, the preferred option aims to stimulate its implementation but the nature of the principle, which is to ensure that energy efficiency measures are properly taken into account during decision making, does not guarantee that energy savings will be achieved, for example when such measures are not cost-effective.

It is important to underline that the public building renovation target of 3% contributes fully to the 1.5% energy savings obligation. At the same time, other measures that Member States can take in the public sector such as on street lighting, water management or public transport, also contribute where they are additional to EU level standards (as per the Article 7 provisions).

Finally, the preferred option leaves a large amount of flexibility to the Member States how to fulfil the proposed binding targets i.e. for annual energy savings and the building renovation rate. For the former, the only requirement is to achieve a limited amount of savings in the transport sector and among energy poor households, while for the latter Member States can freely choose which buildings to renovate.

Investments underpinning the preferred policy option

Increased GHG ambition entails significant investments in energy efficiency and renewable energy. Against this background, the preferred policy option aims at facilitating energy efficiency investments, reducing their perceived risks, increasing the effectiveness in the use of public funding and helping mobilise private financial resources[106], in line with the priorities identified in the European Semester, National Energy and Climate Change Plans (NECPs), and Just Transition and Recovery Plans.

Ensuring coherence in the finalisation of the package

The final step of the sequential approach outlined above for the coherent design of the 'Fit for 55' proposals will be carried out on the basis of the analysis of this and the other impact assessment reports. The choices left open for policy-makers will be taken, measures fine-tuned and calibrated, and overall coherence ensured. Until that stage, all indications of preferred measures are to be considered preliminary as preserving overall effectiveness, efficiency and coherence may require adjustments as the final package takes shape.

Overall coherence was already established by the Climate Target Plan, which clearly showed that action in all policy areas under the 'Fit for 55' package is necessary to achieve the 2030 targets. Therefore, stronger energy efficiency measures are crucial to reach results, to increase Member States' ambition, to address the identified weaknesses in the current framework and to mitigate the possible undesirable effects of other policy initiatives.

In particular, a possible extension of the ETS to the buildings and transport sectors, and the resulting increase in energy prices may have social impacts, especially on low-income households. Support measures to promote energy efficiency, such as the strengthening of Article 7 by obliging Member States to address vulnerable, energy poor,

[106] This will be achieved mainly through non-regulatory measures (see, for example, the section on *'Attracting private investment and stimulating green loan financing'* in the Renovation Wave strategy for a more elaborate discussion) and strengthening of the provisions on financing, energy services, qualification and certification, and audits.

or low-income households, will help to alleviate this. In fact, strong energy efficiency measures would be necessary to avoid excessive distributional effects due to the ETS extension.

At the same time, such an extension could affect the effectiveness of the EED, notably as regards Article 7, which is expected to deliver around 50% of the total savings estimated to come from the EED. To enable effective synergies of such an extended ETS with the EED, it should be ensured that Member States may only count the energy savings under Article 7 from energy efficiency measures (which are measured and verified), and not from the reduced energy use as a result of a carbon price. This would be in line with the additionality requirement[107], and be consistent with the preferred options under the ETS and for CO_2 vehicle standards.

While an extended ETS could enhance additional energy savings, carbon pricing alone cannot resolve the well-known barriers to the take up of energy efficiency measures in these sectors. In view of this, the energy saving measures, such as those promoted under Article 5 or Article 7 (i.e. through energy efficiency obligation schemes or alternative policy measures), and under the EPBD will remain vital to ensure that cost-effective energy efficiency measures are implemented at end-user level.

The interaction between the approach to energy efficiency and renewables shows broad coherence, reflecting the fact that stronger efforts on energy efficiency are necessary for a cost effective deployment of renewable energy in view of meeting both energy and climate targets. This is particularly the case for heating and cooling planning, whereby the EED sets the framework for identifying the energy efficiency and renewable energy potential, and requires the Members States to implement policies and measures to exploit this potential. These policies and measures directly support the achievement of the heating and cooling sector target under the RED.

The further inclusion of transport measures under Article 7 would stimulate Member States to take further action on transport. As such, there would not be a regulatory overlap but rather synergies with the measures of the Sustainable and Smart Mobility Strategy, as the EED would establish an obligation while leaving it to Member States what measures they would like to use for achieving the reduction in energy use in transport.

Finally, the Commission has started the review of the EPBD with a view to come forward with a proposal towards the end of 2021. While at this point in time it is not possible to prejudge the outcome of that review, the preferred option respects the specific role of the EPBD in setting cost-optimal energy performance requirements, while strengthening the EED provisions pertaining to buildings (Article 5), in particular for public procurement (Article 6), provides the necessary horizontal framework for action.

[107] Member States must fulfil the additionality requirement as set out in Annex V(2) EED. Energy savings need to be additional to those that would have occurred in any event without the activity of the obligated, participating or entrusted parties. To determine the savings that can be claimed as additional, Member States have to show how energy use and demand would evolve in the absence of the policy measure in question by taking into account energy consumption trends, changes in consumer behaviour, technological progress and changes caused by other measures implemented at EU and national level.

A complementary document to the full set of individual impact assessments looking at the effectiveness, efficiency and coherence of the final package will accompany the "Fit for 55" proposal.

9. HOW WILL ACTUAL IMPACTS BE MONITORED AND EVALUATED?

Monitoring and evaluation of progress towards the policy objectives can be done using monitoring tools under existing instruments or existing Eurostat data, and through other means, including the Governance Regulation (see also section 1.4).

The mechanism embedded in the Governance Regulation is based on the integrated National Energy and Climate Plans, covering ten-year periods starting from 2021 to 2030, regular progress reports by the Member States and integrated monitoring arrangements by the Commission. This will allow the Commission to assess the progress made at Union level towards meeting the objectives of the Energy Union, in particular as regards the 2030 targets for renewable energy and energy efficiency. Member States also have the obligation to report on their progress towards alleviating energy poverty.

Regarding the specific policy objectives, it is expected that monitoring will take place as follows:

Table 16 Monitoring of objectives

Objectives	**Monitoring tools**
Objective 1: Increase effort by Member States to achieve a 36-37% energy efficiency target **Key indicators:** FEC; PEC; number of public buildings renovated annually (i.e. rate of renovation); energy savings achieved due to public building renovation (i.e. depth of renovation); annual energy savings under article 7; contribution of energy efficiency measures to alleviation of energy poverty;	Member States' biennial reports in accordance with the Governance Regulation. From that information it is possible to infer progress towards the overall EU energy efficiency target. This also includes information on: - Cumulative amount of energy savings achieved over the period 2021-2030 under Article 7 (energy saving obligations); - Total floor area renovated under Article 5 (public buildings); - Measures to utilise energy efficiency potentials of gas and electricity infrastructure (EE 1st). ESTAT collects annual energy consumption data per Member State and key economic sectors. EU Building Stock Observatory[108] EU Energy Poverty Observatory[109]
Objective 2: Reinforce the EED to better address market barriers and failures. **Key indicators:** Increase of the use, and size, of	Governance regulation, under which Member States have the obligation to report on: - Market-based instruments that incentivise energy efficiency improvements, including but not limited to energy taxes, levies and allowances; - Policy and measures to promote energy services in the public sector;

[108] https://ec.europa.eu/energy/topics/energy-efficiency/energy-efficient-buildings/eu-bso_en
[109] https://www.energypoverty.eu/

energy performance contracts in the public sector; Level and impact of investments in energy efficiency measures; Savings achieved through energy audits;	- Measures to remove regulatory and non-regulatory barriers that impede the uptake of energy performance contracting and other energy efficiency service models; - The use of Union funds, in the area of energy efficiency at national level. The Commission will undertake regular studies on the impact of specific articles of the EED, for example as regards Article 7 on energy savings obligations or Article 8 on energy audits. The JRC undertakes regular assessments of market developments in key areas such as energy services companies and financing measures[110]. Investments in energy efficiency under EU financial programmes, including InvestEU, NextGenerationEU, European Strategic Investment Funds, EIB facilities, ELENA technical assistance facility. DEEP database[111] Odyssee/Mure database[112]
Objective 3: Improve understanding of impacts of energy efficiency measures taken by Member States **Key indicators:** see above-mentioned indicators; impacts of public procurement on energy savings.	Monitoring tools indicated above. Policy Assessment Tool[113], EED Concerted Action[114]

[110] See for example: https://ec.europa.eu/jrc/en/energy-efficiency/eed-support
[111] https://deep.eefig.eu/
[112] https://www.odyssee-mure.eu/
[113] (Draft) Technical assistance study to develop a tool for assessing energy efficiency policies and measures; Fraunhofer, 2020
[114] https://www.ca-eed.eu/Homepage