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# Strategic Roadmap for digitalisation and AI in the energy sector

A Eurelectric consultation response paper

November 2025

Eurelectric represents the interests of the electricity industry in Europe. Our work covers all major issues affecting our sector. Our members represent the electricity industry in over 30 European countries.

We cover the entire industry from electricity generation and markets to distribution networks and customer issues. We also have affiliates active on several other continents and business associates from a wide variety of sectors with a direct interest in the electricity industry.

## We stand for

The vision of the European power sector is to enable and sustain:
- A vibrant competitive European economy, reliably powered by clean, carbon-neutral energy
- A smart, energy efficient and truly sustainable society for all citizens of Europe

We are committed to lead a cost-effective energy transition by:

**investing** in clean power generation and transition-enabling solutions, to reduce emissions and actively pursue efforts to become carbon-neutral well before mid-century, taking into account different starting points and commercial availability of key transition technologies;

**transforming** the energy system to make it more responsive, resilient and efficient. This includes increased use of renewable energy, digitalisation, demand side response and reinforcement of grids so they can function as platforms and enablers for customers, cities and communities;

**accelerating** the energy transition in other economic sectors by offering competitive electricity as a transformation tool for transport, heating and industry;

**embedding** sustainability in all parts of our value chain and take measures to support the transformation of existing assets towards a zero carbon society;

**innovating** to discover the cutting-edge business models and develop the breakthrough technologies that are indispensable to allow our industry to lead this transition.

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WG Sustainable Network Technology
WG RES & Storage
WG Thermal & Nuclear
WG Hydro
WG Customers & New Services
WG Retail Market Design
WG E-Mobility
WG Buildings & Energy efficiency

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## Digitalisation and AI in the energy sector

## Call for evidence

Eurelectric welcomes the opportunity to respond to the consultation forming the Strategic roadmap on digitalisation and AI in the energy sector.

### Assessment

**The power sector has made substantial progress** in digitalisation, but levels of maturity vary significantly across Europe. Digital tools and AI offer valuable opportunities, for example: to enhance data analysis, demand forecasting, grid balancing, predictive maintenance, renewable integration, customer interaction, and overall operational efficiency. These developments can strengthen system stability and resilience, improve consumer satisfaction, increase market predictability, and foster innovation for a more competitive Europe.

**At the same time, the rising energy demand of data centres and AI** infrastructure must be planned and developed in a grid-friendly manner by taking into consideration the systemic impact of their integration and tackling subsequent bottlenecks accordingly. The power sector stands ready to cooperate to meet this demand.

**However, digitalisation also presents major challenges**. The upfront and ongoing costs of new digital tools are significant. For DSOs, the regulatory frameworks are sometimes disincentivising digitalisation as OPEX costs and by not allowing a full recovery of costs borne. Adding to this, a shortage of specialised IT and digital skills further limits the ability to implement and manage these solutions effectively. Cybersecurity risks remain critical, as digital systems increase exposure to potential attacks on essential infrastructure. In addition, poor **data quality** and the persistence of **legacy systems** complicate integration, reduce interoperability, and slow down technology adoption.

**The needs for data exchange in the energy sector are growing**, driven by the transition and added flexibility of the power system. New solutions to improve data quality and interoperability, secure transmission and storage of information require substantial and ongoing efforts. In this context, data sharing practices should be carefully regulated to maintain security, while also guaranteeing a suitable degree of flexibility to allow a smooth adoption without imposing drastic changes on existing systems.

**Recommendations:**

1. **Data readiness for AI:** Ensure that RAID-E explicitly addresses data quality, interoperability, and preparatory steps necessary before AI deployment becomes feasible at scale. These result-oriented efforts could truly provide added value for the sector. Adding to this, it remains key to continue **supporting research and innovation** through fostering R&D partnerships, EU pilot projects, dedicated funding instruments, and targeted skills development to drive digital transformation.
2. **Sustainable data centre integration**: Manage demand by fostering policy to reduce speculative connection requests and increasing grid capacity to mitigate congestion and promoting early stakeholder dialogue within DNDPs to align future demand with grid planning.
3. **Guiding roadmap with recommendations:** We welcome a coordinated EU roadmap that complements existing legislation while avoiding regulatory overlaps and additional complexity. Alongside the roadmap, the sector looks forward to guidance on AI high risk use cases for the sector which maintains a narrower scope, as originally intended in the law (AI Act, recital 55).
4. **Build on existing structures:** Any new initiatives should utilise existing ecosystems and governance structures whenever they have proved effective.
5. **EU-wide AI initiative:** a Horizon-funded programme for a specialised foundation model could accelerate AI deployment. If launched, development should remain strictly European within a trusted data-sharing environment, based on European AI models, and supported by secure access to European compute infrastructure. In this case, real-world examples and testing are needed before wide deployment. Relevant stakeholders should be included when defining use cases and training processes. As an example, a model for improved weather forecasting could be valuable.

# Public consultation - Survey

## Part 1 – Your involvement in digitalisation and AI in the energy sector

### Question1. How do you assess your level of knowledge and perception of the sector?

| | Excellent | Very good | Good | Basic | No knowledge | I do not know / No opinion |
|---|---|---|---|---|---|---|
| *a. My knowledge of the energy system and its dynamics is: | X | | | | | |
| *b. My knowledge of how digital solutions could apply to the energy system is: | X | | | | | |
| *c. My knowledge of how AI could apply to the energy system is: | X | | | | | |

* Question2. What is your or your organisation's involvement in digitalisation of the energy system?

Answer
a. Energy generation
Answer
b. Network operation
Answer
c. Energy supply
Answer
d. Service providers
Answer

e. Technology providers
Answer
f. Developers of digital / AI solutions
Answer
g. Regulatory and public institutions
Answer
h. Research/ academia
Answer
i. Consumers/ prosumers / energy communities
Answer
j. Other, please specify (100 characters max)
Answer
k. No opinion

Industry association representing DSOs, generation, market players such as aggregators & energy communities

## Part 2 – Accelerate the deployment of digital and AI solutions to benefit energy system and consumers

Question3. Which key areas of the energy system stand to benefit most from the deployment of digital and AI technologies?

*Maximum 3 selection(s)*
Answer
**a. Power grid management: real-time monitoring, predictive maintenance, grid balancing**
Answer
b. Renewable energy generation: permitting, digital repositories of data, environmental impact assessment (EIA) etc.
Answer
**c. Renewable Energy Integration: grid integration, dispatch optimisation**
Answer
**d. Demand Management: smart consumption, demand-side flexibility, dynamic pricing.**
Answer
e. Energy efficiency in buildings or energy intensive industries and processes
Answer
Other, please specify
Answer
No opinion

Question4. Select the three main barriers to deploy digital and AI technologies in the energy sector.

*Maximum 3 selection(s)*
Answer
a. Lack of interoperability and standards
Answer
**b. Limited access to high-quality data**

Answer
**c. Cybersecurity and data privacy concerns**
Answer
d. High upfront investment costs
Answer
e. Regulatory and policy gaps
Answer
f. Skills and workforce shortages
Answer
g. Low digital maturity of legacy systems
Answer
h. Lack of demonstration projects and use cases
Answer
i. Fragmented governance and coordination
Answer
**j. Unclear business models and uncertain returns on digital investments**
Answer
k. Social perception issues and mistrust of digital and AI technologies
Answer
l. Resistance to organisational change
Answer
m. Fear of vendor lock-in
Answer
n. Other, please specify
Answer
o. No opinion

Question5. To what extent can digitalisation and AI have an impact on energy poverty?

*Maximum 3 selection(s)*
Answer
a. Digital and AI tools can eradicate energy poverty
Answer
**b. Digital and AI tools can be implemented by local authorities to identify and support energy poor households, via specific technology easy to handle**
Answer
c. Digitalisation has only an indirect positive effect on energy poverty
Answer
**d. Digital and AI tools have limited impact on alleviating energy poverty**
Answer
e. Digital and AI tools increase the energy consumption of energy poor and vulnerable households, negatively affecting their welfare and increasing energy poverty
Answer
**f. Other, please specify:**
**Indirect risks of increasing energy poverty can be mitigated by focusing**

**on increasing consumer accessibility and ensuring inclusivity by-design, by for example not excluding non-digital consumers.**

**can promote energy efficiency and demand response targeted to selected vulnerable households. Any digitalisation measures should have**
Answer
g. No opinion

## Part 3 – Establish the common European energy data space

Question6. Which are the three main barriers when establishing a common European energy data space, to enable demand side flexibility and smart energy services.

*Maximum 3 selection(s)*
Answer
a. Absence of an established data governance framework
Answer
b. Lack of a consistent data access regulatory framework
Answer
c. Lack of sufficient funding for creating a data sharing infrastructure
Answer
d. Complexity of technologies and lack of simple plug-and-play solutions
Answer
e. Lack of data interoperability and insufficient use of commonly agreed data exchange standards 1
Answer
**f. Trade-off between open access and data privacy**
Answer
g. Lack of sufficient data exchange due to commercial confidentiality
Answer
h. Lack of digital competences and skills
Answer
i. Lack of trust and/or public acceptance
Answer
**j. Cybersecurity vulnerabilities**
Answer
k. Lack of awareness by the different actors
Answer
l. Other please specify
**Value generated is not clearly identified, lack of value for the different actors involved.**
Answer
m. No opinion

Question7. What would be the most adequate type of entity to oversee the governance of the common European energy data space?
Answer

a.The European Commission acting as the overarching governing body responsible for the governance of the energy data space
Answer
b. An independent EU entity mandated by an EU regulation
Answer
**c. Joint task force of EU entities (e.g. the network operators)**
Answer
d. A Commission expert group
Answer
e. A Combination of the above
Answer
f. None of the above, but [*please specify below*]
Answer
g. No opinion

Question8. What are the main actions that could help mitigate risks associated with data spaces?

*Maximum 3 selection(s)*
**Answer**
**a. Establishing oversight for data privacy and security protocols**
**Answer**
**b. Defining clear guidelines for data ownership and control**
Answer
**c. Coordinating the development of interoperability standards**
Answer
d. Setting up regulatory bodies for compliance management
Answer
e. Implementing systems for regular data quality assessments
Answer
f. Developing a financial strategy for sustainable funding
Answer
g. Facilitating communication and collaboration among stakeholders
Answer
h. Building scalable infrastructure for future growth
Answer
i. Other, please specify
Answer
j. No opinion

## Part 4 – Develop AI foundation models for the energy sector

Question9. Given that most existing applications in the energy sector rely mostly on traditional AI methods, do you think there's a case for deploying AI foundation models?

Answer
a. Yes, definitely, AI foundation models hold strong potential to accelerate innovation and improve decision-making across the energy sector.
**Answer**
**b. Yes, but with caution, it should be explored in specific use cases, with clear safeguards and governance in place.**
Answer
c. Possibly in the future, the technology is promising, but it needs further maturity and testing before wide deployment.
Answer
d. No, too risky, the uncertainties and potential misuse outweigh current benefits in critical energy infrastructure.
Answer
e. Not sure, more information and real-world examples are needed to form an opinion.
Answer
f. Other, please specify
Answer
No opinion

Question10. Do you think an EU-wide initiative bringing together European energy and technology companies for the development of AI foundation models, would accelerate the deployment of digital and AI solutions to the energy system?

Answer
a. Strongly agree
**Answer**
**b. Agree**
Answer
c. Unsure
Answer
d. Disagree
Answer
e. Strongly disagree
Answer
f. No opinion
Answer
g. Other, please specify

Question11. What should be the priorities for an EU-wide initiative to support the development of AI foundation models for the energy sector?

*Maximum 3 selection(s)*
Answer
a. Establish a trusted environment for data sharing for the purposes of development and training of AI models
**Answer**
**b. Testing and validation of AI models**
**Answer**
**c. Develop regulatory sandboxes for application of AI models**
Answer
d. Joint procurement for AI model development
Answer
e. Deploy of AI models at large scale
Answer
f. Management of risks associated to the application of AI models
**Answer**
**g. Share best practices for risk for compliance with national and EU regulation**
Answer
h. Secure access to compute infrastructure (e.g. AI factories)
Answer
i. There is no need for an EU-wide initiative, the market actors can build AI models privately
Answer
j. Other, please specify
Answer
k. No opinion

## Part 5 – Prepare the energy system of tomorrow and boosting EU competitiveness

Question12. Investments in smart grids – What are the major barriers that prevent investments in smart/digitalised grid solutions?

*Maximum 3 selection(s)*

**Answer**

**a. Legal constraints - grid tariffs are not incentivising smart/digital solutions.**

**Answer**

**b. Financial constraints – the financial resources that are available for grid developments are directed to other areas.**

Answer

c. Technical constraints - the technical complexity or maturity of the smart solutions might raise problems during operations, therefore such investments would pose higher risks.

**Answer**

**d. Interoperability issues - it is difficult to ensure compatibility between the installed grid assets and the new smart components and technologies.**

Answer

e. Know how – the grid operators find challenging to understand the costs and benefits of the novel technologies, or do not have the capacity to integrate them in their systems.

Answer

Other, please specify

Answer

No opinion

Question13. The use of digital twins in electricity grids – What would be the most pressing needs of the grid operators to enable them to deploy integrated digital twin solutions in their grids?

*Maximum 3 selection(s)*

**Answer**

**a. Improved observability of grid assets and data made available by those assets.**

Answer

b. Improved access to grid edge data (e.g. smart meters, distributed energy resources).

**Answer**

**c. Improved interoperability among different technologies/grid components.**

**Answer**

**d. Suitable remuneration framework to support effective investment recovery.**

Answer

e. More advanced solutions for integrated digital twins made available on the market.

Answer

f. Other, please specify
Answer
g. No opinion

Question14. Research and innovation – What further actions would most effectively strengthen Europe's capacity to innovate in smart energy systems?

*Maximum 3 selection(s)*
**Answer**
**a. Making available suitable EU funding for piloting innovative solutions (e.g. Horizon Europe).**
Answer
b. Having access to other funding sources, notable private to bring innovation to markets.
**Answer**
**c. Offering dedicated de-risking financial instruments to reduce the implementation risks of innovative technologies.**
**Answer**
**d. Building partnerships (e.g. between grid operators and academia & research), establishing innovation hubs (among key players in the energy value chains).**
Answer
e. Strengthening trans-European cooperation (e.g. through a more effective implementation of the SET Plan).
Answer
f. Other, please specify
Answer
g. No opinion

Question15. The European Commission supports the development of AI solutions for the energy sector. Already available measures include the creation of AI factories, and of Testing and Experimentation Facilities (TEFs). Would any additional measures be needed and if yes, which ones?

**Answer**
**a. Support for creating ecosystems/hubs that bring together developers and energy players to build AI-based solutions, applications, foundational models etc.**
Answer
b. Support for the development of AI-based applications, foundational models, solutions etc.
Answer
c. The current public support is sufficient for the time being. Private companies, R&I organisations, grid operators, aggregators and other energy players should make the best use of it when developing applications and solutions for the energy sector.
Answer
d. Other, please specify

Answer
e. No opinion

## Part 6 – Integrate the electricity demand of data centres in the energy system in a sustainable way

Question16. What are the major barriers that hinder grid connection of data centres?

*Maximum 3 selection(s)*
**Answer**
**a. Infrastructure constraint, lack of grid infrastructure limiting access**
Answer
b. Time constraints, connection requests are too long to process
Answer
c. Financial constraints, connection to the grid and power are too costly
Answer
**d. Planning constraints, connection requests are denied based on location or redirected to other locations**
Answer
e. Complexity, difficulty to navigate applicable rules and procedures
Answer
f. Divergent national rules and procedures
Answer
**g. Other, please specify**
**“Lack of a specific framework for connection of large consumers, that can create capacity with defined timelines for the connection of large scale projects (such as data centres), that avoids exhausting the available capacity in the network for all other new connections.**
**“There is a need to coordinate data center locations with the availability of grid and renewable energy sources deployment.”**
Answer
h. No opinion

Question17. What are the major challenges that arise from the rapid expansion of data centres?

*Maximum 3 selection(s)*
**Answer**
**a. Grid congestion in areas with data centre clusters**
Answer
**b. Complexity in grid planning caused by rapid development of data centres**
Answer
c. Inflexible and firm demand profiles of data centres with little variability
Answer
d. Delays in grid connection approvals caused by rising demand
Answer
e. Risk of overloading substations resulting to costly and time-consuming upgrades

Answer
f. Challenges in integrating renewable energy: meeting data centres' power needs with clean energy sources requires careful matching of generation and demand
Answer
g. Impact in energy affordability: perception that data centres compete with households and local businesses for limited energy resources
Answer
h. Environmental concerns related to water use, land use and landscape preservation (e.g. visual impact)
Answer
**i. Other, please specify:**
**capacity depends on geographical location; ghost connection requests; data centers can exhaust all capacity**
Answer
j. No opinion

Question18. What immediate measures should be taken to ensure the sustainable integration of data centres into the power grid?

*Maximum 3 selection(s)*
Answer
a. Improve transparency and set data sharing obligations for data centre developers and grid operators by establishing early and continuous dialogue
Answer
**b. Coordinate long-term planning integrating data centre expansion into national and regional grid development plans**
Answer
c. Reflecting grid capacity and sustainability requirements more strongly in local permitting requirements
Answer
d. Incentivise data centres to be built in areas with available grid capacity and close to renewables' generation areas
Answer
e. Promote flexibility and load shifting through financial or non-financial incentives
Answer
f. Mandate the use of renewable energy or green PPAs
Answer
g. Grid connection requirements linked to sustainability – conditioning grid access on sustainability criteria, such as carbon impact or load flexibility
Answer
h. Other, please specify
**Incentivise DCs to be built in areas suited to integrate them (Clean power production proximity, grid capacity, re-use waste heat)"**
Answer
i. No opinion
Question19. What actions could support the shift to more sustainable and energy efficient data centres?

*Maximum 3 selection(s)*
Answer
**a. Creating a rating or labelling scheme for data centres**
Answer
**b. Introducing minimum performance standards that aim to improve resource efficiency (power, water usage or other resources)**
Answer
c. Ensuring access to clean energy through financial instruments such as PPAs
Answer
d. Incentivising waste heat recovery and reuse in industrial or residential cluster in proximity
Answer
**e. Incentivising the enrolment of data centres in flexibility programs**
Answer
f. Incentivising research into hybrid grid connection with on-site renewable power generation
Answer
g. Other, please specify
Answer
h. No opinion

## Part 7 – Enhance transparency and risk oversight

Question 20. Which of these actions would be most beneficial to mitigate risks associated with the use of digital and AI in energy systems and create a trusted environment?

*Maximum 3 selection(s)*
Answer
**a. Regulatory advice and guidance on compliance with requirements and obligations under the AI Act provisions on high-risk systems and with other Union legislation applicable to AI (e.g. NIS 2, Cyber Resilience Act, GDPR etc.)**
Answer
b. A clear liability framework and principles for shared responsibility across the AI value chain in case of AI failure
Answer
**c. Coordinating energy stakeholders to agree on safeguards for digital and AI technologies (identify common risks, secure critical infrastructure, and establish standards that ensure safety, interoperability, and accountability)**
Answer
d. Requiring mechanisms for human oversight and intervention (human-in-the-loop for direct approval and human-on-the-loop for ability to override)
Answer
**e. Other, please specify**
**Clear principles in case of data misuse leading to cyber/physical attacks impacting electricity flow**
Answer
f. No opinion

Question21. On what aspects of AI and digitalisation related legislation would you see the highest need for further guidance for deployment of digital and AI technologies in the energy sector?

*Maximum 3 selection(s)*
Answer
**a. GDPR compliance: advising on effective GDPR-compliant anonymisation techniques suitable for smart meter and grid operational data**
Answer
**b. AI Act compliance: high-risk systems for the energy sector**
Answer
**c. The Network and Information Systems (NIS2) Directive**
Answer
d. The Cyber Resilience Act
Answer
e. The Data Act
Answer
Other, please specify
Answer
No opinion

## Part 8 – Establishing a coordination and governance framework

Question22. What do you perceive as the main barriers in building a coordination and governance framework among the different actors for digital and AI technologies in the energy sector?

*Maximum 3 selection(s)*
Answer
**a. Insufficient knowledge transfer and collaboration between Member States**
Answer
b. Lack of engagement with international organisations and forums like the IEA and Clean Energy Ministerial
Answer
**c. Limited or insufficient infrastructure for supporting a diverse AI innovation ecosystem in energy**
Answer
**d. Inadequate integration of digitalisation of energy policies, including AI principles, in national strategies (or National Energy and Climate Plans)**
Answer
e. Lack of monitoring and exploitation of results
Answer
f. Other, please specify
Answer
g. No opinion

Question23. What are the main aspects to be prioritized by the European Union when setting up a coordination and governance framework among the different

actors in the digital and energy domains?

*Maximum 3 selection(s)*
Answer
a. Harmonizing national regulatory frameworks
Answer
**b. Supporting sectoral innovation**
Answer
c. Establishing clear formal governance structures for AI systems
Answer
**d. Enhancing EU's participation in new international initiatives on AI in energy**
Answer
e. Designing of 'European AI in energy' plans and measures in line with international best practices.
Answer
f. Ensuring comprehensive coverage of digitalisation of the energy system in national EU regulations.
Answer
Other, please specify
Answer
No opinion

Question24. Which of the following actions do you think would be most effective in developing a coordinated framework to advance AI and digital technologies in the energy sector?

*Maximum 3 selection(s)*
Answer
**a. Establish an expert group dedicated to AI in energy, possibly under an existing group such as the Smart Energy Expert Group (SEEG)**
Answer
b. Establish a dedicated implementation working group on AI in energy within the SET Plan
Answer
**c. Engage Member States to develop a unified strategic approach to AI in energy or strengthen synergies between Digital Decade Policy Programmes and National Energy and Climate Plans**
Answer
**d. Enhance EU's participation in international initiatives on AI in energy to understand the needs of relevant actors**
Answer
e. Ensure proper coverage of the digital transformation of the energy system in the upcoming revision of the Energy Governance Regulation
Answer
Other, please specify
Answer
No opinion

Question25. What are the priority topics for digitalisation and AI in energy that the EU should engage with in various international fora?

*Maximum 3 selection(s)*
Answer
**a. Exchange best practices on the integration of AI in the energy system, focusing on regulatory barriers and how to overcome them**
Answer
**b. Develop high-level strategic orientations on the development and use of AI in the energy system**
Answer
c. Foster AI policies that support development of beneficial, trustworthy, and robust artificial intelligence in the energy system
Answer
d. Other, please specify
Answer
e. No opinion

Eurelectric pursues in all its activities the application of the following sustainable development values:

Economic Development

- Growth, added-value, efficiency

Environmental Leadership

- Commitment, innovation, pro-activeness

Social Responsibility

- Transparency, ethics, accountability

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