

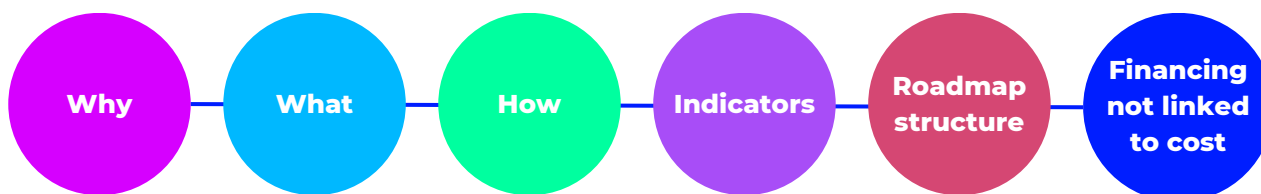
POLICY ROADMAPS FOR THE REPLICATION OF INNOVATIVE ENERGY SERVICE MODELS

POLICY BRIEF

MARCH 2026

This document aims to support policymakers at national level to comprehend the mix of relevant directives, regulations and initiatives, while making a link with the regulatory, financial and market recommendations suggested in this deliverable.

The methodology is influenced by the European Commission's practical toolkit for preparing Roadmaps for Administrative Capacity Building^[1] and includes a 6-step approach in the process of roadmap development.



InEEExS aims to promote the digitisation of business processes and the integration of smart services as key factors in optimizing global supply chains and energy efficiency. Smart services provide innovative ways to deliver value, offering new approaches to supplier-customer relationships. Despite their potential, the adoption of smart services faces significant barriers, such as market, financial, and legal challenges, which impact their development and implementation. The involvement of multiple stakeholders with differing perspectives further complicates the process. Addressing these barriers is therefore essential for widespread adoption and maximizing the transformative potential of smart services in the energy sector.

The InEEExS policy roadmap echoes a thorough analysis of the relevant regulatory framework, while making a direct link with the findings of “Business and Policy Roadmaps”. It must be mentioned that this roadmap reflects a general approach and does not go into the details of the national and/or regional circumstances. Developing national policy roadmaps would require a thorough analysis of the national context, including the status of the relevant legislation, national targets, conditions and socio-economic priorities, as well as current and planned policies and measures and funding instruments. However, the InEEExS policy roadmap could serve as a first step towards a more concise national roadmap.

[1] https://ec.europa.eu/regional_policy/policy/how/improving-investment/roadmap-admin_en



Some of the barriers identified reflect the following areas

- Complex and fragmented regulatory framework and market rules
- Limited consumer awareness and participation
- Lack of regulatory support for energy communities
- Insufficient market access for smart services and technologies
- Regulatory barriers to grid integration of renewable energy and distributed energy resources (DER)
- Limited access to financing for renewable energy and distributed energy resources (DER) projects
- Regulatory gaps in demand response participation and consumer flexibility compensation
- Insufficient monetization mechanisms for demand flexibility services
- High upfront costs of energy efficiency and retrofitting projects
- Limited access to and interoperability of energy data for digital and smart energy services
- Regulatory uncertainty for innovative business models (e.g. aggregation, peer-to-peer trading, energy-as-a-service)
- Administrative complexity and permitting delays affecting renewable and energy efficiency projects

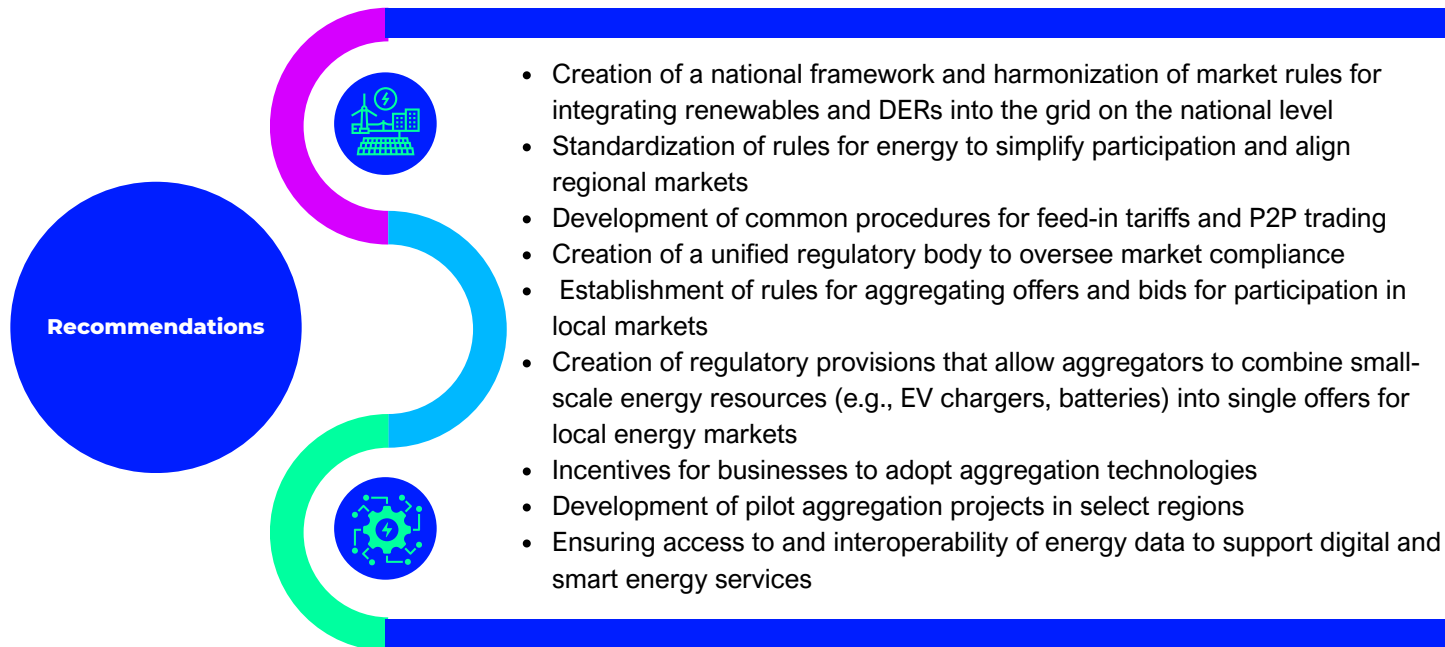
This policy roadmap aims to reveal the key legislative framework and associated initiatives covered under the Fit-for-55 package that promote the digitalisation of the energy system towards the clean energy transition.

The **EU electricity market** is designed to incentivise the clean energy transition while delivering on key objectives of energy security and affordability. The revised rules aim to make the EU energy market more resilient and the energy bills of European consumers and companies more independent from the short-term market price of electricity. The **Electricity Directive** (EU/2019/944) on common rules for the internal market for electricity and the **Electricity Regulation** (EU/2019/943) on the internal market for electricity put the consumer at the centre of the clean energy transition, enabling active participation, with a strong framework for consumer protection. This can be achieved by using long-term contracts, such as power purchase agreements and structuring investment support with 2-way contracts. The rules allow more flexibility to accommodate the increasing share of renewable energy in the grid and contribute to the creation of green jobs and growth. The Electricity Directive (EU) 2019/944 ensures that renewable energy sources are prioritised in electricity markets and connected to the grid effectively. It also promotes the use of electricity storage and demand-side response to balance the grid and integrate more renewable energy.

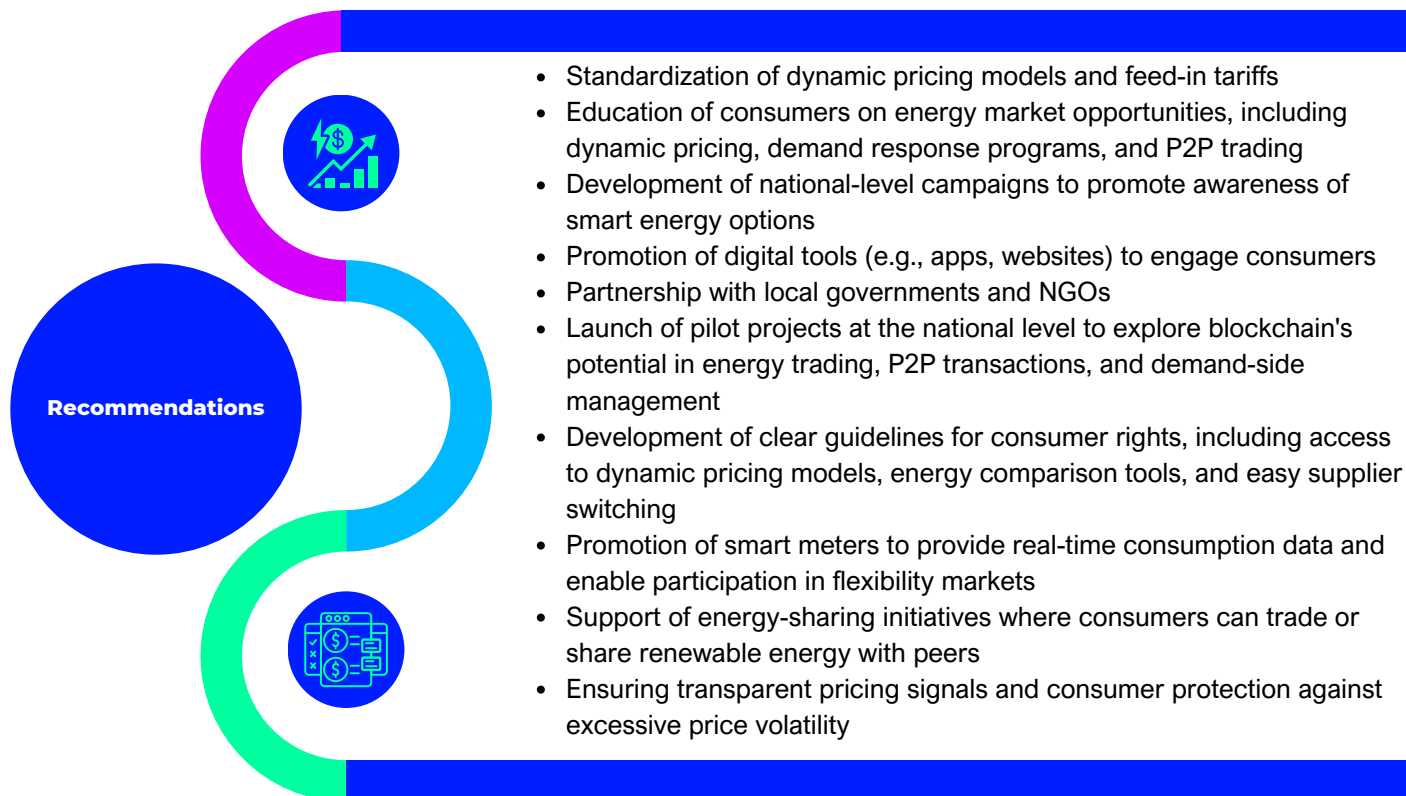
The framework has been further complemented by the recast of **Electricity Market Design 2024** (EU/2024/1747), which reinforces price stability mechanisms, promotes long-term contracts such as PPAs and Contracts for Difference, and strengthens the role of flexibility, storage, and demand-side participation in electricity markets.

In addition, the policies for energy system integration support the energy transition by creating a more interconnected and coordinated energy network that makes better use of renewable resources and enhances efficiency. A more flexible and decentralised energy system, driven by energy system integration, is therefore needed to smoothly absorb additional renewable generation and reach the EU's decarbonisation goals. Energy system integration means creating stronger links between different types of energy carriers (such as electricity, liquid, gas and solid fuels, etc.), energy infrastructure and consumption sectors.

As part of the European Green Deal, the Commission presented an **EU strategy for energy system integration** in July 2020 which promotes the electrification of end-use sectors and involves various existing and emerging technologies, processes and business models, such as ICT and digitalisation, smart grids and meters and flexibility markets.



Smart energy pricing models provide efficiency, transparency and incentives to keep costs as low as possible. In the **pay-as-bid model**, producers (including cheap renewables) would simply bid at the price they expect the market to clear, not at their generation costs. Overall, it is better for consumers to have a transparent model that reveals the true costs of energy and provides incentives for individuals to become active in generating their own electricity.



Energy communities enable collective and citizen-driven energy actions to support the clean energy transition. They can contribute to increasing public acceptance of renewable energy projects and make it easier to attract private investments in clean energy measures. Energy communities can be an effective means of re-structuring energy systems, by empowering citizens to drive the energy transition locally and directly benefit from better energy efficiency, lower bills, reduced energy poverty and more local green job opportunities. This role is further strengthened under the Citizens Energy Package (COM (2026) 115 final), which enhances consumer empowerment, promotes energy sharing and participation in energy markets, and addresses affordability and access to clean energy solutions, particularly for vulnerable consumers.



- Promotion of citizen-driven energy actions to build trust and drive local participation
- Legal recognition and provision of administrative and financial support for energy communities
- Alignment of national laws with EU definitions for energy communities
- Provision of grants or subsidies for community-driven renewable projects
- Establishment of specific goals at national and local level for the establishment of at least one energy community per municipality.
- Facilitation of energy sharing and peer-to-peer participation within and across energy communities
- Provision of technical assistance and one-stop-shop support for the creation and operation of energy communities

Smart grids are energy networks that can automatically monitor energy flows and adjust to changes in energy supply and demand accordingly. When paired with smart meters, which measure the energy fed into and consumed from the grid, they can provide real-time information on energy-usage to consumers and suppliers. Since smart grids can respond to changes in supply and demand, they are well suited to cope with variations in supply from renewable energy sources, helping to integrate more wind and solar, as well as new electricity loads, such as heat pumps and electric vehicles.

Smart grids open-up the possibility for consumers who produce their own renewable energy, for example from rooftop solar panels, to sell it back to the grid. With smart meters, final customers also get accurate and regular measurements of their energy use and get billed only on electricity they actually use. This puts an end to incorrect bills, and back billing, which are currently a significant concern for consumers.

Smart meters can provide close to real time feedback on energy consumption, enabling consumers to better manage their use, save energy and lower their bill, for example, by adapting their energy usage to different energy prices throughout the day. Moreover, smart meters enable consumers to actively participate in energy communities and energy sharing schemes. Through smart metering, network operators get a better insight into each part of the network. This allows them to better plan their investments and manage their infrastructure in response to the requirements of their customers, therefore reducing network operation and maintenance costs which are ultimately borne by consumers through network tariffs.

Smart meters should allow consumers to reap the benefits of the progressive digitalisation of the energy market. Consumers should also have timely access to their energy consumption data and dynamic electricity price contracts. According to the EU Agency for the Cooperation of Energy Regulators (ACER) Market Monitoring Report, 54% of European households had an electricity smart meter at the end of 2021, while in 13 EU countries, the penetration rate was over 80% at the end of 2022.[2] To maximise the value of metering data, especially the high potential offered by fit-for-purpose smart meters, the Commission adopted Implementing Regulation (EU/2023/1162) in June 2023[3] aiming to improve access to metering and consumption data by introducing requirements for interoperability and non-discriminatory access. These measures empower consumers, through digitalisation, to actively participate in the energy transition and enable energy service providers to develop new, beneficial services and products. Additionally, in July 2024, guidance was published to support the streamlined reporting of national implementation of these rules, further enhancing the integration and utilisation of smart meter data across the EU. In addition, the Data Act (EU/2023/2854) further supports fair access to and use of energy-related data, facilitating the development of innovative digital energy services.[4]

[2] Energy retail and consumer protection volume

[3] <https://www.acer.europa.eu/electricity/market-monitoring-report>

[4] <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32023R1162>

[5] <https://ep.europa.eu/en/publication-detail/-/publication/f33b3dd9-3a82-11ef-a1cb-01aa75ed71a1/language-en>



Recommendations

- Development of market access frameworks for smart technologies (e.g., demand response, smart meters) into local energy markets
- Simplification of the procedures for certifying and integrating smart technologies
- Mandate local utilities to adopt smart systems for grid management
- Provision subsidies for smart technology adoption by consumers
- Establishment of national guidelines for energy data sharing under GDPR and EU data frameworks
- Development of interoperable systems for secure data exchange between stakeholders
- Provision of incentives for utilities and companies to adopt interoperable platforms
- Fund research into secure energy data solution
- Development of policies that ensure fair access for renewable energy providers to the grid and market mechanisms
- Simplification of grid connection processes for small-scale DERs
- Development of clear guidelines for consumer rights, including access to dynamic pricing models, energy comparison tools, and easy supplier switching
- Application of the Implementing Regulation (EU) 2023/1162: Ensure interoperability and secure access to metering data
- Increase investments in smart grids and advanced data management systems to facilitate energy system integration and optimize renewables
- Implementation of the Digitalisation of Energy Action Plan with robust cybersecurity measures to safeguard data and grid operations

Flexibility markets help to incentivise changes in energy supply and demand by integrating different technologies. As the energy system relies more and more on renewables and electricity (for example because of e-mobility and electric heat pumps for heating) the electricity system becomes more decentralised and interactive. Flexibility markets help energy networks to monitor energy flows and create market signals to motivate changes in energy supply and demand, integrating smart meters, smart appliances, renewable energy resources and energy efficient resources accordingly.

For the energy system to integrate various sources of renewable energy and ensure that production and consumption of electricity always match, the grids need to become smarter. This requires a high-level of digitalisation and automated communication and control, while it will benefit consumers, as they can get better control over their energy consumption. They can for example opt for clean, locally produced electricity, invest in local cooperatives or install solar panels on their roof.

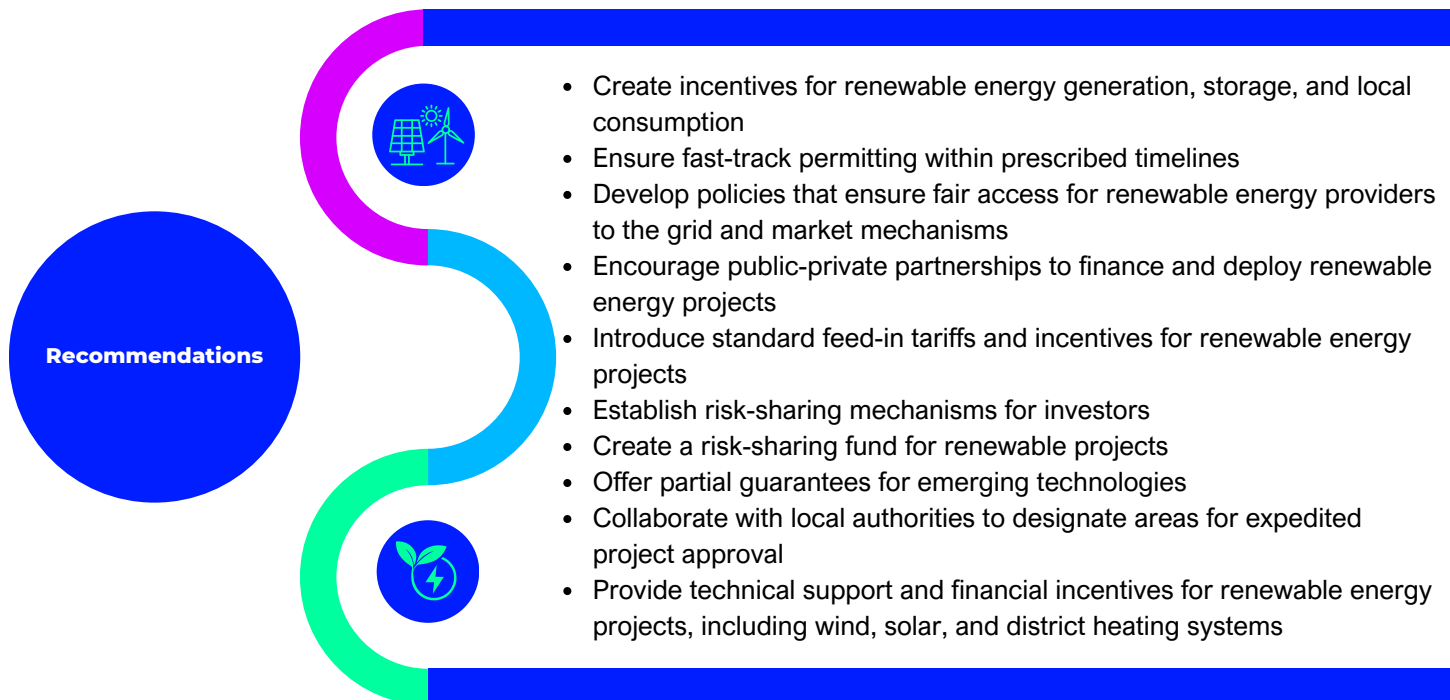


Recommendations

- Establishment of clear national frameworks and compensation mechanisms for consumer participation in demand response programs
- Creation of national regulations for demand response participation
- Definition of transparent compensation models for flexibility services
- Promotion of pilot demand response programs to refine mechanisms
- Implementation of real-time pricing models in electricity markets
- Aggregation of consumer demand response for market trading
- Monetization of demand flexibility with dynamic pricing
- Introduction of dynamic pricing

The Renewable Energy Directive is the legal framework for the development of clean energy across all sectors of the EU economy. The more flexible the energy system is, with generation that can rapidly turn on or off, storage that can absorb or put power onto the system, or responsive consumers who can increase or decrease their demand for power, the more stable prices can be and the more renewable energy the system can integrate.

Building on the 2009 and 2018 directives, the revised directive introduces stronger measures to ensure that all possibilities for the further development and uptake of renewables are fully utilised. This will be key to achieving the EU's objective of climate neutrality by 2050 and to strengthen Europe's security of energy supply. In addition to the new headline target to double the existing share of renewable energy sources, a strong policy framework will facilitate electrification in different sectors, with new increased sector-specific targets for renewables in heating and cooling, transport, industry, buildings and district heating/cooling, but also with a framework promoting electric vehicles and smart recharging.



The Energy Efficiency Directive is a key driver of Europe's energy transition. The 2023 revised directive raises the EU energy efficiency target, making it binding for EU countries to collectively ensure an additional 11.7% reduction in energy consumption by 2030, compared to the projections of the EU reference scenario 2020. As a result, overall EU energy consumption by 2030 should not exceed 992.5 million tonnes of oil equivalent (Mtoe) for primary energy and 763 Mtoe for final energy. The revised directive also puts a stronger focus on alleviating energy poverty. It aims at empowering consumers through stronger requirements for EU countries to raise awareness and provide information on energy efficiency. It also emphasises the creation of one-stop shops, technical and financial advice and consumer protection via out-of-court mechanisms for the settlement of disputes. Furthermore, it includes improved regulations to identify and remove barriers related to split incentives for energy efficiency renovations between tenants and owners or among multiple owners. The changes introduced require EU countries to prioritise energy efficiency improvements for vulnerable customers, individuals affected by energy poverty and those living in social housing. Under the energy savings obligation, each EU country is responsible for achieving a share of its energy savings among vulnerable customers and those affected by energy poverty.

The Energy Performance of Buildings Directive contributes directly to the EU's energy and climate goals, aiming to achieve a fully decarbonised building stock by 2050. It also supports better air quality, the digitalisation of energy systems for buildings and the roll-out of infrastructure for sustainable mobility. Some of the measures included in the revised Directive include:

- the gradual introduction of minimum energy performance standards for non-residential buildings based on national thresholds to trigger the renovation of buildings with the lowest energy performance
- a binding target to increase the average energy performance of the national residential building stock by 16% by 2030 in comparison to 2020, and by 20-22% by 2035, based on national trajectories
- an enhanced standard for new buildings to be zero-emission and the calculation of whole life-cycle carbon for new buildings

- enhanced long-term renovation strategies, to be renamed National Building Renovation Plans
- increased reliability, quality and digitalisation of Energy Performance Certificates with energy performance classes to be based on common criteria
- the introduction of building renovation passports to guide building owners in their staged and deep energy renovations
- increased deployment of solar technologies in all new buildings and certain existing non-residential buildings where technically and economically feasible, and ensuring that new buildings are solar-ready (fit to host solar installations)
- a gradual phase-out of boilers powered by fossil fuels, starting with the end of subsidies to stand-alone boilers powered by fossil fuels from 1 January 2025
- one-stop-shops for the energy renovations of buildings for homeowners, small and medium-sized enterprises and other stakeholders
- further roll-out of recharging points for electric vehicles in buildings, removing barriers to their installation, enabling smart charging and introducing measures for bike parking in buildings
- data collection and sharing, to improve knowledge on the building stock and awareness on energy consumption in buildings



- Mandate retrofits for public and private buildings by set deadlines
- Development of targeted subsidies, tax breaks, and low-interest loans for renovations
- Development of national-level campaigns to promote awareness of smart energy options
- Promotion of digital tools (e.g., apps, websites) to engage consumers
- Partnership with local governments and NGOs for on-ground outreach
- Encouragement of hybrid systems combining gas and renewables
- Phase out of inefficient heating and cooling systems with a clear timeline
- Promote policies supporting innovations in gas technologies
- Prioritisation of vulnerable households and addressing energy poverty through targeted renovation support schemes
- Establishment and strengthening of one-stop-shops to provide technical, financial, and advisory support for building renovations
- Improvement of data collection, monitoring, and the use of Energy Performance Certificates (EPCs) to support evidence-based policy design and implementation

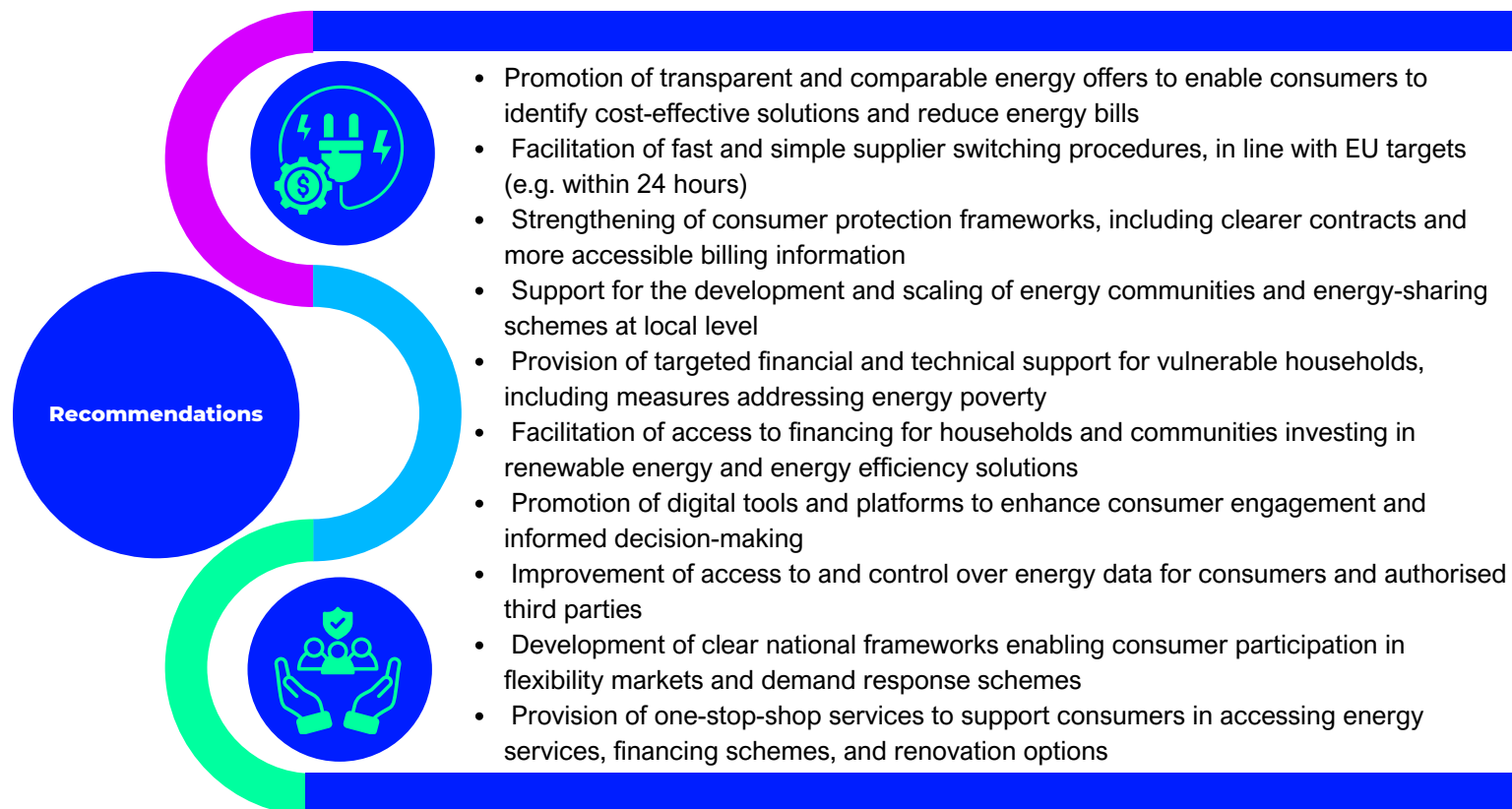
The **Citizens Energy Package** (COM/2026/115) introduces a comprehensive set of measures aimed at strengthening the role of consumers within the EU energy system, with a particular focus on affordability, transparency, and active participation. It seeks to address persistent challenges related to energy price volatility, limited consumer engagement, and unequal access to clean energy solutions, while supporting the transition towards a more decentralised, digitalised, and inclusive energy market.

The package builds on the existing EU regulatory framework by reinforcing consumer rights, enhancing market accessibility, and enabling new forms of participation such as energy sharing and community-based energy initiatives. It also places increased emphasis on social fairness, ensuring that vulnerable households are protected and supported throughout the energy transition.

Some of the key elements of the package include:

- lower energy bills and more transparent pricing, with clear and comparable offers enabling households and building users to identify cost-effective solutions
- easier and faster supplier switching (within 24 hours EU-wide), enabling potential savings of up to €200 per year per household
- stronger consumer protection, including clearer contracts and more accessible billing information, increasing transparency and trust
- strengthened provisions for energy communities and energy sharing, enabling citizens to produce, consume, store, and share renewable energy locally, with potential savings of up to €1,100 per year through collective self-consumption and surplus energy sales

- enhanced consumer empowerment through access to real-time information, flexible retail contracts, and participation in demand response and flexibility services
- targeted measures to address energy poverty and protect vulnerable households, including safeguards against disconnections and support for energy efficiency improvements
- facilitation of access to financing for households and communities to invest in renewable energy and energy efficiency solutions
- promotion of digital tools and platforms that enable consumer engagement, data access, and informed decision-making in energy markets
- improved access to and use of energy data, enabling the development of personalised and data-driven energy services
- simplification of energy markets and reduction of administrative barriers, making it easier for consumers to navigate offers and participate in energy systems



There are several **Key Performance Indicators** that could be applied to showcase the progress towards the smart and digital clean energy transition. The variety of the relevant policy initiatives and measures can be linked with indicative targets and associated indicators depending on the national conditions and in line with the National Energy and Climate Plans (NECPs). Indicatively, some indicators are presented below:

- increase in adoption of smart meters
- share/number of households equipped with smart meters
- share/number of households and businesses participating in demand response programs
- number of operational local energy communities
- improved grid flexibility and reduced restriction of renewable energy
- increase in cross-border electricity trade and regional market integration
- increase of renewable energy penetration
- number of active citizens participating in local energy initiatives
- reduction in final energy consumption (annual and cumulative)
- number of public sector buildings renovated
- number of private buildings renovated
- percentage of buildings equipped with smart heat pumps and energy management systems
- reduction in CO₂ emissions
- reduction in energy poverty rates
- reduced energy bills
- number of new green jobs
- upskilling of workforce (training programs)
- availability and use of real-time energy data by consumers and market actors
- number of consumers participating in energy sharing or peer-to-peer (P2P) schemes

Figure 1 - Indicative Policy roadmap structure

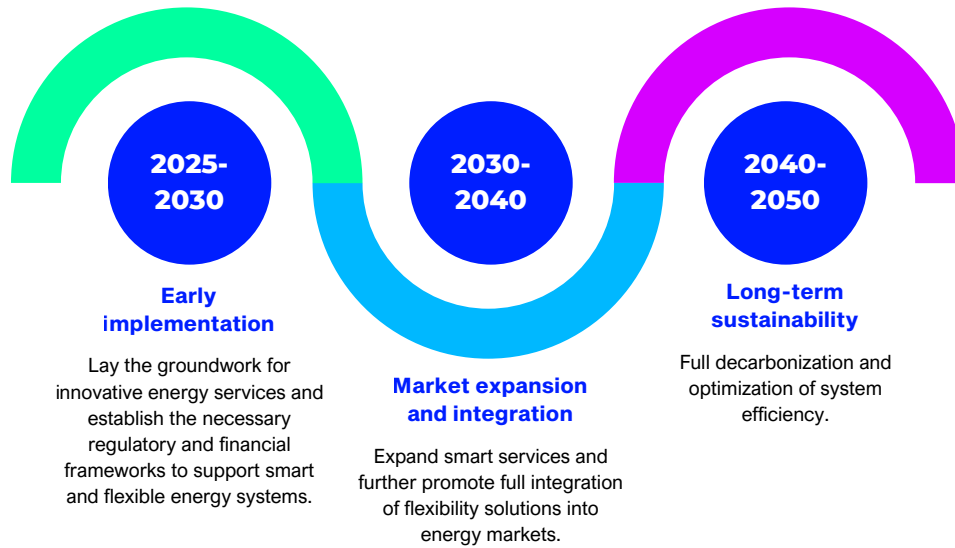
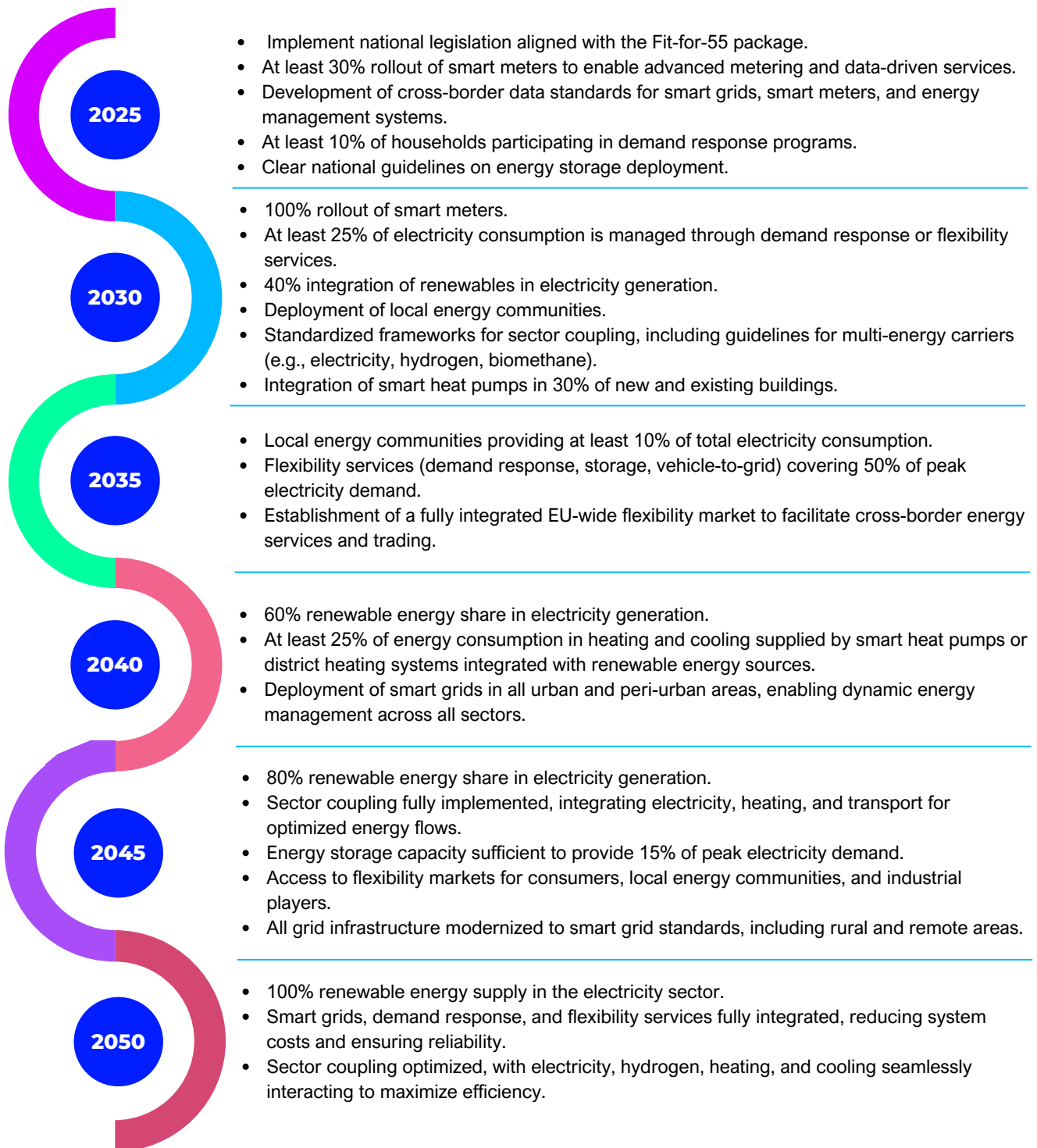


Figure 2 - Action plan towards digital and clean energy transition



The EU provides numerous funding instruments that could finance the Policy roadmap and the associated Action Plan. The REPowerEU plan, published on 18 May 2022, presents a comprehensive set of actions and resources aims to a) promote energy conservation, encourage clean energy production and diversify energy supplies in the EU, by prioritising energy savings, energy efficiency, and the expansion of renewable energy sources. To address any potential negative impacts stemming from the current regulatory framework, the revenue generated from the extension of the **EU Emissions Trading System (ETS2) to buildings and transport will be used through the Social Climate Fund.**



- Launch state-level green energy funds
- Provision of low-interest loans and grants for renewable projects
- Development of partnerships with local banks and financial institutions
- Establishment of retrofitting funds at the national level
- Partnership with Energy Service Companies (ESCOs) to deliver RES and energy efficiency projects
- Provision of financial incentives for early adopters of energy-efficient technologies
- Use revenues from the Social Climate Fund to subsidize renewable energy projects for low-income households
- Provision of financial and technical support for energy efficiency improvements in vulnerable communities
- Creation of one-stop shops for energy transition assistance, offering personalized advice and resource

ABOUT InEExS

The core concept of the LIFE project InEExS is the deployment of integrated energy services across sectors and carriers, and the tokenization of energy saving data in a public blockchain to facilitate cooperation among market segments and actors. InEExS improves the implementation of Energy Efficiency Directive (EED) Art8 and supports Obligated Parties to provide integrated service offers that enable energy savings, system efficiency and include non-energy benefits.

Particular attention is placed on the development of business models and contractual schemes that facilitate the implementation of sector-integrating smart energy services and the deployment of a wide range of sustainable technologies, such as renewables (RES), electric vehicles (EVs), heat pumps, internet of things (IoT) controls and other energy efficiency (EE) measures. The InEExS consortium brings together diverse market actors (utilities, energy communities, energy agencies, technology providers) who engage in trust creation methods to connect their activities through distributed ledger technology and smart contracts. This approach is validated through concrete business cases across Europe, specifically in Germany, Spain, Greece, and the Nordic countries, demonstrating the practical application of InEExS's innovative solutions in diverse contexts.

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