



DE-RISK LFMs

Policy and Regulatory Recommendations for EU and 10 Countries



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Α	AI .	Artificial intelligence
В	BESS	Battery Energy Storage System
C	CEC	Citizen Energy Community
D	DER	Distributed Energy Resources
D	DR .	Demand Response
D	OSF	Demand-side Flexibility
D	OSO	Distribution System Operator
D	OSR	Demand-side Response
Е	ïV	Electroviacle
F	S	Flexibility Services
F	SP	Flexibility Service Provider
lo	To	Internet of Things
IC	CT	Information and Telecommunication Technology
17	Γ	Information Technologies
LI	FM	Local Flexibility Market
N	NECP	National Energy and Climate Plan
C	OSS	One Stop Shop
Р	² 2P	Peer to Peer
Р	V	Photovoltaic
R	RE	Renewable Energy
R	REC	Renewable Energy Communities
R	RES	Renewable Energy Sources
Т	oU	Time-of-Use
Т	SO	Transmission System Operator



The DE-RISK project, funded under the Horizon Europe programme, aims to accelerate the deployment of Local Flexibility Markets (LFMs) across the European Union, supporting the clean energy transition, grid resilience, and active consumer participation. This policy report is based the findings of the **DE-RISK** Project on implementation and provides actionable recommendations for the European Commission and national authorities to address key regulatory and policy gaps identified in ten target countries: Spain, Portugal, Ireland, Greece, Bulgaria, Türkiye, Netherlands, Romania, France, and Italy.

Local Flexibility Markets are essential to efficiently integrate distributed energy resources (DERs), respond to local grid constraints, and enable consumers and energy communities to actively contribute to system optimisation. However, their development remains uneven and fragmented across Member States, with persisting regulatory barriers, limited incentives, and inconsistent system operator coordination.



KEY FINDINGS

- Fragmentation of regulatory frameworks: Many countries lack dedicated legal definitions, clear roles, and obligations for LFMs and flexibility providers.
- DSO-TSO coordination gaps: There is no consistent framework for coordinating flexibility congestion procurement and management across voltage levels.
- Limited access and incentives for consumers and aggregators: Current frameworks often do not provide sufficient incentives or visibility citizen-led participation.
- infrastructure and interoperability: Digital Absence of harmonised standards impedes the scaling of flexible services and cross-border replication.





At the **EU level**, the report calls for:

- Harmonised definitions and market design guidelines for LFMs.
- A binding requirement for national regulatory authorities (NRAs) to establish flexibility procurement frameworks.
- Strengthening consumer participation and the role of energy communities in LFMs.
- Accelerated development of interoperable digital platforms and real-time data exchange standards.

At the **national level**, each country must:

- Address country-specific legal, regulatory, and technical gaps.
- Integrate flexibility markets into national grid planning and tariff design.
- Build institutional capacity at regulatory and system operator levels.

CALL TO ACTION

The time is right for EU and national actors to align regulatory frameworks with the capabilities of modern distributed energy systems. The DE-RISK roadmap provides a concrete basis to deliver a flexible, resilient, and inclusive energy system. This report urges the European Commission and national bodies to take coordinated, ambitious steps in 2025 – 2030 to unlock the full potential of Local Flexibility Markets.



1. INTRODUCTION



CONTEXT AND PURPOSE

The European energy system is undergoing a profound transformation driven by decarbonisation, decentralisation, and digitalisation. To meet the European Green Deal targets, deliver on the Fit-for-55 package, and implement the Electricity Market Design reform, energy systems must become more flexible, resilient, and consumer-centric.

Local Flexibility Markets are emerging as a vital mechanism to unlock demand - side flexibility, integrate distributed energy resources, and address local grid constraints in a cost-effective manner. By enabling consumers, prosumers, energy communities, and aggregators to offer flexible services, LFMs can reduce system costs, defer grid reinforcements, and enhance energy security.

However, LFMs remain at an early stage of development across the EU. National regulatory frameworks vary significantly in maturity, with many lacking the legal, technical, and market conditions necessary for LFMs to scale. Without clear policy and regulatory direction, these markets risk fragmentation, inefficiency, and underutilisation.

DE-RISK PROJECT AND OBJECTIVES

The DE-RISK project, funded under the Horizon Europe programme, addresses these challenges by developing a comprehensive roadmap for LFM deployment European across ten countries: Spain, Portugal, Ireland, Greece, Bulgaria, Türkiye, Netherlands, Romania, France, and Italy.

This policy document translates the project's findings and the roadmap's outcomes into a targeted set of policy and regulatory recommendations to support:

- The European Commission in shaping common guidelines and incentives.
- National policy and regulatory bodies in removing barriers and aligning frameworks.
- System operators and market actors in accelerating LFM deployment.

These recommendations are grounded in real-world system needs, regulatory readiness, and stakeholder input, and are intended to guide coordinated EU and national action from 2025 to 2030 and beyond.

2. METHODOLOGICAL OVERVIEW

The recommendations presented in this document are mainly based on the DE-RISK LFM Roadmap, developed through a structured, multi-level methodology that integrates technical analysis, regulatory mapping, and stakeholder engagement.



1. COUNTRY SELECTION AND SCOPE

The ten countries that have been analysed, include the DE-RISK partner countries - Bulgaria, Greece, Ireland, Spain, Portugal and Türkiye, and four additional countries: France, Italy, the Netherlands and Romania, added to broaden the comparative scope. These countries represent a diversity of regulatory maturity levels, electricity system structures, and flexibility requirements.



2. REGULATORY AND MARKET MAPPING

A comparative analysis was conducted across all countries to:

- Assess the current status of LFMs in policy and regulation.
- Identify legal barriers, institutional bottlenecks, and technical readiness.
- Evaluate the roles of DSOs, TSOs, aggregators, and consumer groups.



3. ROADMAP DEVELOPMENT AND RECOMMENDATIONS FORMULATION

Each country's flexibility landscape was assessed through:

- Gap analysis: assessing the national status of the LFM framework.
- Barrier identification: covering regulatory, institutional, market-based, digital and social challenges.
- Definition of short- and medium-term actions to support LFM implementation.

The outcomes of the comparative analysis were synthesised to define:

- Cross-cutting EU-level recommendations applicable across all Member States.
- Country-specific recommendations tailored to national regulatory and system contexts.
- A set of implementation actions for the period 2025–2030.

This methodology ensures that all recommendations are:

- Evidence-based and aligned with the existing energy system realities.
- Actionable for policymakers and regulators.
- Scalable and replicable across the EU.



4. STAKEHOLDER ENGAGEMENT

The project engaged a broad range of stakeholders via national and DE-RISK project workshops, on-line meetings, surveys and discussions, participation in international events, etc.



3. KEY BARRIERS AND OPPORTUNITIES IDENTIFIED ACROSS COUNTRIES

The DE-RISK comparative analysis revealed a combination of common barriers and emerging opportunities across the ten target countries. While the degree of regulatory maturity varies, most countries face structural challenges that hinder the full deployment of Local Flexibility Markets. At the same time, there are promising practices and initiatives that can be scaled or replicated.

3.1. COMMON KEY BARRIERS

1. Regulatory and Legal Uncertainty

- Lack of legal definitions for flexibility services or LFMs in several national energy laws.
- Undefined or unclear roles and responsibilities for DSOs, TSOs, aggregators, and flexibility providers.
- Limited regulatory guidance at the national level on how flexibility should be procured and remunerated.

2. Market Access and Participation Constraints

- Barriers to entry for aggregators, including licensing burdens and restricted access to consumption/production data.
- Limited participation of consumers and energy communities mainly due to unclear value propositions or high transaction costs.
- Insufficient mechanisms for demand-side actors to compete with conventional generation or infrastructure-based solutions.

3. DSO-TSO Coordination Deficiencies

- Fragmented or missing coordination protocols between system operators across voltage levels.
- · No joint planning or prioritisation of local vs. national congestion management actions.
- Absence of platform interoperability or shared visibility of network constraints.

4. Digital Infrastructure Gaps

 Non-standardised data formats and APIs for exchanging flexibility offers, metering, and network status.

- Lack of real-time communication capabilities for activating flexibility at local level.
- Weak or fragmented ICT infrastructure, particularly in rural or less-developed regions.

5. Consumer Engagement and Incentives

- Flexibility signals are not reflected in retail prices or tariffs, limiting end-user incentives.
- Limited trust in digital platforms, automation, or third-party aggregators.
- Gaps in regulatory protection and consumer empowerment frameworks, particularly for vulnerable users.

3.2. EMERGING OPPORTUNITIES AND ENABLERS

1. Regulatory Innovation

- Some countries (e.g., Netherlands, France) are using regulatory sandboxes to test flexibility solutions.
- Provisions under the revised Electricity Regulation (EU) 2019/943 and Electricity Market Design reform introduces new legal instruments to accelerate LFM integration.

2. Pilot Projects and Demonstrations

- LFMs are being tested through EU-funded pilots and national regulatory experiments (e.g., OneNet, CoordiNet, INTERRFACE).
- These initiatives provide tangible evidence on cost-effectiveness, grid impact, and market potential of LFMs.

3. Digitalisation Trends

- Advanced metering infrastructure and smart grid deployments are expanding the digital backbone needed for flexibility.
- Open-source platforms and standardised APIs are emerging as key enablers to support interoperability.

4. Societal Readiness

- There is growing consumer awareness of energy-related issues and increased interest in self-consumption and peer-to-peer trading.
- Energy communities and prosumer-based models offer a grassroots channel for active participation in LFMs.







Based on the results of the DE-RISK project, the following EU-level policy recommendations—structured around five strategic pillars—aim to harmonise the development of Local Flexibility Markets (LFMs) across Europe and prevent market fragmentation:

1. REGULATORY ALIGNMENT AND MARKET DESIGN

- Define LFMs in EU legislation or through an implementing regulation that establishes common principles and actor roles.
- Mandate national regulatory authorities (NRAs) to establish flexibility procurement frameworks with minimum design requirements.
- Ensure non-discriminatory access to LFMs for all qualified actors, including aggregators, energy communities, and SMEs.
- Establish a European reference model for LFM operation, integrating DSO/TSO coordination and digital interfaces.

2. CONSUMER AND CITIZEN PARTICIPATION

- Enforce the right of consumers and energy communities to participate in flexibility markets under fair conditions.
- Develop EU-level guidance on flexibility contracts, secure data sharing, and consumer protection.
- Support the creation of local flexibility aggregators and innovative retail models through technical assistance and funding.

3. DSO-TSO COORDINATION

- Require the development of DSO-TSO cooperation frameworks for congestion management and flexibility procurement.
- Promote common grid planning methodologies that integrate flexibility into network investment decisions.
- Support shared digital tools and interfaces for system visibility and activation management.



4. DIGITAL INFRASTRUCTURE AND INTEROPERABILITY

- Mandate the use of standardised data formats and APIs for metering, dispatch, and settlement in LFMs.
- Align LFM platforms with existing ENTSO-E/CIM standards, e.g. building on BRIDGE and OneNet outcomes.
- Ensure cybersecurity and data privacy frameworks are applied to all digital LFM services.

5. FUNDING, CAPACITY BUILDING, AND MONITORING

- Launch a dedicated EU funding window (under CEF Energy, LIFE, or Digital Europe) to support the deployment of interoperable LFM platforms and regulatory pilots.
- Fund capacity-building programmes for NRAs and DSOs, focusing on LFM design, monitoring, and compliance.
- Introduce an EU-wide LFM Readiness
 Index to monitor Member State
 progress and identify support needs.



5. COUNTRY SPECIFIC RECOMMENDATIONS FACILITATING DEPLOYMENT OF LFMS



CURRENT STATUS SUMMARY

Bulgaria is in the early stages of integrating flexibility into its energy system and lacks a regulatory framework for LFMs. Independent aggregation is not yet defined or operationally possible. An appropriate regulatory framework is needed to facilitate market flexibility, which includes solving energy sharing issues.

Smart metering and digitalisation are progressing slowly, limiting near-term flexibility deployment.

The DSOs and ESO (TSO) operate without formal mechanisms for flexibility procurement. Some implemented EU-funded projects (e.g., FLEXCHESS, FLEXGRID) have introduced concepts but not led to systematic changes.

- Bulgaria has limited development of flexibility markets, with no formal structure for LFMs.
- Electricity distribution is regionally managed by private DSOs, with low regulatory engagement in flexibility procurement.
- The Energy and Water Regulatory Commission (EWRC) has not issued specific guidance on flexibility or aggregators.
- The legal framework for energy communities or aggregators is underdeveloped, and consumer participation is low.





MAIN BARRIERS

- No legal or regulatory basis for LFMs, flexibility services, or aggregation. Weak institutional capacity to design or monitor flexibility mechanisms.
- Low consumer digital readiness and minimal awareness of flexibility benefits. Slow digitalisation and metering rollout, especially for residential and rural users.
- Lack of incentives or obligations for DSOs to consider flexibility in network planning.
- No regulatory or technical framework for local market design, data sharing, or procurement processes.
- Lack of consumer awareness and protection mechanisms in the context of dynamic pricing or flexibility contracts.

POLICY GUIDELINES FOR FACILITATING DEPLOYMENT OF LFMS AND EXPLOITATION OF FLEXIBILITY

To align with the EU's climate objectives and ensure energy security, Bulgaria should consider the following guidelines and recommendations for its energy long-term frameworks (LTFs) and enhance of energy flexibility up to 2030:

Regulatory Framework to Enhance LFMs:

Clear regulations have to be established to facilitate the operation of LFMs, enabling DERs to participate effectively. All relevant parties, including DSOs, TSOs, and energy service companies, etc. should be involved in the regulatory development process to ensure comprehensive and practical guidelines.

Legal frameworks and pilot programs will encourage the adoption of innovative energy solutions. An appropriate regulatory framework must be established to facilitate market flexibility, which includes solving energy sharing issues.

The administrative and bureaucratic processes have to be reduced to facilitate the establishment of closed networks and clarify how citizens engage with the network—whether as producers or consumers of energy, as users or energy communities, must still navigate various institutions to reach their objectives. Still further efforts and actions are needed to fully transpose the EU directives and comply with EU legislation.





Energy Sources Diversification:

In line with the NECP the share of energy from RES in gross final energy consumption has to be increased to at least 34.1% by 2030, focusing on solar, wind, and hydroelectric power. Large solar parks and small distributed power generation systems with PV capacity to around 2,645 MW are planned to be installed by 2030. At least 2 GW of new wind power installations, particularly in areas with favourable wind conditions can be developed. Hydropower already plays an important role in Bulgaria's energy mix, that is why the focus has to be on the modernization and optimization of existing hydroelectric power plants.

Battery Storage Systems Utilisation:

The deployment of battery storage to manage the variability of RES, ensuring a stable and reliable power supply needs to be promoted. The potential of pumped hydro storage projects, such as utilizing existing reservoirs like Dospat and Batak, to provide large-scale energy storage solutions should be explored.

Demand Side Flexibility Enhancement:

Complete liberalization of the electricity market will create the necessary conditions to enhance the system's flexibility by enabling competitive pricing and boosting the liquidity of the electricity exchange market. The process of installing smart electrical meters has to be completed. The upgrade of the electricity grid with smart technologies will enable real-time monitoring and management of energy consumption. Programs that encourage consumers to adjust their energy usage during peak periods, contributing to grid stability and efficiency have to be initiated and developed.

Energy Infrastructure Modernisation:

The deployment of battery storage to manage the variability of RES, ensuring a stable and reliable power supply needs to be promoted. The potential of pumped hydro storage projects, such as utilizing existing reservoirs like Dospat and Batak, to provide large-scale energy storage solutions should be explored.

Energy Efficiency Measures:

Programs to improve insulation and EE in residential and public buildings, addressing energy poverty and reducing overall consumption have to be further implemented and industries to adopt energy-efficient technologies and processes to lower energy intensity to be encouraged.





Phasing Out Coal Reliance:

A clear roadmap to reduce coal-based energy production has to be followed, aiming for a complete phase-out in line with EU directives. Investments in economic diversification and retraining programs in coal-dependent areas should be accomplished to mitigate social and economic impacts.

Innovation and Research Support:

The development of pilot projects that test new technologies and business models for flexibility services should be further encouraged. Partnerships with research institutions to explore innovative solutions and best practices in flexibility continued.

Public Engagement:

Citizen education and involvement in energy transition plans will build public support and ensure equitable policy implementation. Self-consumption and development of energy communities in the country should be promoted based on developed models.

SUMMARY OF RECOMMENDATIONS

- 1. The national Energy Act has to better specify flexibility services, LFMs, and aggregator roles.
- 2. The EWRC (regulator) has to develop rules for aggregation, energy sharing, flexibility procurement, and DSO pilot zones.
- 3. A regulatory sandbox can be launched to test LFM models in urban areas with high congestion.
- 4. Smart meter rollout should be accelerated and DSOs have to collect and publish relevant network data. Basic data access protocols for metering and demand-side visibility should be introduced and real-time monitoring enabled.
- 5. EU structural and recovery funds must be engaged to support digital infrastructure and pilot projects.
- 6. A national flexibility strategy, aligned with NECP and grid modernisation plans, should be developed. A national LFM platform, based on European standards, hosted by a neutral actor needs to be established.
- 7. The liberalization of the electricity market has to be completed and the competitive pricing will enhance the system's flexibility, thus boosting the liquidity of the electricity exchange market.





- 8. Flexibility has to be integrated into distribution network planning and investment approvals. Incentive-based regulation for DSOs to use flexibility as a network resource can be created.
- Non-discriminatory access rules for aggregators and energy communities have to be applied. Aggregator licensing and consumer protection rules will enable new entrants and trust.
- 10. Training and capacity-building for regulators and DSOs on LFM design, monitoring, and enforcement should be provided.

ACTORS TO ENGAGE

- Regulator: EWRC (Energy and Water Regulatory Commission) to create legal and regulatory framework.
- Ministry of Energy: to lead the legislative reform and NECP integration.
- ESO (TSO): to coordinate planning and flexibility integration; regional DSOs to test local markets and build digital capacity; both to provide data and design pilots.
- Universities and technical institutes, energy agencies: to support pilot evaluations and workforce training.
- EU funding bodies: to provide technical assistance and infrastructure financing.

To achieve climate neutrality by 2050 according to Bulgaria's commitments under the Paris Agreement will require significant investments in infrastructure, technology and training. Bulgaria should enhance its energy flexibility, ensuring a resilient and efficient energy system aligned with European Union climate objectives.



CURRENT STATUS SUMMARY

France has a relatively advanced regulatory framework for flexibility, with several mechanisms enabling participation at TSO and DSO levels.

The CRE (Energy Regulatory Commission) has recognised the need for LFMs and initiated relevant consultations. Aggregators operate in the balancing market, and energy communities are gaining legal support.

Several EU-funded and national projects (e.g. Smart Grid Vendée, OSMOSE) explore LFM models. DSOs (notably Enedis) are flexibility piloting local tenders congestion-prone zones. However, comprehensive framework non-discriminatory, transparent, market-based procurement is still lacking and needs to be developed.

France has also ensured consistency between the long-term network development plans and the submitted National Energy and Climate Plans, following a fruitful cooperation between the relevant authorities and TSOs. It has introduced resource adequacy mechanisms and modified its existing capacity mechanism, to be compliant with EU rules.





MAIN BARRIERS

- Local flexibility initiatives are not yet standardised or scaled across all DSOs.
- Limited DSO-TSO coordination protocols exist in operational procurement.
- There is complexity in data access for third parties, and the regional transparency is inconsistent.
- Tariff signals do not fully reflect the locational value of flexibility.

POLICY GUIDELINES FOR FACILITATING DEPLOYMENT OF LFMS AND EXPLOITATION OF FLEXIBILITY

Enhancing RES development and LFMs in France by 2030 requires a mix of regulatory support, technological innovation, market design improvements, and local engagement. Some key recommendations in that regard are mentioned below:

Strengthen Regulatory & Market Frameworks:

Standardized market rules for DSOs should be established to procure flexibility from local actors and incentives for Demand Response and decentralized energy trading introduced.

Capacity Market Adjustments are needed by reforming France's capacity market to allow smaller flexibility providers (e.g., aggregators). Grid tariffs can be revised by incentivizing distributed energy production and self-consumption.

Enhance LFMs:

Decentralized markets have to be further developed where consumers, industries, and aggregators can trade flexibility. Some examples are: the Réseau de Transport d'Électricité (RTE) & Enedis piloting LFMs in Brittany and Nouvelle-Aquitaine to manage peak demand, and NODES market platform (European-based), which allows localized energy trading between producers and consumers.

A National LFM Platform should be created, along with a unified digital interface to enable local energy trading. Transparent pricing and secure transactions for flexibility markets should be ensured.





Aggregation & Demand Response Participation:

The role of third-party aggregators should be expanded to enable small energy consumers (homes, businesses) to participate. Residential & industrial DR has to be encouraged with dynamic pricing and ToU tariffs. Real-time energy pricing and smart demand-side response mechanisms should be also deployed.

Digital & Smart Grid Technologies:

Smart meters, Al-driven demand prediction, and blockchain for efficient trading can be deployed. P2P energy trading for prosumers (solar PV owners, energy communities) enabled. France could allow decentralized energy trading via smart contracts in pilot zones.

• Energy Storage & Hydrogen for Grid Flexibility, Electric Vehicles:

Investment in battery storage and green hydrogen for balancing intermittent RES should be supported. Example: H2V Normandy & Dunkirk green hydrogen projects provide industrial-scale hydrogen storage and flexibility; Corsica's battery storage pilot, stabilizing solar power integration.

V2G (Vehicle-to-Grid) and battery storage solutions can also be developed to provide flexibility services. EV owners should be incentivized to sell energy back to the grid. Example: Renault's Advanced Battery Storage uses EV batteries as a decentralized flexibility resource.

• Expand Energy Communities and Peer-to-Peer (P2P) Trading:

Decentralized energy-sharing schemes and local self-consumption should be supported. Local energy communities should be incentivized to invest in flexibility assets like batteries and EV. Financial support and tax benefits for energy communities participating in LFMs have to be provided. Example: Blockchain P2P pilot projects in France: Engie experimenting with blockchain-based energy exchanges.

Pilot Projects & Scale Up:

Regional LFM pilot projects should be launched to test models prior to national rollout. Coordination between DSOs, TSOs (RTE), municipalities, and energy cooperatives has to be supported.





SUMMARY OF RECOMMENDATIONS

- A national LFM framework, interoperable with national data hubs and RTE systems, under CRE guidance has to be developed to standardise design and procurement. The unified digital platform will facilitate local energy trading, ensuring transparent pricing and secure transactions for flexible markets.
- Standardized market rules for DSOs to procure flexibility from local actors have to be established and DSO obligations to be strengthened to assess and procure local flexibility before grid expansion.
- Capacity Market Adjustments are needed by reforming France's capacity market to allow smaller flexibility providers (e.g., aggregators). Aggregator access to metering data has to be improved and contracts across DSOs to be standardised.
- 4. France could allow decentralized energy trading via smart contracts in pilot zones and could broaden the insights gained from pilot programs to develop regional LFM strategies.
- 5. The LFMs should be embedded in the national energy and network planning processes, including ADEME and RTE planning tools.
- 6. Network tariffs need to be reformed to reward flexibility and dynamic response.
- 7. Cross-DSO flexibility marketplaces for scalability can be introduced and a national clearing and settlement mechanism for local flexibility services established.
- 8. DSO-TSO procurement coordination rules to avoid double procurement or conflicts should be formalised.

ACTORS TO ENGAGE

- CRE for regulatory standardisation and scaling.
- Enedis and other DSOs for platform rollout and procurement systems.
- RTE (TSO) for coordination and system planning.
- Aggregators and community energy actors for market participation and innovation.
- Ministry for Ecological Transition for policy coherence





CURRENT STATUS SUMMARY

Greece has no dedicated regulatory framework for Local Flexibility Markets (LFMs), although flexibility is recognised in broader national energy planning documents.

The Regulatory Authority for Energy, Waste and Water (RAAEY) oversees energy market regulation but has not issued specific guidance on local flexibility procurement. DSOs (HEDNO) and TSO (ADMIE) operate under a vertically unbundled model, with limited coordination flexibility services. on Flexibility is primarily addressed at the transmission level through balancing services; distribution-level flexibility is largely untapped. Several EU-funded pilots (e.g., WiseGRID, FLEXCoop, iFLEX) have tested local demand response and flexibility solutions.

Greece is among the European countries that have established a framework enabling independent aggregators to participate in wholesale markets, but energy storage is still unable to access it due to the lack of a regulatory framework.





MAIN BARRIERS

- Regulatory vacuum: No legal definition or obligations for LFMs, flexibility providers, or aggregator market access.
- Lack of DSO-led flexibility procurement mechanisms and no incentives to substitute grid investments with local services.
- Low consumer engagement due to tariff structures that do not reflect system conditions or rewards for flexibility.
- Limited digitalisation of distribution networks, with partial smart meter rollout and no standardised data sharing protocols.
- No framework for DSO-TSO coordination on congestion management or flexibility activation.

POLICY GUIDELINES FOR FACILITATING DEPLOYMENT OF LFMS AND EXPLOITATION OF FLEXIBILITY

LFMs enable DER—such as distributed generation, DR, and storage systems—to provide FS, ensuring grid stability and efficient renewable integration. Greece plans to significantly expand its RES capacity, enhance energy storage solutions, and modernize its energy infrastructure. To achieve this, the following actions have to be implemented:

Regulatory and Policy Framework:

The transposition of the EU directives has to be further followed. Development of standardized protocols and interfaces can further facilitate seamless integration of various DERs into the LFM.

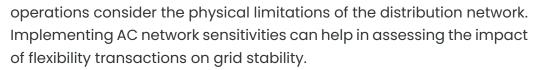
Energy Storage and Grid Modernization:

To support the integration of RES, the country has to further invest in smart grid technologies and demand-side management to balance supply and demand effectively. Additionally, by enhancing its electricity grid Greece can accommodate increased RES input and improve interconnections with neighbouring countries, thus positioning itself as a regional energy hub.

Market Design and Structure:

By adopting a continuous trading framework real-time matching of flexibility supply and demand can be enabled. This approach enhances market liquidity and responsiveness, which is crucial during the initial stages of LFM development. It has to be ensured that market





Technological Infrastructure:

The deployment of the smart meters needs to be finalised, and robust communication networks should provide real-time data, essential for the accurate dispatch and settlement of flexibility services. Energy storage solutions can be incorporated to manage variability in renewable energy production and enhance system reliability.

Stakeholder Engagement and Education:

Capacity Building training programs offered for grid operators, energy producers, and consumers will help them understand and effectively participate in LFMs. The active involvement of consumers can be encouraged by promoting DR programs and incentives for flexibility provision. There is a need to educate and involve local communities in RES projects to ensure public support and address potential concerns.

• Pilot and Demonstration Projects:

Pilots about LFMs initiated in some regions will test market designs, assess performance, and identify potential challenges. Based on pilot outcomes, successful models can be scaled up to a national level, ensuring that lessons learned enrich implementation strategies.

SUMMARY OF RECOMMENDATIONS

- The energy legislation should be amended to define LFMs, flexibility services, and to clarify roles of DSOs, aggregators, and energy communities.
- 2. RAAEY has to establish a regulatory framework for DSO-led procurement of local flexibility services (e.g., open calls, local tenders).
- 3. A national regulatory sandbox for LFM pilots in selected urban or island areas (e.g., Crete, Cyclades) can be launched.
- 4. Market rules should be updated to enable aggregator participation and define baseline/measurement protocols.
- 5. Accelerate smart meter deployment and require HEDNO to publish network constraint data where flexibility could be used.
- 6. A national LFM platform interoperable with ENTSO-E/CIM standards and open to all actors has to be developed and implemented.





- 8. Establishing DSO-TSO coordination mechanisms will contribute to joint flexibility procurement and congestion management.
- 9. Design of time-varying tariffs and dynamic pricing models will help better reflect system conditions and reward flexible behaviour.
- 10. Aggregator and energy community participation have to be fostered through technical standards, data access rights, and funding support.

ACTORS TO ENGAGE

- Regulatory Authority RAAEY: to lead regulatory reforms and oversight.
- Ministry of Environment and Energy: for legislative changes and national energy planning.
- DSO: HEDNO for implementation of LFM pilots, digitalisation, and data transparency.
- TSO: ADMIE to coordinate congestion management and system planning.
- Aggregators and ESCOs to provide market-based flexibility services.
- Energy communities and consumer organisations: for contributing to grassroots engagement and service design feedback.

In conclusion, Greek wholesale markets are currently open to a large number of participants including RES producers, aggregators of RES, demand response aggregators, self-supplying consumers and consumers representing dispatchable loads. By implementing the planned reforms, Greece can successfully develop LFMs that support the integration of RES, enhance grid resilience, and contribute to the country's 2030 energy and climate objectives.





CURRENT STATUS SUMMARY

Ireland has a relatively advanced flexibility ecosystem under the National Energy Demand Strategy, focused on the TSO-led programme for grid stability. By revising its rules on energy payments; Ireland aims to remove the primary barrier to the participation of DSF in the wholesale market, and further review of the technical and administrative requirements are necessary. It is required to ensure a level playing field between DERs and other assets, promoting fair and equal access to the market for all participants.

The Commission for Regulation of Utilities (CRU) is open to innovation but has not issued LFM-specific regulations. EirGrid (TSO) procures significant flexibility services. DSOs (ESB Networks) have begun exploring local flexibility options but under limited frameworks. Aggregator participation is allowed in principle but limited in practice, especially at the distribution level.

Pilots like Innovative Grid Services and Dingle Project have explored residential and local flexibility.





MAIN BARRIERS

- No Local Flexibility Market framework has been developed. ESB Networks received regulatory approval from CRU to procure up to 500 MW of demand-side flexibility through structured tenders, effectively fulfilling the role of LFMs. ¹
- Aggregator access to distribution-level flexibility services is being actively developed, with CRU supporting multi-market participation and ESB Networks enabling third-party involvement in pilot tenders.²
- DSO-TSO coordination for flexibility procurement is in the process of being formalised under CRU's regulatory oversight currently after a second consultation, with ESB Networks aligning procurement with EirGrid's operational timeframes.³
- Tariff structures are evolving slowly to reflect locational value, with CRU exploring dynamic pricing and ESB Networks incorporating congestion signals into procurement criteria.⁴
- Despite ongoing efforts by CRU and ESB Networks—including smart meter rollout and dynamic pricing initiatives—consumer participation in flexibility services remains limited, particularly among residential users, due to low awareness, perceived complexity, and modest financial incentives. 567

POLICY GUIDELINES FOR FACILITATING DEPLOYMENT OF LFMS AND EXPLOITATION OF FLEXIBILITY

• Comprehensive Regulatory Framework aligned with National Energy Strategies:

Clear policies defining the roles and responsibilities of participants in LFMs, including consumers, producers, and aggregators should be established.

Ensuring that LFM initiatives are consistent with Ireland's National Energy Demand Strategy and the Climate Action Plan, and following the objectives outlined in the NECP, will contribute to achieving the goals of sustainability and energy security.



CRU Decision Paper CRU202560 - DSO Demand Flexibility Product Arrangements

CRU - ESB Networks Demand Flexibility Product Proposal Consultation

BSB Networks Flexible Demand Product Proposal– Second Consultation

CRU - Dynamic Electricity Price Tariffs Decision Paper

National Network, Local Connections Programme (NNLC)

Expression of Interest for Flexible Demand Connections – Final Publication (DOC-111223-HVK)

⁷ ESB Networks - Demand Flexibility Product Proposal - Cover Note



• Promotion of FS and Market Design and Mechanisms:

Market structures should be created that incentivize FS, ensuring fair compensation for participants who adjust their demand or supply in response to grid needs. Collaboration with grid operators will align LFM development with grid infrastructure plans, facilitating the seamless integration of flexible resources.

Mechanisms for procuring FS from various providers, including DR and distributed generation, have to be developed to enhance grid reliability and efficiency. Access to wholesale prices through dynamic electricity contracts for citizens and businesses should be promoted. Long-term contracts should be offered to flexibility service providers to encourage investment and provide financial stability.

Technological Innovation:

Investments in advanced grid technologies, such as smart meters and real-time monitoring systems will facilitate efficient communication and operation within LFMs. The rollout of smart meters in the country should be completed. The development and integration of energy storage systems to manage variability in renewable energy production and enhance grid stability have to be promoted.

• Stakeholder Engagement:

Local communities' empowerment to participate in LFMs should be supported by providing education and incentives, enabling them to contribute to and benefit from the energy transition.

Establishment of collaboration platforms - forums for dialogue among regulators, grid operators, technology providers, and consumers will align objectives and address challenges collaboratively.

Pilot Projects and Scalability Plans:

Launch of pilot LFMs in selected regions will test market designs, technologies, and regulatory approaches, using the insights gained to refine and scale up successful models.





SUMMARY OF RECOMMENDATIONS

- 1. A national LFM strategy under CRU guidance, building on national programmes and pilot results has to be created.
- 2. DSOs should be enabled to procure flexibility through local tenders or contracts under regulated cost recovery.
- 3. Data access rules and digital infrastructure for aggregators and third parties have to be improved.
- 4. Launch of open calls for community-based flexibility pilots, especially in rural or constrained areas has to be supported.
- 5. Standardised contractual and settlement frameworks for flexibility at the distribution level shall be developed.
- A national LFM digital platform, interoperable with EirGrid systems and EU standards has to be developed further than local pilots. LFMs should be embedded in network development and reinforcement planning by ESB Networks.
- 7. DSO-TSO flexibility coordination protocols for congestion and security services should be formalised.
- 8. Consumer and SME aggregators should be supported through targeted technical assistance, funding schemes, and engagement programmes to enable their active participation in flexibility services.

ACTORS TO ENGAGE

- CRU for regulatory frameworks and DSO mandates.
- Department of the Environment, Climate and Communications to support LFM in policy and planning.
- EirGrid and ESB Networks for operational integration and platform development.
- Aggregators and energy communities to scale local solutions and participation.

The lessons learned from the implementation of the DE-Risk pilot in Ireland shows that public-sector buildings could become valuable contributors to flexibility markets with the right regulatory changes. Improving procurement rules, adjusting tariffs, supporting aggregation, and investing in smart controls would help unlock this potential.

Implementing LFMs in Ireland by 2030 is pivotal for enhancing grid resilience, integrating RES, and achieving decarbonisation goals. By following these guidelines, Ireland can effectively contribute to the implementation of LFMs by 2030, fostering a resilient, efficient, and sustainable energy system.





CURRENT STATUS SUMMARY

Italy is frontrunner in **LFM** experimentation, with advanced pilots (e.g. UVAM, CoordiNet, EdgeFlex). The regulator (ARERA) supports innovation and has established pilot rules for aggregator participation. DSOs (e.g., e-distribuzione) actively test flexibility procurement in zones. The TSO (Terna) congestion operates a capacity and balancing market; integration with DSO-led markets is being explored. Citizens can participate aggregators, but retail market complexity and tariff structures limit engagement.

MAIN BARRIERS

- LFMs remain isolated pilot projects, not yet integrated into national regulation.
- Coordination between Terna and DSOs is progressing but still not standardised.
- There is a lack of long-term signals or stable revenue models for flexibility providers.
- Regulatory burden for aggregators remains high, especially for smaller actors. There is an absence of a dedicated framework for independent aggregators covering DA and ID markets.
- Consumer awareness and price signals for flexibility are weak.





POLICY GUIDELINES FOR FACILITATING DEPLOYMENT OF LFMS AND EXPLOITATION OF FLEXIBILITY

Developing FS and LFMs in Italy requires a combination of regulatory adjustments, technological advancements, market incentives, and stakeholder engagement. To align with the EU 2030 objectives, Italy should follow the following key guidelines:

• Strengthening Regulatory and Market Frameworks:

Clear and stable regulatory frameworks for flexibility service providers have to be implemented. DR programs should be expanded and aggregators enabled to participate in capacity and balancing markets.

Clear market access rules for prosumers and DERs have to be issued aligned with EU directives (e.g., Clean Energy Package, Fit for 55) and DSOs should have a framework to procure FS for grid stability.

Expanding Distributed Energy Resources (DERs) Participation:

Solar PV, battery storage, electric vehicles (EVs), and smart home energy management systems should be further promoted. Financial incentives for residential and industrial prosumers have to be provided to participate in LFMs. Businesses and communities should be encouraged to form Energy Communities that trade surplus energy and offer flexibility.

Development of Digital Market Platforms:

Blockchain and Al-based flexibility trading platforms for real-time transactions have to be deployed. Peer-to-peer (P2P) energy trading among local consumers and prosumers should be enabled. Smart contracts for automated and transparent energy exchanges utilised.

Enhancing Demand Response & Smart Grid Technologies:

Time-of-use tariffs and real-time pricing for industrial and residential consumers have to be expanded. At and IoT for predictive load management and automated DR activation have to be integrated and smart grid infrastructure to support bidirectional electricity flows upgraded.

Encouraging Electric Vehicles (EVs) & Vehicle-to-Grid (V2G):

V2G programs where EVs act as grid batteries should be promoted and incentives for EV owners to participate in LFMs provided. Charging infrastructure operators have to be encouraged to integrate FS.





Strengthening Collaboration Between Stakeholders:

Cooperation between TSOs, DSOs, aggregators, prosumers, and policymakers has to be fostered, cross-border LFM initiatives with neighbouring EU countries supported and public-private partnerships to de-risk investment in FS organised.

SUMMARY OF RECOMMENDATIONS

- Scale pilot learnings into a formal regulatory framework for LFMs, under ARERA oversight.
- 2. Improve DSO-TSO coordination protocols, especially for real-time activation and visibility.
- 3. Introduce standardised LFM procurement platforms across DSOs.
- 4. Expand the UVAM model to enable locational procurement at the DSO level.
- 5. Simplify rules and reduce entry barriers for small aggregators and energy communities.
- 6. Align smart meter data access with EU data governance principles.
- 7. Enable multi-year contracting and revenue stacking for flexibility services.
- 8. Reform network tariffs and incentives to better reflect local system needs.
- 9. Link LFMs with climate adaptation and decentralisation strategies.
- 10. Promote cross-border pilot replication with neighbouring countries.

ACTORS TO ENGAGE

- ARERA for regulatory scaling and standardisation.
- Terna and DSOs for coordination and platform development.
- Ministry of Ecological Transition for national policy alignment.
- Aggregators, cooperatives, and SMEs to expand participation.
- Municipalities and regions to host and replicate successful LFM zones.

By implementing the recommendations and leveraging existing pilot projects, Italy can accelerate the adoption of LFMs, aligning with the EU's 2030 energy transition goals. The key is integrating DERs, engaging prosumers, leveraging digital technologies, and ensuring regulatory clarity.





CURRENT STATUS SUMMARY

Netherlands is a European leader in flexibility innovation, with several pilots, sandboxes, and regulatory adaptations (e.g. Energy Act reform). DSOs (Enexis, Stedin, Liander) and TSO (TenneT) actively collaborate on congestion management and market-based Flexibility is flexibility. increasingly integrated into network planning and investment deferral strategies. A decentralised energy system, strong digitalisation, and active prosumers support LFM readiness.

MAIN BARRIERS

- LFMs are still fragmented across DSOs and lack standardisation or interoperability.
- Current regulation limits long-term contracts and investment signals for flexibility providers, hinders DR and storage integration.
- Coordination between DSOs and TSO can be operationally complex, with multiple pilots running in parallel.
- Energy community participation in flexibility remains limited by market design.
- Cost-benefit assessments for LFMs lack a harmonised national methodology.





POLICY GUIDELINES FOR FACILITATING DEPLOYMENT OF LFMS AND EXPLOITATION OF FLEXIBILITY

• Clear Regulatory Framework:

The roles and responsibilities of DSOs, TSOs, and market participants in LFMs have to be better defined, and DSOs should be mandated to run transparent flexibility tenders, ensuring market fairness. LFM market rules standardisation will ensure consistency across different regions.

• Market Participation:

Transparent pricing mechanisms for FS should be developed and market participation enabled from various flexibility providers, including prosumers, aggregators, and storage operators. The Netherlands could implement a national or regional digital marketplace where DSOs buy flexibility from businesses, battery operators, and prosumers. TSOs like TenneT use Equigy (EU TSO Blockchain Platform) to integrate small-scale flexibility assets into balancing markets. The wider adoption can be promoted by making it mandatory for DSOs to provide a digital interface for small-scale flexibility providers.

Coordination Between DSOs and TSOs:

Data-sharing protocols between DSOs and TSOs are recommended to avoid conflicts in flexibility procurement. Coordinated congestion management strategies would leverage LFMs at both distribution and transmission levels. GOPACS (Grid Operator Platform for Congestion Solutions) is a Dutch initiative where DSOs and TSOs collaborate to resolve grid congestion using market-based solutions. To enhance LFM effectiveness, the government could expand GOPACS to directly integrate with new local flexibility platforms.

Standardized Data and Digitalization Protocols:

Open-access data-sharing platforms should be introduced to ensure transparency and enable real-time LFM operations.

Adoption of standardized communication protocols will help integrate multiple LFMs and ensure interoperability. The Netherlands could require LFMs to adopt a standardized communication protocol that allows automated participation in DR and flexibility markets.

Incentives for Flexibility Providers:

Financial incentives or compensation schemes for early market adopters can be offered. The Netherlands could introduce a flexibility





remuneration scheme where industrial consumers and energy communities are rewarded for providing FS.

Consumer Protection and Fair Pricing:

Non-discriminatory access to LFMs for all market participants has to be ensured and consumers protected from excessive pricing volatility through regulatory oversight.

Regulatory Sandboxes and Pilot Projects:

Innovation support can be provided by allowing temporary exemptions from strict regulations in controlled environments. Insights from pilot projects insights on best practices and potential market design improvements can be gathered.

SUMMARY OF RECOMMENDATIONS

- A national standardised framework for LFM operation across DSOs should be developed.
- 2. A federated digital platform model, ensuring interoperability and real-time visibility can be supported.
- 3. DSO flexibility needs have to be integrated into regional energy strategies and grid investment planning.
- 4. The aggregator rights and access to consumer data under consent should be strengthened.
- 5. Pilot flexibility incentives for community energy projects in constrained zones have to be introduced.
- 6. A national clearing mechanism or interface between DSO and TSO platforms can be established.
- Tariff reforms to reflect locational grid constraints and time-variable costs can be implemented. Regulatory support for long-term LFM contracts and revenue stacking created.
- 8. Cross-border LFM interoperability, particularly with Germany and Belgium can be further fostered.

ACTORS TO ENGAGE

- Regulator: ACM for standardisation and long-term contracting frameworks.
- DSOs & TenneT for coordination and platform architecture.
- Ministry of Economic Affairs and Climate Policy for national alignment and funding.
- Community energy groups for decentralised participation.
- Open-source platform developers to ensure vendor-neutral interoperability.



CURRENT STATUS SUMMARY

Portugal acknowledges the flexibility and aggregation in its NECP and Electricity Sector Plan, but LFMs are not yet formalised. DSO (E-REDES) is involved in innovation pilots on flexibility (e.g. InteGrid, CoordiNet). The regulator (ERSE) has started consultations on system flexibility Smart and aggregation. meter deployment is nearly complete and provides a strong data foundation. There is a growing ecosystem of prosumers and communities, supported energy legislation and national programmes.

MAIN BARRIERS

- No dedicated framework or obligations for DSO-led flexibility procurement.
- Lack of TSO-DSO coordination protocols or joint congestion management processes.
- Aggregator participation in balancing or local markets not yet activated.
- Limited transparency and access to network constraints and flexibility value.
- Consumer participation hindered by unclear incentives and weak market signals.





POLICY GUIDELINES FOR FACILITATING DEPLOYMENT OF LFMS AND EXPLOITATION OF FLEXIBILITY

Regulatory Framework:

In alignment with the EU's Clean Energy Package, Portugal has implemented Decree Law 15/2022, which restructures the National Electrical System (NES) and the outlined key activities should be further followed: simplification of administrative procedures; network planning optimization; introduction of competitive mechanisms; consumer empowerment; legal framework for innovation.

Pilot Projects and Market Initiatives:

To implement these policies, Portugal has launched pilot projects focusing on LFMs. E-REDES, Portugal's primary DSO, in partnership with Piclo, has initiated the country's first LFM platform which enables FSPs to participate in upcoming service opportunities, facilitating the integration of DER and enhancing grid decarbonisation efforts. E-REDES and Piclo collaboration should be further fostered and developed.

Investments in Smart Grids and Energy Storage:

Portugal has to invest heavily in smart grids and energy storage. Incentives are needed to enhance grid flexibility and manage the anticipated increase in renewable energy production and consumption. E-REDES is advancing the deployment of smart grids to accommodate new technologies and improve grid resilience.

Stakeholder Engagement and Future Outlook:

The successful development of FS in Portugal hinges on active collaboration among various stakeholders, including regulatory authorities, grid operators, technology providers, and consumers. Initiatives like the DE-RISK project aim to support the market uptake of RES by fostering the adoption of LFMs and minimizing implementation risks through innovative customer engagement strategies.





SUMMARY OF RECOMMENDATIONS

- 1. LFMs should be defined in national legislation, and regulations should specify actor roles and processes.
- 2. A national LFM coordination platform, interoperable with EU systems, has to be launched.
- 3. Flexibility should be integrated into DSO investment planning and regulatory incentives.
- 4. It is recommended that E-REDES and REN (TSO) jointly identify flexibility needs and enable coordination pilots. DSO-led LFM procurement models should be developed and tested, building on pilot experience.
- 5. Guidelines for aggregator operation can be issued and data access aligned with EU standards.
- 6. Real-time network visibility tools for DSOs and aggregators can be rolled out. Successful energy community and aggregator participation models should be scaled up.
- 7. Tariff innovation (e.g., time-of-use, dynamic) and participation schemes for citizens have to be promoted.
- 8. A regulatory monitoring and evaluation framework for LFMs should be developed.

ACTORS TO ENGAGE

- Regulator: ERSE for regulatory definition and pilot oversight.
- Ministry of Environment and Climate Action for legal alignment.
- E-REDES and REN for platform development and coordination.
- Aggregators and digital service providers to activate LFM roles.
- Consumer cooperatives and municipalities to scale inclusive models.

As Portugal progresses toward its 2030 energy objectives, the continuous evolution of regulatory frameworks, technological advancements, and stakeholder cooperation will be pivotal in realizing a resilient and sustainable energy system.





CURRENT STATUS SUMMARY

Romania is at an early stage of flexibility integration, with no regulatory framework The for LFMs. DSOs and **TSO** (Transelectrica) operate under traditional centralised model. Flexibility is mentioned in the NECP and National Recovery and Resilience Plan. implementation is limited. Aggregation is not enabled by law or regulation, and retail market liberalisation is incomplete. Smart meter rollout is partial and varies significantly across DSOs.

regulatory impediments include changes creating investor uncertainty, complex permitting lengthy and processes causing delays and higher costs, and limited grid capacity with technical challenges. Ambiguity in financina regulatory procedures, difficulties for smaller developers, and a shortage of skilled professionals also hinder progress. Legislative and regulatory support is crucial to overcome these obstacles and support sector growth.





MAIN BARRIERS

- No legal framework for flexibility services, aggregators, or LFMs.
- DSOs lack incentives or obligations to consider non-wire alternatives.
- Data infrastructure and network visibility are weak or unavailable.
- Limited awareness among consumers, DSOs, and public authorities.
- Access to EU funds is underutilised for LFM and digitalisation.

POLICY GUIDELINES FOR FACILITATING DEPLOYMENT OF LFMS AND EXPLOITATION OF FLEXIBILITY

To effectively enable LFMs in Romania, it's essential to establish a comprehensive regulatory framework that promotes flexibility, encourages investment, and ensures efficient market operations.

Align National Policies with European Directives:

Romania's regulatory framework for LFMs should ensure consistency with EU directives and compliance with EU regulations which will facilitate cross-border cooperation, attract investment, and promote best practices in FS.

Clear Legal Framework for Flexibility Services:

Flexibility services have to be defined within the national legislation by establishing the roles and responsibilities for all market participants, such as DSOs, TSOs, aggregators, and prosumers. The framework should facilitate the integration of flexible resources like DR, energy storage, and distributed generation into the energy market. The introduced concepts like active customers and CECs aim to empower consumers to participate actively in the energy market, and lay the groundwork for FS.

Policies that support the deployment of energy storage systems, including removing double taxation on stored energy and providing incentives for storage infrastructure development should be promoted. The possibility of DSOs and TSOs to own and manage energy storage installations under specific conditions, can enhance grid stability and flexibility.

Market-Based Mechanisms for Flexibility Procurement:

Transparent and competitive platforms where FS can be traded can be established. This involves creating standardized products and contracts that allow flexibility providers to offer services to DSOs and TSOs, ensuring grid stability and efficient energy use.





contracts that allow flexibility providers to offer services to DSOs and TSOs, ensuring grid stability and efficient energy use.

Aggregators can pool resources from multiple consumers and producers to participate in flexibility markets; their roles and responsibilities should be clearly defined in regulation.

The introduction of dynamic electricity pricing would reflect real-time supply and demand conditions, encouraging consumers to adjust usage patterns and provide flexibility. Enabling consumers to engage in contracts with dynamic pricing terms, will foster active participation in flexibility markets.

• Grid Infrastructure and Digitalization:

Investments in smart grids development, equipped with advanced metering and communication technologies, will allow effective monitoring and management of DER. This infrastructure is essential for the accurate measurement and verification of FS, ensuring that participants are compensated fairly. Robust data management systems can handle the increased data flow from various market participants, ensuring security and privacy.

Protocols for effective communication and coordination between TSOs and DSOs should be developed that will efficiently contribute to managing flexibility resources, preventing conflicts, and maintaining grid stability. A good example is the EFLEX project which demonstrates a blockchain-based platform in Romania and Bulgaria, enabling TSOs and DSOs to trade FS with prosumers.

Financial Incentives and Support Mechanisms:

Subsidies, grants, or tax incentives can encourage investment in technologies and projects that offer FS. Financial support can accelerate the adoption of energy storage systems, demand response programs, and other flexible resources.

R&D initiatives focused on innovative flexibility technologies and business models should be supported.

Energy Communities and Prosumers:

The development of CEC and REC by providing a regulatory framework that facilitates their creation and operation should be further fostered. These communities can aggregate flexible resources, participate in LFMs, and enhance local energy resilience. Streamlined processes – simplified procedures – for prosumers to connect to the grid, including simplified notification procedures for small–scale installations have to be implemented.





SUMMARY OF RECOMMENDATIONS

- 1. Flexibility and aggregation, based on EU Electricity Regulation should be included in national energy regulation.
- 2. A national LFM strategy, aligned with NECP updates and smart grid investments has to be developed.
- 3. The regulator (ANRE) has to be mandated to set rules for DSO flexibility procurement. Pilot LFM zones in urban and industrial congestion hotspots have to be established.
- 4. The introduction of performance-based regulation for DSOs that rewards flexibility is needed.
- 5. The use of EU funding instruments will accelerate digitalisation and platform testing. A national digital platform for flexibility bids, accessible by DSOs and aggregators, has to be created.
- 6. Training programmes for DSOs and local authorities on LFM design are recommended to be initiated.
- 7. Partnerships with community energy groups to pilot participation have to be fostered and cross-sectoral collaboration (ICT, municipalities, energy) ensured to scale LFMs.

ACTORS TO ENGAGE

- Regulator: ANRE for legal and market rule development.
- Ministry of Energy and Environment for NECP and funding alignment.
- Transelectrica and DSOs for pilot zones and infrastructure upgrades.
- Academia and technical universities to support pilot evaluation and capacity building.
- Local governments and EU support offices to mobilise co-funding and partnerships.

By implementing these recommendations, Romania can create a robust regulatory environment that facilitates the development and operation of LFMs, contributing to a more resilient and efficient energy system to be built in the next few years.





CURRENT STATUS SUMMARY

Spain has a relatively advanced legal framework for flexibility, particularly following the transposition of the Clean Energy Package.

The DSO (i-DE and others) and TSO (REE) have begun exploring flexibility services, but local markets are still in early pilot stages. Recent regulatory developments (CNMC) have enabled independent aggregators, but practical implementation is pending. Flexibility has been considered in island systems (e.g., Canary Islands) and some regional projects (e.g., InterFlex).

The National Energy and Climate Plan (NECP) highlights flexibility as essential for system efficiency and decarbonisation and outlines some key strategies and actions like expansion of renewable energy and storage, regulatory reforms for flexibility and demand response, promotion of innovative business models and implementation of local flexibility markets.





MAIN BARRIERS

- Lack of formalised LFM structure and unclear mechanisms for DSO-led flexibility procurement.
- Limited DSO-TSO coordination protocols and absence of shared platforms or congestion visibility.
- Aggregation framework lacks clarity on baseline, measurement, and remuneration rules.
- Tariff structures provide weak price signals for local flexibility.
- Fragmentation between autonomous regions and DSOs in market implementation.



INSIGHTS FROM THE SPANISH DE-RISK PILOTS

The *Joven Futura pilot in Murcia* reflected the barriers to local flexibility markets in Spain, which are mainly regulatory, related to public understanding of the energy system, and stem from the lack of a fully liberalized retail market. Traditional retailers—linked to distribution—still hold a large market share (over 80%) in the residential sector, almost entirely through fixed-rate tariffs. This trend intensifies when market prices become volatile, as shown in this CNMC report. ⁸

La Balma pilot in Barcelona showed that while ToU incentives can promote demand shifting, it can also fall short of generating enough benefit to the user for long-term behavioural changes.

The deployment of new Smart Grid Infrastructure with real time measurements is crucial to reduce the need of extra installations, which inconvenience the user and reduce their rate of acceptance.

It is important for the DSO to develop an incentive mechanism based on demand change which further promotes demand shifting beyond ToU schemes, as they currently do not provide enough incentives, or they are extremely dependent on daily price differences.





Update on the state of the retail electricity market. consumer flexibility 2023 (CNMC, 2023)



POLICY GUIDELINES FOR FACILITATING DEPLOYMENT OF LFMS AND EXPLOITATION OF FLEXIBILITY

To ensure the successful deployment of LFMs in Spain, comprehensive recommendations can be defined to be implemented across policy, market, technology, and stakeholder engagement.

Regulatory and Policy Framework:

Clear market rules are needed. Roles, responsibilities, and compensation mechanisms for flexibility providers (DSOs, aggregators, prosumers) should be defined. Independent aggregators that bundle residential, commercial, and industrial flexibility have to be legally recognized.

Incentives for flexibility services have to be developed. Financial incentives for demand-side response (DSR), battery storage, and distributed generation participation created. For example: Introduce tax breaks or subsidies for residential and industrial consumers that provide grid flexibility; Implement dynamic network tariffs, encouraging consumers to shift energy consumption based on grid demand; Allow LFMs to stack revenue streams (e.g., capacity payments, congestion relief, frequency control).

A regulatory sandbox for LFMs is recommended to be created. Regional pilot programs in high-renewable penetration areas (e.g., Andalusia, Catalonia, Basque Country) can be launched. Flexibility providers may be allowed to test real-time bidding, aggregation models, and dynamic pricing structures.

Communication between DSOs and TSO (REE)has to be improved to optimize flexibility procurement.

Market Design & Participation:

Local price signals should be ensured through local tariffs. Location-based pricing for grid services, reflecting congestion and voltage support needs to be implemented. This approach would allow DSOs to remunerate consumers for providing local marginal flexibility, rewarding those in congestion-prone areas.

Digital platforms to facilitate real-time bidding for FS, accessible to aggregators, prosumers, and storage owners have to be developed.





Hybrid Market Models may be created. It can be allowed both bilateral contracts (for long-term flexibility procurement) and spot market transactions for real-time grid balancing and peer-to-peer (P2P) trading of energy and flexibility within communities.

Technological Enablement:

Smart grid infrastructure deployment has to be fostered. Full smart meter coverage should be reached by 2027 to enable real-time Demand Response. Investments have to be accomplished in real-time distribution network monitoring (sensor-based grid management). Al-driven forecasting tools for DSOs to predict congestion needs and anticipate demand peaks should be implemented and blockchain technology to secure P2P flexibility transactions used.

Vehicle-to-Grid integration can be achieved by creating V2G incentives, allowing EV owners to sell flexibility to the grid. Charging station management software development is needed that supports LFM participation and fleet-based V2G services for commercial EV operators (e.g., bus depots, delivery vans) can be piloted.

Consumer & Stakeholder Engagement.

Participation of energy communities, industries, and households in LFMs has to be encouraged through dynamic tariffs and peer-to-peer trading. Financial incentives for self-consumption collectives participating in LFMs would be good to be offered. Energy communities should be allowed to bid solar-battery flexibility into distribution-level markets and blockchain-based energy wallets for REC/CEC members can be provided to track transactions.

Stakeholders have to be informed about flexibility markets, their benefits, and participation mechanisms. DSO-led education programs on how households can participate in LFMs will be useful to be launched. User-friendly mobile apps for consumers can be developed to track and adjust energy usage dynamically.

Pilot Projects and Scaling:

Regulatory sandbox projects can be developed. Test projects in urban and rural areas may be launched to assess the impact of LFMs on the grid. Utilities, technology firms, and local governments should be engaged in developing scalable solutions. Smart city initiatives involvement will help to integrate urban energy storage solutions and collaboration with local governments can develop regulatory blueprints.





SUMMARY OF RECOMMENDATIONS

- 1. A national regulatory framework for LFMs, led by CNMC, with specific provisions for DSO flexibility procurement has to be defined.
- 2. Market rules update is needed to enable transparent access for aggregators to both wholesale and local flexibility markets.
- 3. LFM mechanisms are recommended to be piloted in urban and rural DSOs, with CNMC oversight.
- 4. A national flexibility registry and baseline methodology have to be established.
- 5. Regional governments should be encouraged to align energy strategies with national flexibility goals.
- 6. A national interoperable LFM platform has to be established hosted by a neutral entity or under DSO governance.
- 7. TSO-DSO coordination protocols have to be mandated, especially in congestion management and joint procurement.
- 8. Locational network tariffs are recommended to be introduced to improve investment signals and reward flexibility where most needed.
- 9. Energy communities and aggregators support should be ensured via innovation funds and standardisation efforts.
- 10. Flexibility should be integrated into long-term distribution planning and incentives.

ACTORS TO ENGAGE

- Regulator: CNMC for market design and aggregation rules.
- Ministry for Ecological Transition and the Demographic Challenge (MITECO) – for NECP alignment.
- REE (TSO) and regional DSOs for implementation and data-sharing.
- Regional authorities for pilot authorisation and stakeholder mobilisation.
- Aggregators and energy communities to shape accessible business models.





CURRENT STATUS SUMMARY

Türkiye is at an early stage of flexibility market development. electricity The system is centrally operated by TEİAŞ (TSO); DSOs are regionally licensed and privately operated but have no mandate or tools for local flexibility. There is no regulatory framework for LFMs aggregators. The role of aggregators is not explicitly defined in Türkiye, creating significant uncertainty in demand-side flexibility participation and virtual power plant (VPP) operations.

The Energy Market Regulatory Authority (EMRA) has started exploring digitalisation and smart grid developments, including with international partners. Smart metering is limited and consumer engagement in flexibility is minimal.

MAIN BARRIERS

- No legal or regulatory definition of flexibility or aggregators.
- Lack of a clear legal definition for energy communities.
- Lack of data transparency and metering infrastructure.
- Weak TSO-DSO coordination and no market mechanisms at local level.
- Low public awareness and technical capacity for decentralised market participation.





INSIGHTS FROM THE DE-RISK PILOT IN TÜRKİYE

The pilot implementations carried out in Türkiye have provided significant findings regarding the regulatory, financial, administrative, and technical barriers delaying the development of Energy Communities (ECs) and Local Flexibility Markets (LFMs).

The existing legal framework is not fully aligned with EU directives (RED II, ED 2019), making it difficult to establish and operate energy communities in Türkiye. Flexibility markets are not explicitly defined in current regulations, preventing demand-side response (DSR), aggregators, and storage operators from effectively participating in flexibility services. While the Unlicensed Electricity Generation Regulation supports self-consumption, it significantly restricts collective energy generation among multiple participants, thereby limiting energy-sharing opportunities.

In addition, *administrative and bureaucratic obstacles* pose significant challenges to the development of energy communities and local flexibility markets. In Türkiye, the implementation of energy projects requires approval from multiple institutions, leading to prolonged permitting processes. A lack of transparency in grid connection approvals and uncertainties regarding interconnection requirements cause delays in project implementation.

Furthermore, the absence of a structured collaboration process between DSOs and TSOs creates significant barriers for energy communities seeking grid access, while the lack of data-sharing mechanisms complicates the management of demand-side flexibility. The unclear permitting requirements for energy storage systems hinder investors and pilot participants from adopting battery integration and other technological solutions.

Furthermore, the absence of established market incentives for flexibility services (e.g., dynamic pricing, time-of-use tariffs, compensation for grid services) hinders economic sustainability and limits the growth of initiatives in this field.

Another critical barrier is **the lack of public awareness and institutional trust in flexibility models**. Consumers and local stakeholders do not have sufficient knowledge about the benefits of energy communities and flexibility markets. The absence of effective engagement strategies to encourage consumer participation in demand-side flexibility initiatives prevents the market from developing adequately.







A *technical obstacle* is the insufficient deployment of smart meters in Türkiye which restricts real-time energy management and the implementation of flexibility trading. This limitation prevents the efficient operation of grid balancing mechanisms, which are crucial for the development of flexibility markets. Additionally, grid congestion in certain regions restricts the integration of a high share of distributed renewable energy, making it more difficult for local energy production projects to expand. Furthermore, interoperability issues between different digital platforms and energy management systems hinder the efficient operation of local flexibility services.

To overcome the identified obstacles preventing the full-scale deployment of Energy Communities and LFMs in Türkiye, some critical steps are recommended to be taken.

- The regulatory reforms should be introduced to legally recognize energy communities and flexibility markets.
- Simplifying administrative procedures and expediting grid access and investment approvals would accelerate the implementation of projects.
- To ensure the sustainability of flexibility markets, it is essential to introduce feed-in tariffs, dynamic pricing models, and investment grants as financial support mechanisms.
- Strengthening cooperation between DSOs, TSOs, and energy communities and enhancing market integration would further establish a more effective system.
- To encourage consumer participation in flexibility services, expanding awareness-raising educational programs would contribute to the broader acceptance of local energy projects within society.
- Finally, investing in smart grid infrastructure and digital energy management platforms would accelerate Türkiye's transition to a more flexible, renewable-based, and consumer-driven energy market.





POLICY GUIDELINES FOR FACILITATING DEPLOYMENT OF LFMS AND EXPLOITATION OF FLEXIBILITY

Regulatory & Policy Framework:

A Clear LFM Regulatory Framework has to be created by establishing a dedicated legal and regulatory structure for LFMs under the Energy Market Regulatory Authority (EPDK). Clear market rules and roles for participants (DSOs, aggregators, consumers, and generators) have to be defined and technical requirements outlined for DERs, storage, and demand-side response (DSR) to participate in LFMs.

There is a need for standardized market rules to ensure interoperability between Türkiye's national electricity market and LFMs with clear pricing, settlement, and dispute resolution mechanisms. Dynamic pricing models, time-of-use tariffs, and locational incentives have to be promoted to encourage flexibility providers.

Market Structure & Mechanisms:

Independent or integrated local trading platforms for FS can be established, supported by Türkiye Elektrik İletim A.Ş. (TEİAŞ) and DSOs. The participation of prosumers, renewable generators, energy storage operators, industrial consumers, and aggregators should be encouraged.

Zonal or nodal pricing to reflect local grid constraints and encourage local balancing has to be implemented and long-term contracts, day-ahead flexibility auctions, and real-time flexibility trading should be introduced.

Digitalization & Infrastructure:

Smart meter and advanced distribution management system (ADMS) rollout should be accelerated to enable accurate monitoring and control. Investments in advanced metering infrastructure for real-time DR are needed. Türkiye can consider developing Al-powered local grid control systems and use blockchain for secure transactions and Al-based forecasting to optimize flexibility trading. Strong cybersecurity measures and data-sharing regulations have to be established to protect market participants.







DERs, Storage and DR programmes Promotion:

There is a need to support battery energy storage systems (BESS) for local grid stability and to encourage peer-to-peer (P2P) energy trading for solar prosumers. Time-of-use (ToU) pricing will optimize DER utilization.

Türkiye can enable local solar and battery owners to trade surplus energy. Commercial and industrial consumers have to be encouraged to offer flexibility via load shifting and financial incentives should be initiated to foster residential participation in DR.

In addition, demand-side energy efficiency measures (e.g., building retrofits, efficient appliances) should be recognised as a source of flexibility and integrated into LFM incentive schemes to maximise grid and climate benefits.

Stakeholder Engagement & Capacity Building:

Regulatory sandboxes and LFM pilot projects can be launched in cities like Istanbul, Ankara, and Izmir with high DER penetration. In partnership with universities, DSOs, and startups new flexibility models can be developed and tested. Hybrid energy communities integrating solar, wind, and EVs can be initiated and supported.

By developing capacity building programs utilities, regulators, and energy service companies can be trained on flexibility market operations and consumers educated on demand-side flexibility participation and potential cost savings.

Local software developers, startups, and digital service providers should be supported to develop interoperable LFM platforms and smart grid applications tailored to Türkiye's market needs.

Integration with National Energy Goals:

LFMs should prioritize balancing solar and wind power fluctuations to support Türkiye's 2053 Net Zero Emissions Target. In line with Türkiye's Green Hydrogen & Storage Strategy hydrogen electrolysis and battery storage participation in LFMs should be also encouraged.





SUMMARY OF RECOMMENDATIONS

- 1. Amend the Electricity Market Law to define flexibility services and LFM mechanisms.
- 2. Identify high-congestion areas suitable for LFM demonstration projects.
- 3. Develop an aggregator licensing framework and enable pilot participation.
- 4. Accelerate smart meter rollout and design a data-sharing framework.
- 5. Establish a national flexibility market roadmap, with clear responsibilities for DSOs and TEİAŞ.
- 6. Create interoperable digital platforms for local procurement of services.
- 7. Introduce performance-based regulation for DSOs that rewards flexibility use.
- 8. Embed flexibility and LFMs in regional investment planning and grid development.
- 9. Build partnerships with universities and municipalities to raise capacity and public engagement.
- 10. Support local technology developers to design interoperable digital solutions for LFMs.

ACTORS TO ENGAGE

- EMRA for regulatory development and oversight.
- Ministry of Energy and Natural Resources for legal changes and NECP alignment.
- TEİAŞ and DSOs for pilot testing and system integration.
- Universities and innovation centres for capacity building.
- International donors (EU, World Bank) to fund digitalisation and pilots.4.6.6. Policy.

By 2030, Türkiye can develop a mature LFM ecosystem through regulatory reform, technology adoption, and strategic pilots. Starting with smart grid investments, demand response programs, and regional trials, Türkiye can unlock the full potential of local energy flexibility.





6. POLICY RECOMMENDATIONS FOR ENABLING REGULATIONS OF THE LFMS IN EUROPE

6.1. HARMONISATION OF NATIONAL LEGISLATIONS

Countries need to continue working on the harmonisation with EU energy directives (e.g., Clean Energy Package, Electricity Market Design). A **standardized legal framework** should be developed to define LFMs and their role in the electricity system, as well as the roles and responsibilities for Distribution System Operators, energy communities, aggregators, and flexibility providers.

Countries must also transpose the new Electricity Market Design rules into national law—particularly the provisions of the amending Directive (EU) 2024/1711, which address dynamic pricing contracts. These rules aim to enable consumers to benefit from price variability (e.g., by using electricity when it is cheaper) and facilitate energy sharing—for example, allowing households to share surplus rooftop solar power with neighbours.

Countries should align their national laws with EU directives to provide *clear definitions* and operational frameworks for RECs and CECs. The transposition of EU directives into national legislation varies among member states.

Currently, there are many different forms of energy communities across Europe - their total number is estimated to exceed 9,000. However, the binding EU regulation of RED II on their non-discriminatory treatment has not yet been fully implemented in many cases. The framework conditions are very different in many EU countries and there are numerous obstacles and challenges. In some countries, such as Spain, Portugal and France, there is already a separate legal framework for energy communities, while in some other countries this is currently being developed.

Most countries have to further *develop an enabling framework* allowing energy communities to participate in the market without discrimination compared to other market actors. Barriers that still exist include issues with accessing the grid, lack of funding opportunities, and complex administrative and regulatory procedures.

Since the CEP, Europe has experienced a global crisis and the European policymakers have worked on solutions like the Fit for 55 (2021) and the REPowerEU (2022) Packages, and the revision of the Electricity Market Design. These laws reinforce the model of energy communities, further acknowledging that citizens no longer need to depend on corporate power for their renewable heating, or renovations. The electricity, second-generation EU legislation for energy communities clarifies that citizen-led initiatives actively contribute to activities that include renovations, energy efficiency, heating and cooling, and the alleviation of energy poverty.



6.2. SIMPLIFICATION OF ADMINISTRATIVE PROCEDURES

Streamlining bureaucratic processes can further facilitate the establishment and operation of energy communities. Bureaucratic burdens, non-transparent processes, and the lack of legal coherence – combined with incomplete framework and guidelines – often result in unclear interpretations of existing legislation by the competent authorities, slowing down the process of RES development for citizens and businesses. In some countries, a lack of support from policymakers or resistance from public and private institutions (e.g., in the case of wind power) is due to insufficient experience or technical expertise. Grid connection and operational procedure challenges frequently stem from inadequate grid capacity, which delays the deployment of renewable energy projects.

The revised RED (Directive 2023/2413 amending Directive 2018/2001) entered into force in November 2023 and certain provisions had to be transposed into national law by 1 July 2024. These provisions include measures to *simplify and accelerate permitting procedures* both for RE projects and the necessary infrastructure projects to integrate the additional RE into the electricity system. RED aims to shorten permit-granting procedures for RE installations, particularly through provisions such as the identification of renewable acceleration areas and specific rules for small-scale solar installations, which are especially relevant for energy communities.

To simplify administrative and validation processes, EU Member States have implemented one-stop shops (OSS) for energy communities at national, regional, or municipal levels. This approach enhances the monitoring of energy community development, facilitates interactions with public authorities, and streamlines specific administrative procedures.



Developing standardized frameworks and taxonomies for LFMs can reduce complexity and promote broader participation. Research has proposed multi-layered taxonomies focusing on congestion management at the distribution level, aiding in the design and implementation of effective LFMs ¹⁰.

The European Commission's RES Simplify project offers guidance to Member States on addressing bottlenecks related to permitting and grid connection procedures.

Market Access and Participation

Transparent and open access rules for all market participants -including prosumers, storage operators, and demand-side response providers - should be ensured. This includes:

- Simplified entry requirements to reduce bureaucratic hurdles for small-scale flexibility providers, including energy communities and households;
- Standardized market rules to ensure a uniform regulatory framework across all EU member states to avoid market fragmentation;
- Data-sharing frameworks establishing clear protocols for real-time data exchange between TSOs, DSOs, and market participants.

Develop incentive mechanisms to encourage participation in LFMs, such as dynamic pricing and flexibility contracts.

- Dynamic pricing models to implement real-time or time-of-use tariffs to incentivize flexible energy consumption;
- Flexibility contracts that offer long-term agreements between DSOs and flexibility providers to ensure a stable revenue stream;
- Capacity-based remuneration to reward energy storage and demand-side response participants for availability, not just activation.

Example: In France, the NEBEF (Notification d'Échanges de Blocs d'Énergie de Flexibilité)³ mechanism allows demand response providers to sell flexibility directly on the electricity market, creating financial incentives for participation.



https://www.sciencedirect.com/science/article/pii/S0306261923015672

Mécanisme NEBEF - Réseau Electrique| Enedis



6.3. SUPPORT TO THE FLEXIBILITY PROVIDERS

Implement remuneration schemes (e.g., capacity payments, locational price signals) to attract investment in flexibility resources.

- Capacity Payments: Provide financial compensation for flexibility providers that commit to being available when needed (e.g., peak demand hours).
- Locational Price Signals: Implement price signals that reflect grid congestion levels, incentivizing flexibility in areas where it is most needed.
- Market-based Compensation: Allow demand-side response and storage operators to bid into capacity and balancing markets, ensuring fair payment for their services.

Example: Germany's Grid Booster Initiative ¹¹ supports large-scale battery storage deployment by offering locational incentives to reduce grid congestion.

Encourage the deployment of DERs such as batteries, EVs, and demand-side response programs.

- Investment Support by providing grants and low-interest loans for battery storage, EV charging infrastructure, and smart grid technologies.
- Regulatory Sandboxes by creating controlled environments where DERs can participate in LFMs without full regulatory constraints, allowing innovation to thrive.
- Vehicle-to-Grid (V2G) Programs by enabling electric vehicles to provide flexibility services for storing and discharging energy based on grid demand.

Example: The UK's Power Potential Project ¹² allows small-scale energy resources to provide flexibility services to the transmission grid, ensuring better DER integration.

Enhancing Grid Infrastructure and Digitalization for LFMs Investment in Smart Grids and Digital Platforms

- Upgrade grid Infrastructure by deploying advanced sensors, smart meters, and automation tools to optimize real-time energy flow and flexibility services.
- Real-Time Data Exchange by developing digital platforms that allow TSOs, DSOs, and flexibility providers to share real-time grid data efficiently.
- AI & Machine Learning for Grid Management by utilising AI-driven predictive analytics to optimize demand response, congestion management, and asset utilization.

Example: Italy's Areti Smart Grid Project ¹³ enhances distribution grid efficiency through digitalization, predictive maintenance, and automation technologies.

Support Standardization of Flexibility Trading

- Interoperable Platforms: Ensure different flexibility market platforms can communicate using standardized protocols and data formats.
- Integration with Wholesale Markets by facilitating flexibility provider participation in national and regional electricity markets, enhancing liquidity.

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Example: The EU's OneNet Project ¹⁴ is working on a unified digital architecture for electricity markets to improve coordination between TSOs and DSOs.

Strengthen Cybersecurity for Digital Energy Transactions

- Robust Cybersecurity Standards: EU-wide cybersecurity guidelines for digital energy platforms, ensuring resilience against cyber threats need to be established.
- Blockchain for Secure Transactions: The use of decentralized ledger technology (DLT) to enhance trust, transparency, and security in flexibility transactions needs to be explored.
- Regular Cyber Risk Assessments: Mandatory risk evaluations for grid operators and flexibility market participants have to be implemented.

Promotion of Fair Competition and Consumer Protection in LFMs

Establishment of Transparent Pricing Mechanisms

- Standardized Market Rules by defining clear methodologies for pricing flexibility services to ensure fair compensation for all participants.
- Real-Time & Locational Pricing by implementing dynamic pricing that reflects grid congestion and supply-demand conditions, ensuring fair market value.
- Regulatory Oversight by strengthening market monitoring to prevent price manipulation and unfair practices.

Example: The UK's "Power Responsive" ¹⁵ Program educates businesses on demand-side response opportunities, increasing participation in flexibility markets.







6.4. STRENGTHENING THE COORDINATION BETWEEN STAKEHOLDERS IN LFMS

Encouraged Collaboration between Key Stakeholders

- Regular Multi-Stakeholder Dialogues by establishing forums where national regulators, DSOs, TSOs, flexibility providers, and energy communities can align on market needs.
- Joint Planning & Investment Strategies to ensure coordinated grid investments between TSOs and DSOs to optimize flexibility resources and avoid costly grid reinforcements.
- Integrated Flexibility Market Models by developing frameworks that allow both DSOs and TSOs to procure flexibility services in a coordinated way.

Example: The Dutch GOPACS (Grid Operators Platform for Congestion Solutions) ¹⁶ facilitates collaboration between TSOs and DSOs to optimize congestion management and market-based flexibility solutions.

Establish Data-Sharing Protocols for Transparency & Efficiency

- Standardized Data Formats to ensure that flexibility providers, TSOs, DSOs, and market operators use common data formats to improve interoperability.
- Real-Time Data Access to enable market participants to access real-time grid and price data to optimize their flexibility offerings.
- Consumer Data Protection by implementing strict cybersecurity and privacy regulations to safeguard consumer energy data.

Example: The EU Common Information Model (CIM)¹⁷ supports standardized data exchange across different electricity market participants, enhancing transparency and interoperability.

By adopting these recommendations, EU countries can enhance the effectiveness of LFMs, contributing to a more decentralized and sustainable energy system able to enhance the RES development.

^{16 17} GOPACS - Platform voor congestiemanagement. | Common Information Model (CIM).



CONCLUSIONS

Ensuring high-quality regulation for the Energy Transition must keep pace with rapid technological advancements and increasing globalization, both of which create significant challenges in determining the appropriate path forward. Global demand for electricity is growing rapidly as a result of efforts towards industrial decarbonisation, development of electromobility and energy storage and rapid penetration of artificial intelligence. These developments pose serious challenges across the entire electricity value chain, from generation to trading.

The legislative changes identified in the report enable a standardized approach to the role of customers, allowing for their improved integration into electricity markets. By rationalising specific regulatory and administrative barriers, these changes enhance user engagement, encouraging more active participation in the LFMs.

The analysis conducted within the framework of the current EU energy regulations, along with the proposed recommendations, provides a roadmap for the widespread implementation of LFMs in the examined countries. The findings highlight essential policy and regulatory adjustments that can facilitate consumer participation as an empowered stakeholder in the grid, ultimately supporting the achievement of the EU's 2030 and 2050 energy targets.

LFMs represent a fundamental tool in achieving Europe's decarbonisation and energy security goals. A standardized approach, robust regulatory oversight, effective business models, and consumer engagement are essential issues in unlocking the full potential of flexibility markets. By implementing the recommended measures and following the outlined roadmaps, the European Commission and national authorities can accelerate the integration of LFMs, paving the way for a smarter, more resilient, and consumer-centric energy system.

Ultimately, the future of Europe's energy transition will depend not only on infrastructure and regulation—but on enabling flexibility at every level, empowering all actors to take part in building a cleaner, fairer, and more responsive energy landscape.



DE-RISK the adoption of Local Flexibility Markets to unlock the safe and reliable mass deployment of Renewable Energy Systems

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