Council of the
European Union

Brussels, 4 June 2026
(OR. en)

10101/26

ENER 311
TELECOM 291
CYBER 269
MI 583
COMPET 667

COVER NOTE

From:	Secretary-General of the European Commission, signed by Ms Martine DEPREZ, Director
date of receipt:	3 June 2026
To:	Ms Thérèse BLANCHET, Secretary-General of the Council of the European Union
No. Cion doc.:	COM(2026) 501 final
Subject:	COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Strategic Roadmap for Digitalisation and AI in the Energy Sector

Delegations will find attached document COM(2026) 501 final.

Encl.: COM(2026) 501 final

EUROPEAN
COMMISSION

Brussels, 3.6.2026
COM(2026) 501 final

COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

Strategic Roadmap for Digitalisation and AI in the Energy Sector

1. Introduction

Digitalisation is reshaping our lives, and the energy sector is no exception. Mario Draghi's report on the future of European Competitiveness[1] underlined the fact that the European Union must harness the 'digital revolution' and invest decisively in Artificial Intelligence (AI) and data infrastructure to safeguard its competitiveness and lead the clean energy transition.

High energy prices in the EU, exacerbated by the escalating fossil fuel crisis, and the pressure they place on both industrial competitiveness and households, make the digital transformation of the energy system more urgent than ever. The conflict in the Middle East has triggered volatile price spikes, exposing the fragility of the EU's dependence on global imports.

True technology sovereignty lies in a digitalised, interconnected energy system that increases electrification and clean energy integration. Digital solutions can give consumers greater control over when they use electricity, allowing them to shift consumption to cheaper hours and lower their bills. For industry, digitalisation can reduce energy costs, improve efficiency, optimise production processes, and make it easier to respond to price signals and participate in flexibility markets. When flexibility from many devices, buildings and industrial processes is aggregated, it can reduce peak demand, limit the need for expensive fossil-fired generation, and lower costs across the whole system. At the same time, digital tools and AI can help grid operators, power plants, storage facilities and industrial sites run more efficiently and predictively. The result is a more competitive industry, lower bills for households, and a more resilient and affordable energy system overall.[2]

The need for an increase in computing capacities will lead to a consequent increase in energy needs for digitalisation, and in particular AI and data centres are driving up energy demand,[3] with potential consequences for decarbonisation, prices and access to grids for all consumers. This goes along with an increasing pressure on water resources as recognised in the EU Water Resilience Strategy.[4] Some Member States and third countries are already facing these challenges. If not tackled at EU level now, these challenges could grow considerably and become harder to solve in the coming years, as the energy consumption of the sector is expected to increase further. It is therefore essential to ensure that digitalisation does not negatively impact other consumers and the Commission's electrification agenda but rather is managed in a way to enable system integration and limit the impact on the energy system.

A sustainable digitalised EU energy system leveraging the potential of digital technologies is therefore no longer optional, but essential. Yet it will not emerge on its own: it requires smart grids, smart meters, and seamless data exchange across the energy system. Nor will digitalisation automatically strengthen Europe. To reinforce the EU's competitiveness and strategic autonomy, the EU must retain sovereign control over the digital solutions, AI models and algorithms on which its energy system increasingly depends. Global players are already

[1] The future of European competitiveness: A Competitiveness Strategy for Europe , M. Draghi, 2024

[2] Digitalisation could deliver over EUR 71 billion in direct annual consumer savings and more than EUR 300 billion in wider system benefits (2030 Demand-side flexibility - Quantification of benefits in the EU, a study, carried out by smartEn and DNV). ACER reports that Swedish households using electric heating can save up to 40% through demand-side flexibility, while the IEA estimates that existing AI applications in power plant operations and maintenance could generate EUR 95 billion in global annual savings by 2035 (IEA - Energy and AI, World Energy Outlook Special Report, 2025).

[3] The IEA estimates that, in advanced economies, data centres will drive more than 20% of electricity demand growth between now and 2030 IEA - Energy and AI, World Energy Outlook Special Report, 2025

[4] Water resilience strategy

taking decisive steps in this direction.[5] If the EU wants to lead the global clean energy transition, it has to develop an ambitious roadmap in this area.

This Strategic Roadmap sets out measures for a digitalised EU energy system in which AI will support the delivery of secure, clean and competitive energy for all consumers. It builds on the policy priorities of the AI Continent Action Plan,[6] the Apply AI Strategy,[7] the work of the AI Office, and the 2022 Digitalisation of Energy Action Plan to reap the benefits of digital solutions for Europe's energy sector. It complements the Cloud and AI Development Act (CADA) which will create the right conditions for the EU to incentivise large investments in cloud and edge capacity.

By 2030, the measures set out in this Strategic Roadmap will help support the sustainable growth of the digital sector in the EU, with positive impacts for all energy consumers. Cross-border exchange and pooling of energy data will also help place the EU on the international AI map, by enabling AI foundation models that respect the EU's data rules and values.

This Strategic Roadmap is structured around three pillars: Pillar I addresses the sustainable integration of data centres into the energy system; Pillar II sets out measures to deploy digital and AI solutions across the energy system; and Pillar III addresses the data governance framework needed to enable smart energy services and AI at scale. These are complemented by a cross-cutting section on trust, cybersecurity and countering hybrid threats, skills and international cooperation, and a concluding section setting out how implementation will be monitored and reviewed.

2. Pillar I – Energy for AI

Pillar I identifies specific actions ensuring that the sustainable integration of data centres into the energy system supports security of supply, competitiveness, and clean energy objectives.

Data centres are critical to the EU's competitiveness and digital sovereignty, providing the computing capacity that underpins most digital services. They can also boost local economies and strengthen integrated digital value chains across the EU. The EU aims to triple its data centre capacity within 5-7 years, ensuring that it matches its needs.

These opportunities come with challenges. Data centres currently account for around 2.5% of EU electricity consumption, and their demand is expected to raise substantially because their installed capacity is expected to grow from approximately 12 GW in 2025 to around 28 GW by 2030.[8] The current demand is geographically concentrated in a limited number of hotspots.[9] However, connection requests are increasing sharply, with individual sites requiring capacities like those of major industrial sites. This additional demand will compound the broader increase driven by the electrification of the economy. These developments could, if not proactively managed, undermine the security and sustainability of the energy supply, exacerbate grid congestion and drive-up electricity prices, especially considering data centres' capacity to compete with other energy consumers for access to energy. In certain regions, the scale and pace of projected demand growth may also require complementary approaches to energy supply and system integration, alongside timely grid reinforcement, such as on-site, co-located

[5] In the U.S., the AI Strategy (U.S. Department of Energy, Artificial Intelligence Strategy, October 2025) and the Genesis Mission (The White House: Launching the Genesis mission) position AI as a strategic asset for the energy sector. China's National Plan for AI-Energy Integration(The State Council: Plan on AI-energy integration and Forbes: China's new AI Strategy explained) sets out a coordinated strategy to embed AI across the energy system.

[6] AI Continent Action Plan (COM(2025)165)

[7] Apply AI Strategy (COM(2025) 723 final)

[8] Study: "Cloud and AI": Technopolis, Wavestone, Timelex, STL Partners, OpenForum Europe, KAPA Research (2025)

[9] Notably around Dublin, Frankfurt, Amsterdam and Paris, but also in Spain, Italy, Belgium, Poland and the Nordic regions.

or "behind-the-meter" generation, which is increasingly deployed for large-scale data centre campuses in other regions globally.

Integrating data centres into the energy system requires the efficient management of grid connections, coordinated grids planning and operation, demand side flexibility and a sustainable supply of energy, for example, through clean co-located generation in proximity to data centres contributing to system integration and security of supply. Network operators need timely information on data centre developments to plan grid investments and manage connections efficiently. The digital sector has a responsibility to ensure its sustainable integration in the energy system. Additionally, water-related challenges must be addressed to fully account for the implications of the water–energy nexus. The upcoming digital action plan for the water sector is expected to support and complement the development of sustainable integration of data centres.

Data centres transform electricity into intelligence for the benefit of the whole economy and society, and they have the potential to experience unprecedented growth in the coming years. In this respect, while energy demand of data centres is unprecedented, challenges related to timely grid access and flexibility are shared with other grid users. For the EU to fully benefit from the potential of cloud and AI, **data centres require timely electricity supply and grid access**. Recent Commission initiatives[10] provide a toolbox for Member States, regulatory authorities and system operators to address the most pressing needs related to grid access, network development and efficient use of grids, building on the existing legal framework.[11]

Delays in network development are seen as a main reason behind **connection queues** for big network users like data centres. The Commission put forward provisions for accelerating permit-granting procedures under the European Grids package and invites regulatory authorities and system operators to engage stakeholders in their network planning exercises early to facilitate anticipatory investment.

To address the barrier of **inefficient use of grids**, regulatory authorities should ensure that the right incentives are in place for system operators and system users, that network charges are designed efficiently and deliver flexibility, reflecting the costs of respective user groups. The upcoming legal proposal to future-proof electricity bills in the EU will clarify these principles before the summer.

Furthermore, regulatory authorities should create a framework for **flexible connection agreements**. Where flexible connection agreements are necessary or beneficial for the energy system, data centres can be good candidates. They can also participate in market mechanisms remunerating flexibility, like balancing or ancillary services and congestion management markets when they meet the technical conditions.

Lastly, **grid connection procedures** can be more efficient by moving away from first-come first-served principle towards greater consideration of maturity and progress in project development to ensure speculative projects do not block grid access. Union-wide grid hosting capacity portal Capacitypedia[12] should help data centres to place their connection request in areas with sufficient or planned development of grids. The Commission is committed to

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[10] Commission Notice – Guidance on efficient and timely grid connections (C/2025/8473), Commission Notice on Guidelines on future proof network charges for reduced energy system costs (C/2025/8574), Commission Notice on a guidance on anticipatory investments for developing forward-looking electricity networks (C/2025/3291)

[11] Notably provisions of the Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity and of the Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity

[12] Capacitypedia: Pan-EU Overview on Grid Hosting Capacity Information

continue facilitating implementation of the relevant Guidance to ensure timely grid access to all users.

EU-wide coordination is needed to speed up the sustainable integration of data centres in the energy system. A Commission-led initiative will develop a replicable model for agreements between public authorities, data centre operators and energy actors to support grid integration, clean energy supply, flexibility and improved energy performance and safeguard water and environmental resources. The model will also facilitate the implementation of the horizontal measures on sustainable grid access mentioned above, fully factoring in the specificities of data centres. To guide action, the Commission will also improve the evidence base on data centre energy use through a long-term EU assessment and monitoring tool, building on the Energy Efficiency Directive reporting, EU statistics[13] and cooperation with the IEA. This will complement and facilitate the implementation of the regulatory framework, including the European Grids Package.

Flagship action 1: A model tripartite agreement for the sustainable integration of data centres into the energy system, to roll out local agreements between data centre operators, energy-related parties and public authorities. The model could lay down actions on: improved provision of information for better grid planning, better informing the decision-making for optimal data centre project sitting, increasing the transparency of grid connection requests (including the use-it-or-lose-it principle to avoid speculative queue reservation), improved use of PPAs[14] and delivering additional generation of clean energy, delivering solutions for data centre flexibility (through market-based instruments and capitalising on the legal framework in force), supporting the recovery and use of waste heat and improving energy performance, leveraging flexible connection agreements as a means to access the grids where needed. The model can be subsequently adapted and piloted in Member States and regions. Water-related issues will be addressed in line with the development of the EU rating scheme for data centres.

Timing: A declaration of intent stating the willingness of the industry stakeholders to cooperate in the framework of a tripartite agreement, and identifying key areas for their action, will be adopted along this Strategic Roadmap; the model tripartite agreement will be published and promoted in the second half of 2026. In addition, and if necessary, the Commission will consider putting forward a legislative proposal to ensure the sustainable integration of data centres into the EU energy system.

Expected impacts: improved coordination between public authorities, data centre operators, electricity system operators and other relevant stakeholders; faster and more sustainable grid integration of data centres; greater uptake of clean energy sourcing and flexibility solutions; better energy performance; lower energy prices; and a more consistent but adaptable framework across Member States. Maximised synergies with district heating.

To align the growth of digital infrastructure with environmental, climate and energy goals, data centres must lead on energy efficiency, resource efficiency and flexibility. In response, the Commission will adopt a **Data Centre Energy Efficiency Package**, including a report on improving energy efficiency of data centres, a Delegated Act establishing an EU rating scheme for the sustainability of data centres, and the launch of a public consultation for minimum performance standards for new and existing data centres in the EU. The Cloud and AI

[13] European statistics, including data on energy consumption in data centres are collected according to the provisions of Regulation (EC) 1099/2008.

[14] In line with the Commission Recommendation on removing barriers to the development of power purchase agreements and other energy purchase agreements (Commission Recommendation (EU) 2026/917).

Leadership Initiative under the Cloud and AI Development Act will support and incentivise the deployment of best-in-class data centres across the Union.

Flagship action 2: An EU rating scheme for data centres covering energy efficiency, water efficiency, clean energy use, waste heat reuse and flexibility[15] **and launch the process for minimum EU energy performance standards**.

Timing: rating scheme adopted in 2026; first labels in 2027; minimum EU energy performance standards needs assessment by 2027.

Expected impacts: increased transparency and promotion of the sustainable development of data centres; optimised projected energy and water consumption.

3. Pillar II – Digitalisation and AI for the energy system

Pillar II identifies specific actions to make the energy system smarter and more data-driven by deploying digital and AI solutions.

As the energy sector advances towards electrification and decarbonisation, electricity grids are becoming the backbone of an integrated and resilient energy system. As highlighted in the European Grids Package, **grids must become smarter and stronger**, but also more resilient to climate and extreme events, leveraging geospatial data and AI to mitigate natural disaster risks. Smart grids provide the real-time visibility, interoperability and control needed to increase the uptake of renewables and optimise energy system operation, benefiting from AI. Smart metering systems are a key enabler of demand response and dynamic electricity price contracts, which can contribute to improving the utilisation of existing electricity network infrastructure, including by reducing the curtailment of renewable energy and facilitating electrification.

Smart grids can cut costs by making better use of existing assets and renewable energy. They improve affordability and resilience through better grid management and support system integration by unlocking flexibility across demand, generation, storage, heating and mobility. For example, Utrecht's vehicle-to-grid car-sharing network shows how electric vehicles can store surplus solar power and feed it back to the grid at peak times, supporting grid stability and reducing curtailment.[16] Smart and bidirectional charging can also generate significant savings for consumers (between EUR 450 and EUR 2,900 per year).[17] Another example is ports, where smart grids can help manage the high electricity demand for shore-side power supply to vessels, and may enable additional flexibility services.[18]

Investment in stronger and smarter European grids is essential.[19] However, progress is still hindered by regulatory and planning practices that favour traditional grid expansion over smart solutions, fragmented approaches to digitalisation across the EU, and uncertainty about the performance of new technologies.

The EU framework already addressed several of these barriers, supporting greater investment in smart grids through electricity market design,[20] the European Grids Package and EU research funding. In particular, the European Grids Package[21] put forward proposals **to promote non-**

[15] Articles 12 and 33 of Energy Efficiency Directive (EU) 2023/1791, building on the existing reporting scheme for data centres introduced in 2024 by the Commission Delegated Regulation (EU) 2024/1364

[16] Utrecht becomes Europe's first city with a V2G electric car-sharing service

[17] Plugging into potential: unleashing the untapped flexibility of EVs, Eurelectric, 2025

[18] Port electricity commercial model (project pilot) - Publications Office of the EU

[19] More than EUR 1.2 trillion should be invested over the period 2024-2040, out of those, EUR 730 bn are envisaged for distribution grids and EUR 430 bn for transmission grids.

[20] Directive (EU) 2024/1711 and Regulation (EU) 2024/1747.

[21] More specifically, in the Proposal to revise the TEN-E Regulation

wire and digital solutions in network planning, while Horizon Europe is supporting innovation in energy systems, grids and storage.[22]

To further support the deployment of smarter grids, the Commission will propose legislation to future-proof EU electricity bills including provisions to enable a more efficient use of current grid assets by employing smart and digital solutions. The proposal mandates the Agency for the Cooperation of Energy Regulators (ACER) to provide a recommendation to regulatory authorities on the use of smart grid indicators to measure the uptake and performance of innovative technologies and digital solutions in transmission and distribution networks. The recommendation will build on the ongoing work in this area. Regulatory authorities will then set performance indicators for efficient grid operation and development. ACER will monitor progress, identify best practices and propose further measures as needed. These indicators should also support the deployment of grid-enhancing technologies, which can expand network capacity by up to 40% and reduce conventional grid expansion costs by as much as 35%.[23]

To accelerate deployment, the Commission will continue supporting transmission and distribution system operators in developing and rolling out digital twin solutions,[24] including through a dedicated toolbox to improve interoperability, scale and practical uptake. In parallel, the EU will continue to back innovation in smart energy systems through Horizon Europe, including funding for advanced electricity grid solutions.[25]

The efficient use of the electricity network relies on the availability of accurate and granular consumption data and on the ability of final customers to access and act upon such data. Smart metering systems are a key enabler of demand response and dynamic electricity price contracts, which can contribute to improving the utilisation of existing electricity network infrastructure, including by reducing the curtailment of renewable energy and facilitating electrification. Considering the imperative need for all Member States to contribute to the smartening of the electricity system, **the Commission will present a legislative proposal to accelerate the rollout of smart meters in the EU**, thereby strengthening consumer participation, enabling demand-side flexibility and supporting a more efficient use of the electricity system.

Flagship action 3: Development of EU key performance indicators for smart grids and acceleration of smart meters rollout

Timing: EU catalogue of indicators to be finalised by mid-2026. Legislative proposal in 2026 to accelerate the rollout of smart meters in the EU, aiming for minimum coverage in each Member States, and task ACER to provide recommendation on smart grid indicators in 2028 with regular monitoring of progress afterwards.

Expected impacts: improved investment decisions in smart and digitalised grids, more efficient use of existing grids, strengthened regulatory oversight by National Regulatory Authorities, more cost-efficient deployment of smart and digital solutions, and accelerated integration of renewables, electrification, resilience and energy efficiency across Europe.

AI is spreading rapidly across the energy system as assets, processes and markets become more digital. However, digitalising individual actors is not sufficient: the full potential of an AI-powered energy system will only be achieved by the deployment of AI solutions across the

[22] In 2021–2027, around EUR 1 billion has been earmarked for energy systems, grids and storage.
[23] CurrENT study: Prospects for innovative power grid technologies, 2024.
[24] ENTSO-E and EU DSO Entity identified challenges, opportunities and common use cases for digital twin solutions in EU grids, which call for a strategic collaborative approach to implementation.
[25] The 2026-2027 work programme allocates around EUR 90 million to advanced solutions for electricity grids.

entire energy value chain, from supply and renewable generation to industry, buildings and mobility.

As a global AI race is underway,[26] the EU must leverage its strength in industrial automation[27] to build **sovereign, secure AI models for the energy sector**, trained on European data and developed by EU firms, and lead the next wave of digital energy technologies. In a sector of such strategic importance as energy, it is a matter of the EU's technological sovereignty that new AI models are developed and managed in the EU. Building on the Apply AI Strategy, and the AI in Science Strategy, the Commission will support the **development of AI foundation models for grid management and planning** as a digital backbone for the energy system.

When trained on large diverse datasets, including earth observation data (for instance, from Copernicus Energy Hub), and fine-tuned for specific use cases, AI models could significantly improve grid functions[28] such as forecasting, congestion management, fault detection and investment planning strengthening the competitiveness of the sector.

Beyond grids, AI can improve renewable plant control and reduce curtailment, strengthen nuclear safety and efficiency,[29] and support renovation planning for buildings and energy-poor households.[30] In line with the Grids Package, the Commission will support the development of open-source AI tools to facilitate the setup of single digital portals at national level that accelerate permit-granting procedures.

For 2026–2027, **Horizon Europe will provide around EUR 75 million for AI technologies** in energy, notably for grids, self-consumption, energy sharing and grid-scale storage, plus a further EUR 190 million for broader digital solutions in renewables, building renovation and energy efficiency. In line with the strategy for EU Open Digital Ecosystems, the Commission will support open-source approaches in EU research and innovation calls. In parallel, EU innovators, startups, scaleups and researchers can draw on complementary instruments across the innovation chain, including AI Factories, European Experience Centres for AI and RAISE[31] for access to computing, data, networks and funding to advance AI-driven scientific breakthroughs, as well as the Scaleup Europe Fund[32] to boost investments in strategic technologies' scaleups and close the gap with global leaders.

Flagship action 4: Development of AI models across the energy value chain

Timing:

- A project agreement launching a Community of Practice for developing AI models for grid management and planning is signed alongside this Strategic Roadmap; dedicated Horizon Europe calls will open in 2026 (EUR 30 million) and 2027 (EUR 20 million); proof-of-concept AI models will be developed and tested in Q1 2027; first operational models by end of 2027.

[26] Professor Draghi highlights that in 2024 the U.S. produced forty notable AI models, China fifteen, and the EU just three.
[27] IEA - Energy and AI, World Energy Outlook Special Report, 2025
[28] AI-based operations & maintenance optimization could save up to $110 billion annually by 2035 in fuel and O&M costs according to the Widespread AI adoption scenario of the IEA (2025), Energy and AI, IEA, Paris
[29] AI can enhance safety and efficiency through predictive maintenance, anomaly detection and advanced modelling.
[30] AI can be trained on data from the European Building Stock Observatory or relevant Copernicus Earth Observation data to support renovation planning notably for energy-poor households. The IEA estimates that by 2035, the use of AI in building energy management systems (BEMS) could save approximately 300 TWh per year globally.
[31] RAISE: Resource for AI Science in Europe, a virtual research institute for EU research on and with AI
[32] Scaleup Europe Fund, a multi-billion late-stage, growth fund, aiming to invest in the most promising European companies

- Develop digital portals for Member States, using generative AI technologies to streamline permit review for renewable energy, storage and grid projects; design in 2027; roll-out in 2028 for public authorities to use.

Expected impacts: improved grid observability, forecasting, congestion management and flexibility integration; easier access to digital tools that help households control consumption, and more inclusive participation in self-consumption and energy-sharing schemes, improved evidence-base for public action through better building-stock and performance data; accelerated renewable, storage and grid deployment through faster and more transparent permitting.

4. Pillar III – Data for AI and the energy system

Effective energy data exchange and interoperability are critical to enable smart energy services and the development of robust AI models. Pillar III identifies concrete actions to establish a comprehensive framework for data exchange and interoperability, ensuring a seamless digital energy ecosystem.

The existing legal framework[33] provides important building blocks for energy data exchange but remains fragmented.[34] The EU legal framework already covers the **primary use of energy data**, meaning the operational data exchanges between identified actors for services such as metering, billing, supplier switching, demand response and grid operation. However, implementation varies significantly across Member States, creating complexity, legal uncertainty and barriers to cross-border smart energy services. Furthermore, horizontal legislation like the Data Act, while it provides principles for access to data from connected products, does not fully address the specificities of regulated energy data and regulated entities. As a result, providers of demand-response or smart electric-vehicle charging services, often redesign software interfaces and renegotiate data-access procedures for each national market hindering the cross-border growth of smart energy services.

At the same time, the framework for the **secondary use of energy data**, meaning the pooling and reuse of energy data beyond its original operational purpose, for example, for research, analytics or AI model development, is less developed. Public datasets remain fragmented or limited for advanced analytics. While horizontal legislation provides safeguards on data protection and cybersecurity, there is no clear sector-specific framework for structured energy data pooling or for the use of AI models. As a result, energy companies or grid operators often hesitate to share detailed data for research purposes or to train AI models. This results in slower AI development due to limited or synthetic datasets.

The core challenge is the absence of a coherent EU approach for trusted, cross-border energy data exchange. To address these gaps, support cross-border smart energy services and foster sovereign AI, **the Commission will coordinate actions to streamline and simplify energy-specific data exchange for both primary and secondary use of energy data** in line with the

[33] Such as the Data Act Regulation (EU) 2023/2854; Electricity Directive (EU) 2019/944; Electricity Regulation (EU) 2019/943; Energy Performance of Buildings Directive (EU) 2024/1275; Renewable Energy Directive (EU) 2018/2001; Alternative Fuels Infrastructure Regulation (EU) 2023/1804 and related implementing acts

[34] 'Limited access to high-quality data', 'Lack of data interoperability', 'Cybersecurity and where applicable privacy' were identified during the open public consultation for the strategic roadmap as the main barriers to deploy smart and AI solutions in energy; Operational Conclusions and Key Takeaways, Third joint meeting of D4E, STF and CoW, Berlin, 4-5 Nov 2025

Digital Omnibus, the Data Act, the European Business Wallets, the EU Digital Identity Wallets, and the wider EU horizontal data framework.[35]

The objective is to make cross-border energy data exchange simpler, more efficient and predictable by providing common interfaces, harmonising rules and trust services at EU level.

Regarding the primary use of energy data, the key priority will be to enhance cross-border data interoperability, thereby supporting smart energy services such as demand-side flexibility and bidirectional EV charging, while coordinating Member States in the development of interoperable national data hubs. Better exchange of energy data can help activate flexibility from electric vehicles, heat pumps, batteries and controllable demand, with digital-enabled solutions potentially unlocking around 230 GW of flexibility by 2030 and reducing system costs for consumers. The work will build on the important **EU-wide energy and e-mobility stakeholder-wide agreed set of recommendations** on data exchange for smart energy services that was published on 20 May,[36] as well as on key pilot projects.[37]

Regarding the secondary use of energy data, the focus will be on facilitating the pooling of energy data for training AI models and for public-interest and research purposes, establishing trust frameworks for AI in energy and developing regulatory sandboxes building upon results of ongoing projects[38] and the Community of practice for developing AI foundation models for power grids. Furthermore, the upcoming legal proposal to future-proof electricity bills in the EU will provide a regulatory incentive for grid operators to cooperate for that purpose and a framework for sector-specific secondary use of energy data.

Flagship action 5: Establish an EU framework for simplified cross-border energy data exchange for smart energy services and AI model training

Timing: assessment in 2026; development as of 2027.

Expected impacts: reduced fragmentation in energy data exchange; enabled cross-border smart energy services at scale; improved grid flexibility and renewable integration; innovation and new business models; a more efficient, integrated and competitive EU energy system; and a single market of smart energy services scalable across the EU.

5. Securing the energy-AI nexus: trust, talent and global cooperation

Integrating digital technologies and AI into critical energy infrastructure can improve performance, but it also increases **safety, as well as hybrid and cybersecurity** risks. In line with the EU Preparedness Union Strategy and building on the expertise of the automative and aviation sector, a European AI energy safety transformation group will focus on transparency, explainability, and human oversight by:

- advancing AI energy safety as a system-level discipline and help ensure that AI does not create systemic risks for critical energy infrastructure, and counter hybrid threats;
- supporting exchanges on incidents, lessons learned, best practices, and risk mitigation based on the AI Act;

[35] For example, it will leverage the secure identification, authentication, and data exchange capabilities provided by the European Business Wallets and the EU Digital Identity Wallets, ensuring that citizens can securely and efficiently access and manage their energy-related data, while maintaining control over their personal and sensitive information.
[36] Data exchange for demand-side flexibility and smart and bi-directional charging prepared jointly by three groups of experts, namely the Data 4 Energy sub-group of the Smart Energy Expert Group, the Sustainable Transport Forum and the Coalition of the Willing on Bi-directional Charging
[37] Five Horizon Europe projects (EDDIE, Enershare, Data Cellar, Synergies, and Omega-X) have advanced data space technologies, which are currently being deployed in 16 MSs through INSIEME, a Digital Europe funded deployment project
[38] Three Horizon Europe projects (EnerTEF, AI-Effect, and EnergyGuard) are piloting Testing and Experimentation Facilities

- monitoring high-risk AI use cases in critical energy infrastructures.

The Commission will work with Member States to establish AI regulatory sandboxes for testing and validation of energy AI applications to foster innovation and contribute to evidence-based regulatory learning on high-risk AI systems and will issue guidance on high-risk AI systems in line with the AI Act. Furthermore, the Commission will promote sovereign AI-enabled tools for vulnerability detection, continuous monitoring, anomaly detection and automated incident response, in line with the wider EU cybersecurity framework.

At the same time, the energy sector's growing electrification, digitalisation and connectivity exposes it to cybersecurity threats.[39] The Joint Communication on strengthening EU economic security[40] identifies six high-risk areas for immediate action. Several of the identified priority actions are directly linked with the energy sector and include risks stemming from strategic dependencies, unauthorised access to sensitive information or disruptions to strategic infrastructure. Solar and wind power generation infrastructures have emerged as a priority cybersecurity concern within these categories, with high risks that include the manipulation or prevention of electricity production, unauthorized access to operational data, the infiltration of key supply chain actors and the possibility to trigger remote blackouts.

To respond to these risks, the Commission is undertaking a systemic assessment of risks in these priority areas, which also include solar and wind installations in the EU, and has most recently restricted the use of EU funds for projects involving inverters from high-risk suppliers. The new proposal for a Cybersecurity Act provides the framework to ban the use of inverters from high-risk suppliers in the EU, if necessary. Finally, the EU will review the energy security of supply framework, possibly including new measures for better identification and management of cybersecurity risks in critical energy devices.

Since energy security increasingly hinges on **resilient supply chains** and the cybersecurity of individual components, the Commission's proposed revision of the Cybersecurity Act includes ICT supply chain requirements to further strengthen the EU's cybersecurity resilience and capabilities. Finally, **the Commission will request the Commission's European Group on Ethics in Science and New Technologies**[41] to provide an opinion on the trustworthy and responsible governance of AI in the EU energy system and how to safeguard public trust, transparency and fairness.

Flagship action 6: Strengthen safety of AI and the cybersecurity of critical devices

Timing: risk assessment of solar installations in the EU in 2026; review the energy security of supply framework in 2026.

Expected impacts: ensure transparency, explainability, and human oversight of AI technologies embedded in critical energy infrastructures; increase cybersecurity and resilience of electricity grids with high-risk devices such as solar inverters; ensure alignment with civil protection and emergency response protocols.

Digitalising energy requires a workforce that combines energy expertise with **digital and AI skills**. Traditional specialisation alone is no longer sufficient: the sector needs hybrid, adaptable and diverse talent capable of bridging these fields, with strong attention to gender balance.

To address the growing need for energy, digital and AI skills, the 2026 call for proposals of the LIFE Clean Energy Transition sub-programme includes **a EUR 10 million action on smart**

[39] According to the IEA, an energy utility experienced more than 1 500 attacks weekly in 2024, three times more than in 2020.
[40] Joint Communication on strengthening EU economic security (JOIN(2025) 977 final)
[41] European Group on Ethics in Science and New Technologies (EGE)

grids to strengthen in-house digital and AI skills of distribution system operators. In view of a possible Net Zero Academy on smart grids, the proposals should take into account the review of academies announced in the "Union of Skills" communication. The Commission will also invest in skills and capabilities through several other channels: an expanded Pact for Skills partnership on the digitalisation of the energy system, with targets to be adopted in 2026 and reviewed in 2029; and continued support through Erasmus+ and the EIT/KICs for projects developing digital and AI skills in study fields and programmes in the energy sector from 2026 onwards, while promoting diverse and gender-balanced talent pipelines.

Coordinated EU action is essential to shape global energy and digital governance in a way that benefits both the EU and its partners. In line with the EU International Digital Strategy,[42] the Commission will **promote international cooperation on the energy-AI nexus** and work with like-minded partners and international organisations[43] to advance the G7 Energy and AI Work Plan from 2026 onwards. The Commission will launch with cities and financial partners a global initiative on digital and AI tools for urban energy transition and energy poverty by 2028, and support knowledge transfer of AI-for-energy solutions to partner countries under the AI for Public Good initiative, with first demonstrations planned for 2027.

6. Implementation of the Strategic Roadmap

Geographical differences in AI readiness could lead to uneven progress across the EU, so targeted action is needed to ensure balanced development and stronger local digital capabilities. To support delivery of the Roadmap by 2030, the Commission will convene an annual **Energy Digitalisation Forum** from 2026 to review progress, identify barriers, share good practices and address emerging developments that may require further action. The Commission will also examine how to better integrate digitalisation and AI into the Energy Union governance framework[44] and will develop in addition concrete objectives and indicative targets with Member States and stakeholders to monitor the progress of digitalisation and AI adoption in the energy system over the coming decade. These objectives should be based on existing monitoring frameworks, and smart grid indicators, such as grid observability and the integration of flexible resources and will rely on available data sources.

The recent energy crisis has highlighted the importance of high-quality energy data to inform policymaking and accelerate the energy transition. As underscored in the Draghi report, there is significant scope to improve the quality, interoperability, and timely availability of energy data and statistics in the EU. As an initial response, the Commission announced **a Fuel Observatory**[45] to track the supply and stock availability of relevant transport fuels. Furthermore, in line with the Data Act, the Commission **will launch a Better Energy Data initiative**, with a view to mapping and addressing gaps in energy data availability, focusing on obtaining more comprehensive, detailed, interoperable, and timely data while ensuring that it is easily accessible. This initiative will inform further steps to streamline and facilitate public and open energy data, including data from public authorities, system operators, and ACER,[46] and to improve energy statistics.[47] This will strengthen the monitoring of EU energy policy

[42] EU International Digital Strategy

[43] Such as the International Energy Agency (IEA), the International Renewable Energy Agency (IRENA) and the Organisation for Economic Co-operation and Development (OECD)

[44] Governance of the Energy Union and Climate Action Regulation (EU) 2018/1999

[45] A Fuel Observatory was announced in the AccelerateEU Communication (COM(2026) 370 final)

[46] Under REMIT, ACER monitors energy markets by collecting and analysing transaction data to detect market manipulation.

[47] By revising Regulation (EC) 1099/2008 to improve monitoring of EU policy targets. Furthermore, the Commission is also exploring producing statistics from innovative and privately held data, pursuing Regulation 223/2009 on official statistics.

targets, enhance transparency in energy markets, and support a more effective clean energy transition.

Flagship action 7: Track digitalisation progress in the EU and improve energy data availability

Timing: convene an annual Energy Digitalisation Forum starting in 2026; define metrics to monitor the progress of digitalisation and AI adoption in 2027; create a Fuel Observatory in 2026; launch a Better Energy Data initiative in Q4 2026.

Expected impacts: ensure balanced digitalisation across Member States, improve energy data availability to monitor EU energy policy targets and support decision making.