MEDREG

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# Guidelines for Good Practice concerning Dynamic Regulation in the Energy Sector

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Institutional Working Group (INS WG)

*Empowering Mediterranean regulators for a common energy future*

## ABOUT MEDREG

MEDREG is the Association of Mediterranean Energy Regulators, uniting 29 regulators from 23 countries across the European Union, the Balkans, and the MENA region. Established in 2007 and co-funded by the European Union, MEDREG serves as a platform for cooperation, knowledge sharing, and capacity building in energy regulation. It fosters coherent regulatory approaches and practices at the regional level, aiming at progressive market integration in the Euro-Mediterranean basin. To support its members, MEDREG organises training sessions, workshops, and tailored, hands-on initiatives that enhance the capacity of energy regulators.

MEDREG's goal is to establish an integrated Euro-Mediterranean energy market that strengthens energy security and drives the clean energy transition. This includes integrating renewable energy sources, reinforcing cross-border infrastructure, promoting innovation, enhancing energy efficiency, and advancing renewable gases like hydrogen. Additionally, MEDREG advocates for transparent and non-discriminatory regulation to attract infrastructure investments, modernise electricity and gas markets, and improve consumer protection.

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This report is the result of the work of the MEDREG Institutional Working Group (INS WG), based on the responses of MEDREG's members to the benchmarking prepared by the chairs of the INS WG and the MEDREG Secretariat. MEDREG thanks the INS WG for their contributions and efforts.


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# EXECUTIVE SUMMARY

In recent years, the energy sector has undergone profound changes that have challenged traditional approaches to regulation. Price volatility, rapid technological developments, and unforeseen events affecting market stability have underscored the need for more flexible and adaptive regulatory frameworks. Consequently, many energy regulators have transitioned from purely standard-based regulation to incentive-based regulation, which rewards regulated entities for improved performance—often through bonus or penalty mechanisms.

Building on this approach, some regulators have gone a step further by experimenting with dynamic regulation (DR). Dynamic regulation enables regulators to temporarily exempt market participants from certain rules to test innovative methods, business models, or operational practices. These pilot phases are carefully monitored through predefined indicators. Based on the results, the regulator may:

- Integrate the successful new rules into the general regulatory framework, making them applicable to all.
- Refine and extend the testing phase to further develop the approach.
- Discontinue the measure if it does not deliver the desired outcomes.

This report presents an initial assessment of regulatory approaches currently applied by MEDREG members—ranging from standard-based to incentive-based and, in some cases, dynamic regulation. This first step aims to establish a clear understanding of how energy markets are currently regulated in the Mediterranean region. In the coming years, MEDREG plans to further investigate the potential and practical implementation of dynamic regulation, drawing on best practices and lessons learned from its members.

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# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| **AI** | Artificial Intelligence |
| **ANRE** | National Authority for Electricity Regulation (Morocco) |
| **ARERA** | Italian Regulatory Authority for Energy, Networks and Environment (Italy) |
| **CACM** | Capacity Allocation and Congestion Management |
| **CAPEX** | Capital Expenditure |
| **CEER** | Council of European Energy Regulators |
| **CERA** | Cyprus Energy Regulatory Authority |
| **CNMC** | National Markets and Competition Commission (Spain) |
| **CRE** | Commission for Energy Regulation (France) |
| **CREG** | Electricity and Gas Regulatory Commission (Algeria) |
| **DR** | Dynamic Regulation |
| **DSO** | Distribution System Operator |
| **EBGL** | Electricity Balancing Guideline |
| **EMRA** | Energy Market Regulatory Authority (Türkiye) |
| **ERA** | Energy Regulatory Agency (Montenegro) |
| **ERC** | Energy Regulatory Commission (Republic of North Macedonia) |
| **ERE** | Energy Regulatory Entity (Albania) |
| **ERSE** | Energy Services Regulatory Authority (Portugal) |
| **EU** | European Union |
| **EV** | Electric Vehicle |
| **FCA** | Forward Capacity Allocation |

| | |
|---|---|
| **HEDNO** | Hellenic Electricity Distribution Network Operator (Greece) |
| **ICT** | Information and Communication Technology |
| **INS WG** | Institutional Working Group |
| **KPI** | Key Performance Indicator |
| **MEDREG** | Association of Mediterranean Energy Regulators |
| **MW** | Megawatt |
| **NRA** | National Regulatory Authority |
| **OPEX** | Operational Expenditure |
| **PV** | Photovoltaic |
| **RAAEY** | Regulatory Authority for Energy and Water (Greece) |
| **RAB** | Regulatory Asset Base |
| **REGAGEN** | Energy and Water Regulatory Agency (Montenegro) |
| **RES** | Renewable Energy Sources |
| **TOTEX** | Total Expenditure |
| **TSO** | Transmission System Operator |
| **TSS** | Tariff methodology for System Services |
| **WACC** | Weighted Average Cost of Capital |

# 1. Methodology and Approach

The methodology of this report is based on a benchmarking exercise conducted among MEDREG members to collect their experiences and knowledge related to the types of regulation used in their specific countries. The exercise involved a questionnaire sent to National Regulatory Authorities (NRAs) in the Mediterranean region, covering various aspects of regulatory methods and structures.

The responses to the questionnaire were analysed to assess the use of different types of regulation (standard, incentive, and dynamic), as well as the challenges and opportunities for NRAs in improving their regulatory practices. Additionally, the report provides case studies from Mediterranean countries to illustrate the use of dynamic regulation (DR). Overall, the benchmarking exercise offers valuable insights into the experiences of NRAs in the Mediterranean region and serves as a key source of information for the analysis and recommendations presented in this report. The report's analysis is further informed by relevant regulatory frameworks and guidelines of both the EU and the Mediterranean countries, ensuring a comprehensive and well-informed assessment of the current situation and potential for improvement.

To harmonise the definitions of each type of regulation used in this report, the MEDREG Institutional Working Group (INS WG) members agreed on the following definitions:

- **Standard (traditional) regulation:** Fixed rules and tariffs with limited flexibility, typically ensuring stability but lacking adaptability to market changes.
- **Incentive-based regulation:** Introduces performance-based mechanisms, rewarding efficiency and innovation while maintaining regulatory oversight.
- **Dynamic regulation (as defined by CEER):** DR is a tool to inform future regulatory decision-making through experimentation. It uses pilot projects, sandboxes, and other options that enable testing new rules in a safe environment before implementing them on a large scale.

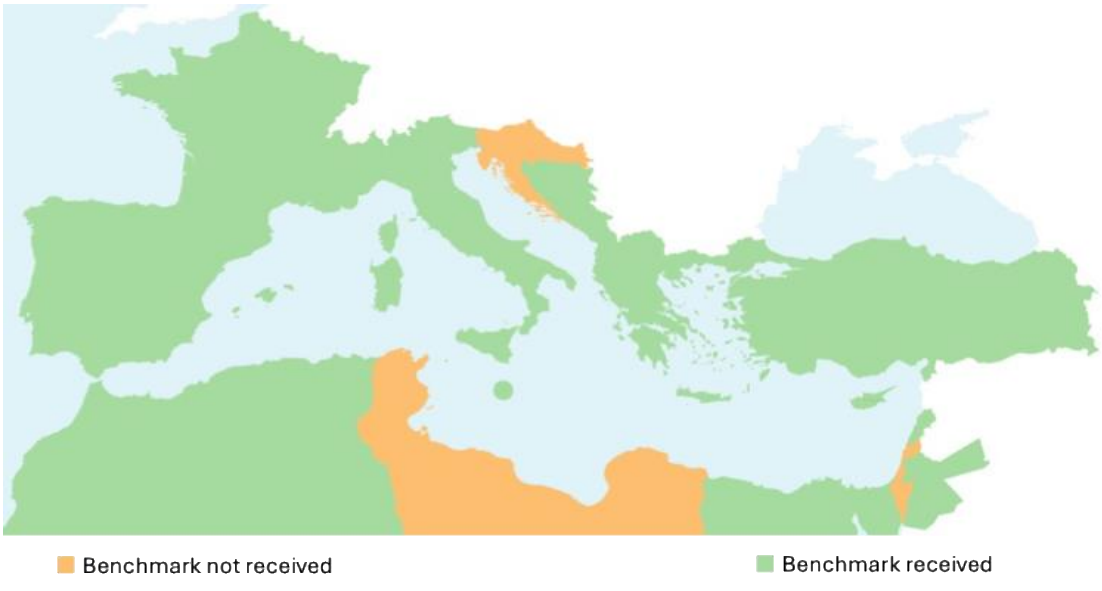


*Figure 1. Benchmarking replies*

# 2. State of Play: Current Regulatory Landscape in the Mediterranean Region

Standard, rules-based regulation remains the foundation of electricity markets across the Mediterranean. However, the benchmark was designed to assess the region's movement towards dynamic and incentive-based schemes. The data reveal a clear and necessary trend favouring modernisation: while traditional, static rules prevail, many countries are exploring or implementing DR to manage the operational complexities of high Renewal Energy Sources (RES) penetration. The figure below summarises the current regulatory typology for the surveyed countries, using the term "Hybrid Regulation" to highlight the use of DR as well.


*Figure 2. Regulatory landscape in the Mediterranean region*

## Analysis

The Mediterranean energy regulatory landscape is characterised by a dynamic and uneven transition. The region is grappling with a Regulatory Trilemma: the simultaneous need to maintain stability (Standard), enforce efficiency (Incentive), and foster innovation (Dynamic).

## Key Finding

The region is rapidly shifting towards hybrid models. Northern and EU-aligned countries lead in implementing advanced incentive and dynamic tools to manage complex, liberalised markets and meet ambitious decarbonisation targets. Conversely, many Southern and Eastern Mediterranean nations continue to rely heavily on standard regulation for stability, with incentive tools introduced primarily to manage basic system losses and spur foundational renewable investments. Future progress requires intensive capacity building and regional harmonisation to bridge this regulatory gap, ensuring that successful pilot project learnings and efficiency mechanisms can be shared and adopted across the diverse operational and political environments of the Euro-Mediterranean basin.

# 3. Incentive Regulation in the Mediterranean Region

Incentive regulation is the key approach of many regulators in the Mediterranean region to move beyond static, cost-plus models. This model introduces performance-based mechanisms to motivate energy utilities to improve their performance in cost efficiency, quality, and innovation.

This model is widely used across the region, with countries like Albania, Cyprus, France, Greece, Montenegro, Morocco, Portugal, the Republic of North Macedonia, and Türkiye all implementing incentive-based mechanisms in their energy sectors. Country-wise details are provided in the annex.

## 3.1 Examples of implementation

In **Spain**, the CNMC has established an incentive-based remuneration framework for the System Operator. This framework, outlined in Circular 3/2025, uses efficiency indicators to measure performance and determine remuneration. Spain too applies efficiency incentives to electricity distribution to improve supply quality and reduce network losses (Circular 6/2019).

In **Portugal**, the revenues allowed for electricity and gas regulated activities are determined using incentive-based regulation. The country's regulatory framework uses a TOTEX[1] approach for transmission and distribution network regulation since 2022, treating both operating and capital costs alike in terms of the overall framework and incentive strength, aiming to provide companies with the freedom to choose the most efficient mix of digital and physical solutions.

In **Morocco**, ANRE has introduced a form of incentive-based regulation through its tariff methodology for system services (TSS). This framework provides tariff reductions for operators who deploy storage solutions, encouraging grid flexibility and innovation.

Meanwhile, in **Türkiye**, EMRA employs a bonus/penalty mechanism for electricity distribution companies based on quality factors such as supply continuity, technical quality, and customer satisfaction. Additionally, Loss and Theft Targets are another incentive mechanism, where EMRA implements measures to reduce losses in the distribution system, encompassing both technical losses and theft. This regulation outlines specific measures and standards for distribution companies to follow.

[1] TOTEX: Total Expenditure is a regulatory approach that treats both capital expenditures (CAPEX) and operational expenditures (OPEX) unifiedly.

**Montenegro** uses a hybrid regulatory method for its electricity TSO and DSO that provides efficiency incentives and permits risk-sharing. Since 2012, this framework has led to approximately €570 million in investments in the transmission and distribution systems.

In **Greece**, RAAEY has implemented a loss incentive factor to encourage the Greek DSO, HEDNO, to reduce technical losses in the electricity distribution network.

Lastly, in **Albania**, incentive regulation is applied through the new Law on Renewable Energy (Law No. 24/2023) on Renewable Energy provides the legal framework for support mechanisms, including feed-in premiums, that incentivise renewable energy producers through transparent and competitive schemes.

## 3.2 Incentive regulation: advantages and disadvantages

**Incentive regulation** introduces performance-based mechanisms that reward efficiency and innovation while maintaining regulatory oversight. This model is widely used across the region, examples being Albania, Algeria, and Montenegro.

- **Advantages**

**Promotes efficiency and cost reduction:** By linking rewards to performance, incentive regulation motivates utilities to reduce costs and improve operations. This approach has proven effective in countries like Türkiye and Greece.

**Encourages innovation and investment**: The promise of transparent returns and fair risk allocation attracts private capital and promotes innovation, as seen with auction-based schemes in Albania and significant investments in Montenegro.

**Aligns interests:** It helps align the interests of the regulator and the regulated entity towards shared goals of service quality and efficiency.

**Improves service quality:** Incentive schemes can be designed to reward improvements in service quality, such as reducing outage frequency and duration, as demonstrated by Italy's RISE framework.

- **Disadvantages**

**Complexity and design challenges:** Designing effective incentive schemes is complex, requiring clear goals and appropriate indicators. This can also lead to "regulatory gaming" or unintended consequences.

**Information asymmetry:** Regulators may struggle to monitor and audit results effectively because companies often possess more data on their true costs and capabilities.

**Risk of underperformance or overinvestment**: There is a risk of companies neglecting social or environmental goals to cut costs. Conversely, they might over-invest to maximise rewards without proportional benefits for consumers.

**Uncertainty and instability:** Frequent changes to incentive structures can create investment uncertainty, and the framework may require adjustments during crises like high inflation.

- **Mitigation Strategies**

To address these disadvantages, it is crucial to:

- Use simple, measurable, and transparent indicators.
- Strengthen the regulator's technical capabilities with adequate resources and digital tools.
- Ensure stability and predictability through clear rules, long-term plans, and regular review processes.
- Apply a TOTEX framework to achieve capex-opex neutrality and encourage more efficient resource allocation.

## Analysis

Incentive-based regulation is the tool most used by Mediterranean regulators to move beyond simple cost recovery towards performance-driven governance. Countries ranging from Spain and Portugal (using TOTEX and efficiency benchmarking) to Türkiye and Greece (applying bonus/penalty for quality and loss reduction) are leveraging this approach.

## Key Finding

This model successfully aligns utility profits with regulatory goals (e.g. reducing losses, improving supply quality, spurring CAPEX/OPEX neutrality). The documented successes—such as substantial investments in Montenegro and enhanced service quality in Türkiye—demonstrate its power to drive efficiency gains. The primary challenge, however, is regulatory complexity and information asymmetry. Regulators must possess advanced technical expertise and robust data analytics to prevent "regulatory gaming", where companies optimise for measured targets at the expense of unmeasured long-term stability or consumer interest.

# 4. Dynamic Regulation: Principles and Implementation Strategies

DR is often enabled by broad regulatory powers, even when a country's laws do not explicitly mention it. The core principles that support DR include:

- **Promoting competition, efficiency, and quality:** Regulators like Italy's ARERA are mandated to promote competition, efficiency, service quality, transparent tariffs, and environmental protection, goals that can be achieved through dynamic approaches.
- **Encouraging innovation:** DR encourages experimentation with new technologies and business models in a controlled environment. It enables regulators to develop frameworks quickly in response to market or technological changes.
- **Risk mitigation:** This approach helps limit risks for operators by temporarily relaxing rules or providing incentives during pilot projects.
- **Accelerating the green transition:** DR supports the effective integration of renewables, flexibility, hydrogen, and digitalisation.
- **Stakeholder engagement:** It encourages participation by new market players, which can boost competition and service variety.

## 4.1 Implementation strategy for introducing dynamic regulation

Based on the experiences of countries that have adopted or are moving towards DR, a structured approach is recommended.

- **Legal basis**

A key initial step is to assess the existing legal and regulatory framework to determine whether it permits the use of DR.

In countries such as Italy and Cyprus, DR is not explicitly mentioned in the law. Instead, it is enabled by the broad powers granted to their respective regulators, ARERA and CERA, to promote competition and efficiency.

In contrast, France has an explicit legal basis for DR through its regulatory sandbox introduced by Law No. 2019-1147.

Spain's framework too explicitly permits regulatory sandboxes under Royal Decree-Law 23/2020, which introduces an additional provision (23º) in the Law 24/2013 on the Electricity Sector to facilitate research and innovation.

Portugal's law for the electricity sector introduced the concept of "technology free zones", dedicated to sandboxes.

Morocco is in the process of preparing a new legislative framework for implementing a broadened mandate for the ANRE, which is expected to progressively integrate DR mechanisms.

Bosnia and Herzegovina faces legal barriers as its law is not harmonised with EU legislation.

- **Pilot projects and phased implementation**

Pilot projects are a central component of DR. They allow new rules and technologies to be tested in a safe, controlled environment before widespread adoption. (More details are provided in the annex regarding the projects.)

**France** implemented a DR pilot project with Elax Energie to remunerate consumers for consumption deferrals, not just curtailment.

**Spain** launched a "sandbox" for voltage control in the electricity transmission grid to test a zonal market mechanism open to all generation and demand technologies, aiming to adapt to high renewable energy production. A second sandbox focused on tariffs to encourage demand response was developed after demand failed to participate in the first one due to technical complexity and barriers, such as tariff design and the lack of certainty in the remuneration associated with any market mechanism.

In **Portugal**, ERSE approves pilot projects under its electricity and gas codes to test the viability of new technologies and practices.

**Italy** applied DR to implement electricity flexibility pilot projects, such as the EDGE project, which established local flexibility markets.

In **Cyprus**, a net metering programme functioned similarly to a regulatory sandbox by enabling the safe integration of solar PV systems.

In Egypt, GasReg approved CNG trucking off-grid as a legal form of "gas transport," extending the law's original definition dynamically to a new technology. In addition, GasReg created new licence types even though these activities are not explicitly mentioned in the law.

This adaptive licensing regime mirrors the idea of using tailored dynamic regulatory treatment for emerging activities

- **Adoption of digital tools and real-time monitoring mechanisms**

Digital tools and monitoring are essential for DR. For the EDGE project in Italy, real-time monitoring supported trust and informed decisions.

- **Regulatory flexibility and periodical adjustments**

DR requires an adaptive framework that can evolve with changing circumstances. Italy's approach involves temporary and iterative rules that enable rapid learning and adjustment. The gas optimisation pilot projects in Italy will be evaluated by the end of 2026 to determine technologies ready for national adoption.

- **Stakeholder engagement and capacity building**

Engaging with stakeholders is vital to the success of DR. Italy's ARERA has found that co-designing projects with market players helped refine the market setup. In Italy, multiple entities share responsibilities, which can slow coordination and create unclear mandates. Scaling pilot projects requires alignment between planning, incentives, and grid operations across different bodies.

## 4.2 Dynamic regulation & RES integration

DR plays a crucial role in facilitating the integration of RES, such as solar and wind power, into the energy grid.

- **Role of Dynamic Regulation in Facilitating RES Integration**

**Adapting to new technologies**

DR, through pilot projects and sandboxes, enables regulators to test new technologies like battery storage and demand-side management in a controlled environment. This is important for technologies that challenge static regulatory approaches like fixed feed-in tariffs.

**Improving grid stability and reliability**

As RES can be intermittent, dynamic approaches permit testing new market mechanisms to manage the grid in a high RES production scenario.

- In Spain, a regulatory sandbox was launched for voltage control in the transmission grid under high RES production conditions.
- In France, the "Reflex" project enabled the grid operator Enedis to loosen grid connection rules to accelerate the connection of solar and wind power plants.
- The same project is a regulatory sandbox pilot through which the DSO Enedis uses local flexibility to defer grid reinforcements and speed up renewable connections. To support this scheme, CRE has authorised a national roll-out under the network tariff.

**Encouraging flexibility**

DR promotes flexibility by creating a framework for services that can quickly respond to supply and demand changes. The EDGE project in Italy, for instance, established local flexibility markets where various users and systems could offer services to support network resilience and decongestion.

- **How dynamic regulation enhances investor confidence**

DR helps attract more investors by reducing uncertainty and demonstrating a clear path for new technologies to be integrated into the market.

**Enhanced market efficiency and investment climate**

By providing a transparent environment for testing innovative solutions, DR provides investors with greater certainty over cost recovery, technology acceptance, and compliance. This is particularly valuable for investments in non-traditional assets like demand response or hydrogen-ready infrastructure.

**Flexibility and adaptability to technological advances**

The ability to test and adapt to new technologies offers investors the confidence that their projects will not be stifled by outdated regulations. In Spain, a call for a regulatory sandbox positively evaluated projects that addressed key challenges like network flexibility and shared storage, attracting new investment.

**Reduced barriers:** In countries like Cyprus, DR has eased regulatory barriers by providing a specific process for licensing innovative projects and technologies.

- **Case studies of successful implementation in RES integration**

**France:** "The Reflex Project": Implemented by Enedis within the framework of France's official energy regulatory sandbox (dispositif d'expérimentation réglementaire), the Reflex project enables an innovative approach to accelerate grid connections for renewable generation (solar and wind). Rather than merely streamlining procedures, the project has been designed as a controlled regulatory experiment that relied on temporary and calibrated derogations from standard grid-connection rules. This allowed Enedis to test new operational limits and unlock additional network capacity without immediate or capex-intensive investments.

The ex-post assessment confirmed the technical feasibility of these relaxed rules. This learning-by-doing approach enabled the connection of an additional 215 MW of renewable capacity compared to the conventional rules, resulting in documented savings of 11.6 million euros. The findings are intended to inform permanent amendments to the national grid connection regulatory framework.

**Italy: "The EDGE Project":** This DR model allowed certain DSOs to implement local flexibility markets. It empowered users to participate in the grid by earning from flexible consumption and

production. The project also helped DSOs manage grid congestion and supported the integration of renewables and energy communities. The lessons learned from the project highlighted that flexible markets are viable, and that regulatory adaptability, stakeholder engagement, and data transparency are key to success.

**Spain: "Voltage Control Sandbox":** In 2022, the CNMC launched its first regulatory "sandbox" to test a market mechanism for controlling voltage in the transmission grid during periods of high renewable energy production. This project, proposed by the Spanish TSO, allowed the testing of a zonal market mechanism open to different generation and demand technologies. The initial project's findings highlighted that while renewable generators participated, demand response did not, which led to the design of a second sandbox specifically focused on incentivising demand participation through tariffs related to reactive energy. The success of this dynamic approach will be crucial in designing the future voltage control market.

**Cyprus: "Smart Metering Pilot":** Before the widespread deployment of smart meters, a DR approach was used to connect approximately 300 domestic prosumers (consumers who both produce and consume energy) via smart meters for remote access. This project successfully established a basis for rolling out smart metering and demand-side management, which led to a reduction of 800 tons of $CO_2$ emissions.

In summary, DR is a powerful tool for advancing energy transition. It enables the safe and efficient integration of RES by promoting flexibility and innovation while simultaneously building investor confidence and reducing regulatory barriers.

## 4.3 Dynamic regulation: advantages and disadvantages

DR uses pilot projects and sandboxes to test new rules in a safe environment before large-scale adoption. This approach is increasingly considered essential for managing the rapid pace of technological advance in the energy sector.

- **Advantages**

**Promotes innovation and flexibility:** DR encourages experimentation and allows regulatory frameworks to evolve quickly in response to market changes.

**Risk mitigation:** DR limits risks for both regulators and operators by temporarily relaxing rules or providing incentives during pilots.

**Informed decision-making:** It generates real-world data and lessons that inform long-term regulatory design and reduce uncertainty before a rule is adopted on a large scale.

**Attracts investment:** By offering a controlled, transparent environment, DR offers investors greater certainty, enhancing their willingness to invest in innovative projects.

- **Disadvantages**

**Regulatory uncertainty**: The temporary nature of rules can confuse market participants and potentially delay long-term investments.

**Complexity and high costs**: Designing and managing pilots requires significant resources from both the regulator and participants. This can be particularly challenging for smaller regulatory authorities with limited resources when managing complex pilot systems.

**Risk of regulatory arbitrage**: There is a risk that some companies might exploit temporary exemptions unfairly or delay compliance with full-scale rules.

**Limited scale and scope**: Pilot results may not always fully represent large-scale operations or diverse market conditions.

- **Mitigation Strategies**

To address these issues, it is recommended to:

- Establish predictable but reversible regulatory frameworks.
- Strengthen the technical capacity of regulators and ensure transparency.
- Define clear pilot timelines and transparent evaluation criteria.
- Promote broad stakeholder engagement and transparent communication.
- Commit to timely evidence-based post-pilot regulatory updates to ensure that successful pilots lead to permanent progress rather than a continuous cycle of experimentation.

### Analysis

DR, primarily implemented through regulatory sandboxes and pilot projects (e.g. Italy's EDGE, France's Reflex, Spain's Voltage Control Sandbox), represents the next milestone for the region. It is the mechanism necessary for safely testing new technologies and market designs required by the energy transition (RES, storage, flexibility).

### Key Finding:

DR effectively manages policy risk by moving regulatory design from theory to controlled, real-world data. It acts as a powerful signal to investors, assuring them that new, capital-intensive technologies will have a predictable pathway to market integration. The successful scaling of DR hinges on establishing a clear legal basis—either explicit (France) or implicit via broad mandates (Italy, Cyprus). Countries lacking institutional capacity or clear legislative frameworks face the challenge of regulatory uncertainty, where temporary rules may confuse, delay progress, or be difficult to integrate into permanent market structures.

# 5. Conclusion and Recommendations

These Guidelines of Good Practice on Dynamic Regulation in the Energy Sector provide an in-depth overview of how Mediterranean regulators are transitioning from traditional, static models to more adaptive frameworks capable of managing the fast pace of technological, environmental, and market change. Benchmarking results from twenty (20) countries demonstrate that while standard and incentive-based regulations remain the dominant tools, there is a growing consensus that DR is becoming essential for achieving a resilient, consumer-centric, and innovation-driven energy transition.

- **Key Findings**

Across the region, DR is already proving its value as a structured method for testing innovative business models, technologies, and market mechanisms before their large-scale adoption. Case studies from Italy, France, Spain, Cyprus, and Portugal show that pilot projects and regulatory sandboxes can significantly accelerate renewable integration, reduce system costs, and foster stakeholder trust. Projects such as EDGE (Italy) and Reflex (France) have demonstrated that local flexibility markets and temporary rule derogations can enhance grid efficiency and resilience while saving millions of euros and avoiding unnecessary investments.

Incentive-based models also remain a powerful complement to dynamic tools, motivating utilities to enhance performance and transparency. Yet, experiences from Greece, Montenegro, and Portugal reveal the need for balanced risk-sharing and robust data analytics to prevent over-investment, regulatory gaming, and information asymmetry.

Several countries possess enabling mandates but lack explicit legislative provisions or sufficient technical resources to launch experimental frameworks. This gap highlights the need for harmonised legal definitions, capacity building, and regional cooperation to create a shared understanding of DR principles.

- **The Strategic Value of Dynamic Regulation**

DR is not merely a temporary policy trend; it represents a new regulatory philosophy built on adaptability, learning, and collaboration. It enables regulators to:

- **Manage uncertainty** through structured experimentation rather than reactive policymaking.
- **Encourage innovation** while maintaining consumer protection and market stability.
- **Introduce measures**, including dynamic pricing caps, consumer education, and targeted support for vulnerable households.

- **Gather real-world evidence** to design smarter, evidence-based permanent rules.
- **Build investor confidence** by offering predictability and transparency in the testing of new technologies such as green hydrogen, digital platforms, and distributed energy resources.
- **Ensure clarity** by confirming that the methods and criteria for dynamic adjustments are clear, publicly available, and consistently applied. Transparent communication helps maintain market confidence and prevents distortion.
- **Protect market stability** by ensuring regulatory adjustments are phased in gradually and supported by impact assessments to protect both investors and consumers.
- **Accelerate RES integration** by aligning incentives with system needs in real time. Regulators should recognise and reward flexibility services such as storage and demand-side response.
- **Encourage digital investment:** Policies should promote investment in digital infrastructure, including smart grids, energy management systems, and advanced metering, which are essential for enabling data-driven and adaptive regulation.
- **Foster interoperability:** Provide regulatory frameworks that consider interoperability measures. Coordination among electricity and gas regulators—at both national and regional levels—can improve efficiency and enhance energy security.
- **Establish continuous monitoring and evaluation systems** to assess the performance of DR. Lessons learned should feed back into policy refinement and capacity-building initiatives.

Moreover, DR is crucial for green and digital transitions. It provides the flexibility needed to integrate renewable energy sources, promote flexibility markets, and accommodate the rapid rise of prosumers, storage, and electric mobility solutions—all central to achieving decarbonisation targets across the Mediterranean.

- **Challenges and Mitigation Strategies**

Common challenges identified include limited technical capacity, fragmented institutional mandates, and high implementation costs. To address these, the report recommends the following:

- **Institutional strengthening:** If resources are available, regulators are encouraged to develop internal innovation units capable of managing pilots, collecting data, and assessing outcomes.
- **Transparent evaluation criteria:** Each pilot should include predefined performance indicators and clear decision paths for scaling, revising, or discontinuing rules.

- **Legal flexibility:** Ensuring a robust legal framework for DR requires support from governments to empower regulatory authorities with explicit or implicit mandates for temporary derogations and experimentation.
- **Digital transformation:** Real-time monitoring systems, interoperable databases, and AI-assisted analytics should be integrated into regulatory processes.
- **Stakeholder engagement:** Market participants, consumers, and innovators must be involved early in the design phase to ensure legitimacy and shared ownership of outcomes.

## The Way Forward for Mediterranean Regulators

The next phase for MEDREG and its members is to institutionalise DR as a permanent component of regulatory governance. This requires moving from isolated pilot projects towards a structured regional framework that supports knowledge exchange, cross-border experimentation, and mutual recognition of results.

Future MEDREG work may also focus on:

- **Strengthening regulatory authorities** and system operators through training, data sharing, and digital tools for real-time market monitoring and adaptive governance.
- **Establishing structured cooperation frameworks** to align market rules, technical standards, and licensing procedures, thereby reducing regulatory fragmentation across the region.
- **Developing guidelines** for pilot evaluation and scaling to transform successful experiments into permanent regulatory instruments.
- **Ensuring participatory mechanisms** for stakeholders to maintain transparency, social acceptance, and long-term policy stability.
- **Facilitating capacity-building programmes** and technical assistance for regulators with limited resources.
- **Promoting harmonisation with CEER and EU frameworks**, ensuring consistency with broader European energy transition goals.
- **Exploring multi-sectoral applications of DR**, linking electricity, gas, hydrogen, and digital markets to maximise systemic efficiency.

- **Final Reflection**

DR embodies the transition from "command-and-control" regulation to learning-based governance. It allows regulators to become active facilitators of innovation rather than mere rule enforcers. The Mediterranean region—with its diversity of market maturity and shared decarbonisation goals—offers a fertile ground for such transformation.

As DR mechanisms are developed, thereby adjusting rules as technology, markets, and policy goals evolve, there is a necessity for the legal underpinnings for such flexibility to acquire a robust basis. This could, in turn, require statutory authority for regulators to develop experimental regulatory sandboxes and frameworks supporting innovation. A necessary corollary would be the calibration of existing monitoring and enforcement powers available to regulators to address these new realities. If implemented strategically and collaboratively, DR can turn regulatory experimentation into a driver of stability, innovation, and consumer trust—laying the foundation for a secure, sustainable, and integrated Euro-Mediterranean energy future.

# Annex: Country details

## 1. Albania: ERE

- **Regulatory model: Standard & Incentive-Based**

Standard regulation remains the foundation of the energy sector regulatory framework, primarily governed by Law No. 43/2015 on the Power Sector and related legislation.

Separately, Law No. 24/2023 on Renewable Energy establishes support mechanisms for renewable energy producers, including competitive auctions and Contracts for Difference (CfD) schemes.

Currently, DR, as defined by CEER, is not formally implemented but is applicable in particular cases.

- **Legal basis allowing the use of DR**

DR is not explicitly mentioned in the current legal framework. However, the Energy Regulatory Entity (ERE), referring specifically to Articles 18, 19, and 20 of Law No. 43/2015, exercises regulatory powers that enable it to regulate, supervise, and control the electricity sector.

- **DR application in RES integration.**

DR has not yet been formally applied in the renewable energy sector, including green hydrogen, in Albania.

- **Contribution of dynamic/incentive regulation to attracting investors**

In the case of Albania, the use of incentive regulation has enhanced market efficiency and the investment climate.

The auction-based schemes (introduced through Law No. 24/2023) for renewable energy projects have improved market transparency and price competitiveness, making Albania more attractive for international investors. Long-term Power Purchase Agreements (PPAs) and Contracts for Difference (CfD) mechanisms reduce investor risk. Regulatory clarity and harmonisation with EU norms enhance the bankability of projects.

However, steps towards market liberalisation, alignment with EU regulations (e.g. CACM, FCA, EBGL, SOGL, and NC ER), and the new Law No. 24/2023 on renewable energy have improved the investment climate and regulatory predictability, particularly in the electricity and renewables sector.

- **Advantages and disadvantages of using incentive regulation**

Incentive/support schemes aim to motivate energy utilities to improve performance (cost efficiency, quality, innovation) by linking profits or rewards to performance indicators, rather than simply reimbursing costs (as in cost-plus regulation).

In Albania incentive/support schemes are applied only in the renewable energy sector. Law No. 24/2023 on Renewable Energy introduces support mechanisms for renewable energy producers—such as competitive auctions, feed-in premiums and Contracts for Difference (CfD) schemes. These mechanisms incentivise RES producers, while performance-based tariff incentives for network operators are not applied.

**Advantages**

- **Encourages efficiency:** Promotes cost-reduction and innovation in operations through tariff cap methodologies used by ERE.
- **Attracts investment:** Transparent returns and fair risk allocation attract private capital, as seen with auctions for solar PV projects like the Karavasta project.
- **Aligns with EU best practices:** Harmonises regulatory tools with Energy Community/EU standards, including CfD mechanisms under Law 24/2023.
- **Long-term stability:** Offers predictable revenue streams, improving the bankability of projects through 15-year PPAs signed with foreign developers.
- **Reduces regulatory burden** and encourages self-regulation through performance targets established by ERE methodologies for electricity price review.

**Disadvantages**

- Risk of underperformance of the companies.
- Information asymmetry.
- Investor overprotection.
- Social or environmental neglect: Efficiency incentives might overlook social equity or environmental goals.
- Implementation of complex incentive schemes requires continued institutional strengthening and further technical capacity development.

Incentive regulation can drive efficiency, investment, and innovation in Albania's energy sector; however, its effective implementation requires strong institutions, data transparency, and appropriate safeguards to prevent unintended consequences. Recent reforms most notably the adoption of Law No. 24/2023 on Renewable Energy have strengthened the regulatory framework

and enhanced investment predictability, particularly through competitive auctions and CfD-based support schemes.

- **Lessons learned from incentive regulation in Albania**

Incentive-based regulation is applied notably through the new Law on Renewable Energy (Law No. 24/2023), specifically Article 12 thereof, which introduces the incentive/support schemes to be applied.

CfD approved by ERE decision No: 136 dated 10.7.2024.

- **Examples of using dynamic regulation.**

Currently, Albania has not implemented formal DR mechanisms in the energy sector.

However, the Energy Regulatory Entity (ERE) has approved the CACM Regulation and is in the process of transposing other key regulations, such as FCA and EBGL. These regulations impact the market operation for the Transmission System Operator (OST), the power exchange (ALPEX), and all market participants, reflecting a more dynamic and coordinated regulatory approach aligned with European standards.

These developments reflect ongoing alignment with EU market frameworks and contribute to the gradual modernisation of the regulatory environment, although formal dynamic regulation tools, such as regulatory sandboxes or pilot schemes, have not yet been introduced.

Currently, Albania has not implemented formal dynamic regulation tools such as regulatory sandboxes or pilot-based experimental frameworks.

- **Future plans for the use of dynamic regulation**

Although dynamic regulation (DR) is not yet formally defined in Albanian legislation, several developments are consistent with its underlying principles.

Digitalisation and consumer-oriented tools contribute to a more adaptive regulatory environment. The Price Comparison Tool (PCT), currently operational, enhances transparency and enables consumers to make informed choices in the liberalised electricity market. While not constituting a regulatory sandbox, such digital instruments may support future DR-oriented initiatives.

Moreover, the ongoing transposition of key EU electricity market and operation regulations—such as CACM, FCA, EBGL, SOGL and NC ER—together with developments in market coupling, balancing market design, and flexibility services, reflects a gradual shift toward more adaptive, data-driven, and innovation-friendly regulatory frameworks.

# 2. Algeria: CREG

- **Regulatory model: Standard & Incentive-Based**

In Algeria, the regulation of the electricity and gas distribution sector rests on an incentive-based system. This system primarily concerns the remuneration of electricity and gas transmission and distribution activities, which is linked to performance targets that operators managing these networks must achieve. Importantly, only electricity generation and the supply of electricity and gas on the national market are open to competition. The tariff system is based on an incentive principle and varies and modulates based on different parameters.

- **Legal basis allowing the use of dynamic regulation**

In Algeria, the current law governing the electricity and gas distribution sector, published in 2002, establishes the tariff system based on an incentive principle, which varies and is modulated with different parameters. For instance, modulation occurs according to voltage and pressure, time blocks, and seasonal block tariffs.

- **Dynamic regulation application in RES integration**

The law states that RES integration will be undertaken through the tariff structure. Currently, the RES are incentivised by another mechanism.

- **Dynamic regulation contributes to attracting investors.**

DR facilitates cost reflectivity. At present, the tariffs remain subsidised, which serves as a means to attract investors.

- **Advantages and disadvantages of using Incentive Regulation**

Incentive regulation helps realise cost reflectivity for the operator while allowing modulation in assumptions for the consumer, thereby reducing energy bills.

- **Lessons learned from using incentive and dynamic regulation**

Even when partially implemented for a specific category, DR is regarded as a tool for more accurately setting cost reflectivity.

- **Example of using incentive regulation**

In Algeria, electricity and gas tariffs are fixed by the Commission for Regulation of Electricity and Gas (CREG) as regulated tariffs rather than through market mechanisms, due to the current ineffectiveness of competition in this sector.

Law No. 02-01, which governs the electricity and gas distribution sector, provides for a specific remuneration system for transmission and distribution activities. This system is designed to incentivise operators to reduce costs and improve service quality. It encompasses not only investment, operating, and maintenance costs for infrastructure but also other essential expenses, while ensuring a fair return on invested capital—comparable to practices in similar sectors and considering development costs. For distribution activities, remuneration is also adjusted to the specific characteristics of the areas served.

These remuneration mechanisms include clear incentives for cost reduction and continuous improvement of service quality. In this regard, the determination of remuneration for the transport of electricity and gas is accompanied by the establishment of objectives for enhancing the quality of supply and customer service.

- **Future plans for the use of dynamic regulation**

Work is underway to incorporate additional parameters as mandated by law and to update the structure to integrate the technical and economic parameters required for the energy transition.

# 3. Bosnia and Herzegovina: SERC

- **Regulatory model: Standard**

Bosnia and Herzegovina primarily employs standard regulation. The country has not yet implemented DR.

- **Legal basis allowing the use of dynamic regulation**

The relevant law—the Law on Transmission of Electric Power, Regulator, and System Operator of Bosnia and Herzegovina ("Official Gazette BIH", No. 7/02, 13/03, 76/09, 1/11)—is not harmonised with EU legislation and does not fulfil all energy policy goals necessary to provide the country's regulator with the legal basis to adopt all required measures to meet EU energy policy objectives.

- **Dynamic regulation application in RES integration**

DR has not yet been applied in Bosnia and Herzegovina.

- **Dynamic regulation's contribution to attracting investors**

DR has not yet been applied in this country.

- **Advantages and disadvantages of using incentives and dynamic regulation**

DR has not yet been applied in Bosnia and Herzegovina.

- **Lessons learned from using dynamic regulation**

DR has not yet been applied in Bosnia and Herzegovina.

- **Example of using dynamic regulation**

DR has not yet been applied in Bosnia and Herzegovina.

- **Future plans for the use of dynamic regulation**

According to the Law on Transmission of Electric Power, the Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina is responsible for policy-making in the energy sector at the state level, which includes drafting and proposing laws. We are informed that activities in this field are ongoing, but the State Electricity Regulatory Commission (SERC) does not have detailed information about potential solutions for drafting documents.

# 4. Cyprus: CERA

- **Regulatory model: Hybrid**

The regulatory framework distinguishes between capital expenditures (CapEx), which are subject to standard regulation, and operational expenditures (OpEx), which fall under incentive-based regulation. A guaranteed return is provided for CapEx. In contrast, for OpEx, while projected values are submitted, a return is not guaranteed. Instead, the regulated entity assumes the financial implications of deviations, either benefiting from savings (profit) or absorbing cost overruns.

A DR approach is followed concerning licensing and operating innovative production projects and electricity storage facilities, as well as using innovative technologies in network infrastructure.

- **Legal basis for the use of dynamic regulation**

DR is not explicitly mentioned in the law; however, provisions in Law 130/2023—Article 5, which outlines the duties and authority of CERA, grant discretion to apply practices that fall under DR.

**Article 4 (1) -d:** CERA assists in achieving, in the most cost-effective manner, the development of secure, reliable, efficient, non-discriminatory, and consumer-oriented systems; promotes system adequacy; and, in accordance with the general objectives of energy policy, energy efficiency, as well as the integration of large and small-scale electricity production from renewable sources and distributed energy generation in both transmission and distribution networks.

**Article 5 (4) -b:** CERA is responsible for investigating the functioning of electricity markets and deciding on and imposing appropriate, necessary, and proportionate measures to promote effective competition and ensure smooth market operation.

Further, through the provisions of **Article 9 (1) – a and c** of the same law, CERA can make regulatory decisions that determine how it will regulate the electricity market under the provisions of the present law and Regulation (EU) 2019/943, and which license holders will be bound by such regulatory decisions.

Notably, CERA has issued a decision facilitating the licensing procedure and operation of innovative electricity production projects and electricity storage facilities, as well as using innovative technologies in the network infrastructure.

Although, as mentioned, there are no specific provisions for DR in the relevant national legislation, there are no legal barriers, as CERA is granted clear authority to issue binding

regulatory decisions and/or guidelines to market participants, and DR approaches can be included in these.

Moreover, there are no institutional reasons preventing the adoption of DR approaches.

- **Application of dynamic regulation in RES integration**

The experimental network of solar power prosumers using smart meters and operating under dynamic tariffs achieved a reduction of 800 tonnes of $CO_2$ emissions over the project's duration. The metering infrastructure and data gathered from this pilot solar network have been used to support the broader implementation of demand-side management systems and the implementation of STOD tariffs. More details on the project are provided below in the example section.

- **Contribution of dynamic regulation to attracting investors**

The use of DR in Cyprus has contributed to attracting more investors by improving flexibility and adaptability to technological advances, as well as enhancing consumer empowerment and cost optimisation.
Further, the approach used in the **Flexitranstore** pilot project (detailed below) has contributed to cost reduction for end consumers through the use of innovative metering infrastructure, which allowed flexibility in energy usage for consumers. Concurrently, a positive outcome for the environment was achieved through the reduction of $CO_2$ emissions.

- **Advantages and disadvantages of using incentive and dynamic regulations in Cyprus**

Incentive-based mechanisms compel the regulated entity to proactively identify and reveal its genuine cost-saving capabilities, driving the entity towards greater operational efficiency, while oversight by the regulator can be less intensive.

Conversely, challenges arise in establishing equitable and effective performance targets for the regulated entity, as the burden of increased costs is borne by the entity, which may expose it to either windfall profits or significant losses, potentially creating perceptions of unfairness for consumers or jeopardising the utility's financial stability.

Regarding DR, it facilitates the implementation of solutions that optimise benefits across potentially multiple interests. Further, it provides the necessary agility to fine-tune existing solutions and enables a rapid response to evolving conditions that impact initial regulatory decisions.

Conversely, implementing DR necessitates increased effort from the regulator, including continuous acquisition and regular updating of relevant data, along with close monitoring of the effects of implemented decisions.

- **Lessons learned from using incentive and dynamic regulation**

In the case of Cyprus, the regulated entity submits its calculated OpEx to CERA. Should actual OpEx be lower than the calculated figures, the regulated entity retains any resulting profit. Conversely, if actual OpEx exceeds the calculated figures, the regulated entity bears the additional cost. This reconciliation occurs annually. A rigorous examination of the submitted values is therefore imperative to ensure their representativeness of actual costs, even when the regulated entity absorbs any excess. This diligent scrutiny ultimately benefits the regulated entity.

Among the lessons learned is that DR requires intensive preparation before decision-making, but it does enable solutions that maximise benefits, even in cases involving multiple interests.

- **Example of using the incentive regulation**

Before the widespread deployment of smart meters, approximately 300 existing domestic prosumers, with photovoltaic (PV) systems installed on their rooftops, were selected to be connected via smart meters for remote access. The project successfully established a basis for the rollout of smart metering and demand-side management in Cyprus.

Another example of a pilot project is Flexitranstore, where a large-scale, 2 MWh capacity battery energy storage system was installed at the Athienou power substation. This battery can be used for storing excess photovoltaic generation that is maximised during noon hours and is supported by advanced measurement devices known as Phasor Measurement Units (PMUs). Consequently, the real-time information obtained from the measurement devices enabled effective control of the battery to provide ancillary services to the grid.

- **Future plans for the use of dynamic regulation**

DR is already in use.

# 5. Egypt:

## 5.1 EgyptERA

- **Regulatory model: Hybrid**

Egypt primarily relies on standard regulatory frameworks through tariff-setting and licensing procedures. However, in recent years, there has been a gradual introduction of DR, especially enabling private-to-private relations and smart grid pilot innovation projects that can be implemented on a wider scale.

- **Legal basis for dynamic regulation**

While DR is not explicitly defined in Egypt's Electricity Law No. 87/2015, EgyptERA is granted broad powers under Articles 4 and 5 to regulate, supervise, and develop the electricity market, including proposing and overseeing pilot projects and new business models. These powers may be interpreted to support DR practices.

- **Application of dynamic regulation in RES integration**

EgyptERA is working to increase the use of DR in the renewable sector. However, new regulations regarding electric vehicles (EVs), smart mini-grids, and private-to-private relations are ways to push the electricity sector to become more dynamic. In green hydrogen, Egypt has signed several MOUs during COP27, and a National Green Hydrogen Strategy was also published in 2023, but these are still at the planning and consultation stage, with regulatory input being developed.

- **Contribution of dynamic regulation to attracting investors**

The use of DR has attracted more investors in Egypt by enhancing market efficiency and improving the investment climate. Further, DR has improved flexibility and adaptability to technological advances.

- **Advantages and disadvantages of using incentive regulation**

**Advantages**

- Strengthening EgyptERA's role in the electricity sector
- Helping to attract new investment
- Increasing the role of the private sector

**Disadvantages**

Resistance from the public sector, which has been mitigated by engaging it in the preparatory phase of the regulations and assigning it a role in implementation.

- **Lessons learned from using dynamic regulation**

Issuing a new regulatory framework that allows private-to-private relations so that a private investor (eligible producer) can build their own RE generation power plants and use the transmission grid to sell their generation to a private consumer (eligible consumer).

The regulatory framework contains the following documents:

- Trade and settlement rules
- Consumer connection agreement
- Producer connection agreement
- Residual sale agreement
- Residual supply agreement
- Use of system agreement

- **Example of using the dynamic regulation**

A real-world example of DR is the private-to-private (P2P) electricity trading pilot, currently in the implementation phase.

On 27th May 2025, EgyptERA granted eligibility to four private producers to engage in P2P agreements, where renewable energy power plants will be built, and the energy produced will be sold directly to private end consumers, helping them meet their climate obligations using the national electricity grid.

Unlike static regulatory models—such as fixed feed-in tariffs or net metering—this dynamic approach enables real-time pricing, direct transactions between users, and adaptive rules based on pilot results. EgyptERA will monitor the platform's performance and adjust the framework as needed, creating a flexible, learning-based regulatory environment.

Performance indicators include:

1. Amount of energy traded between parties
2. Number of active participants
3. Impact on local grid stability
4. Consumer cost savings compared to utility tariffs

Expected impact: Greater stakeholder participation and a decentralised energy market with more consumer choice and innovation. Additionally, the preparation of the market opening and the preparation of the transmission company to act as a transmission system operator (TSO).

- **Future plans for the use of dynamic regulation:**

DR is already in use.

## 5.2 GasReg

- **Regulatory model: Hybrid**

Standard regulation remains the foundation of the gas market regulatory framework, mainly governed by the Law no. 196 for 2017 and its executive regulations mainly for licensing procedures, licensees rights and obligations, Licensing document, etc. However, GasReg led a gradual introduction of Dynamic regulation while implementing its action plan along the past recent years.

- **Legal basis allowing the use of dynamic regulation**

While dynamic regulation is not explicitly defined in Law No. 196 for year 2017, article 4 of the aforementioned law provides a legal basis for Gasreg to exercise all powers necessary to achieve its objectives including without limitation setting development and business plans, work programs and management rules and techniques that enable GasReg to implement its mandate. These powers may be interpreted to support dynamic regulatory practices.

these legal basis map to typical "dynamic regulation" tools which include:

- ✓ Regulatory sandboxes / time-limited derogations
- ✓ Temporary changes to codes & tariff methodologies
- ✓ Data access & monitoring KPIs & requiring data reporting
- ✓ transitional market liberalization plan and phases

- **Dynamic regulation application in creating new regulatory categories and licenses**

Dynamic regulation often involves adjusting legal definitions to accommodate innovation. GasReg used Article 13 of Law 196 / 2017 to establish dynamic regulation in designing a whole regulatory framework for the Compressed Natural Gas (CNG) activities through the following:

- ✓ GasReg Approved CNG trucking offgrid as a legal form of "gas transport," extending the law's original definition dynamically to a new technology.
- ✓ GasReg Created new licence types even though these activities are not explicitly mentioned in the law.

This adaptive licensing regime mirrors the idea of using tailored dynamic regulatory treatment for emerging activities

- **Dynamic regulation contribution in attracting new investors and enhancing the market efficiency.**

CNG regulatory framework adopted a phase of public consultation sessions and hearings with CNG existing and potential investors to test the proposed frameworks before issuing binding rules. This matches "dynamic monitoring" concept collecting evidence and adjusting rules instead of enforcing static regulation; this contributed to increase the CNG companies performance on a side, and to attract and encourage investments in the field of Gas Market Activities on the other side through flexible and adaptable regulatory techniques.

- **Dynamic regulation contribution to apply Data-driven review and annual recalibration**

The CNG tariff and licensing system was approved for one-year validity, with a built-in review based on actual costs and revenues. This short regulatory cycle created an adaptive feedback mechanism—a hallmark of dynamic regulation—ensuring learning and recalibration instead of fixed multi-year tariffs and license fees.

- **Advantages & disadvantages of using dynamic regulation**

**Advantages:**

- Strengthening Gasreg role in the gas market
- Covering innovative technologies
- Engaging all stakeholders and using stakeholder feedback before final rule-making
- Introducing competition safeguards and consumer-choice mechanisms
- Help attracting new investment and increasing the private sector engagement
- Enhancing the market performance and efficiency

**Disadvantages:**

- Dynamic regulation requires the regulator to monitor pilot outcomes and enforce compliance or consumer protection conditions; the law gives enforceable tools which should be used carefully otherwise they may lead to imbalance and harm for the stakeholders.
- Using extensively dynamic regulation may send a negative message to stakeholders that regulations are not built on a solid basis; to avoid this the regulator has to keep transparency and clarity while using any dynamic regulatory techniques and while changing any existing regulations.

- Keeping the stakeholders involved should not result in their interference in the regulatory decisions.

### Future plans for the use of incentive regulation:

GasReg is aiming to apply incentive regulations in the near future plans.

# 6. France: CRE

- **Regulatory model: Incentive and dynamic regulation**

France uses a hybrid regulatory type of incentive and DR.

- **Legal basis for use of dynamic regulation**

Law No. 2019-1147 of 8th November 2019 on Energy and Climate introduced France's energy regulatory sandbox. Experiments conducted under this framework must contribute to achieving the energy policy objectives set out in Article L.100-1 of the French Energy Code:

Under Article 61, paragraph 1, CRE and the administrative authority (DGEC) can grant derogations from the rules on network access and use to test innovative technologies and services that contribute to the energy transition and smart grid development, as well as the broader policy objectives laid out in the Energy Code. Any derogation cannot exceed four years and may be renewed once.

No derogation may be granted if it is likely to impair the due performance of network operators' public service obligations, jeopardise network security or safety, or degrade operational quality. Derogations must also comply with EU law and the public policy provisions of national law.

Pursuant to Article 61, paragraph 5, CRE publishes annual reports on the progress of these sandbox experiments.

- **Application of Dynamic regulation in RES integration**

DR has been implemented through Enedis' "Reflex" project under France's energy regulatory sandbox. This project uses local flexibility as a non-wires alternative to optimise distribution grid sizing and speed up the connection of wind and solar plants. It has helped relieve bottlenecks in the grid connection process as renewable deployment accelerates.

This four-year derogation granted by the administrative authority based on Article D.342-23 of the Energy Code allows Enedis to adapt certain grid connection rules. This unlocks additional network capacity without immediate, capital expenditure-intensive reinforcements.

In the pilot areas, the approach is expected to enable an additional 215 MW of renewable capacity compared to the conventional regime. Ex-post assessment reports documented savings of €11.6 million and 8 MW connected to the grid. In practice, some installations can connect before substation upgrades in return for occasional and contractually agreed curtailment. The pilots run in two regions to reflect different network conditions.

The derogation runs from 2021 to 2025. Enedis has now proposed a progressive scale-up. To support deployment, CRE has introduced an incentive mechanism under the network distribution tariff with penalties if Enedis fails to meet roll-out targets.

**Links:**

Légifrance - Publications officielles - Journal officiel - JORF n° 0169 du 23/07/2021

Délibération de la CRE du 13 mars 2025 portant décision sur le tarif d'utilisation des réseaux publics de distribution d'électricité (TURPE 7 HTA-BT)

- **Contribution of dynamic regulation to attracting investors**

The use of DR has attracted more investors in France through the following:

- Enhanced market efficiency and investment climate
- Flexibility and adaptability to technological advances
- Improved grid stability and reliability
- Consumer empowerment and cost optimisation
- Enhanced climate investments: Reflex by Enedis
- Consumer empowerment, cost optimisation, and improved grid stability and reliability: Elax Energie.
- Flexibility and adaptability to technological advances, and improved grid stability and reliability: Vehicle-to-grid by Renault SAS (a service of bidirectional charging for its vehicles, where CRE granted a derogation in the network tariff for the clients of this service).

- **Advantages and challenges of using incentive and dynamic regulation in France**

Regarding incentive regulation, the principal advantage lies in driving better performance by the regulated entity; it has proven effective multiple times.

However, if poorly calibrated, it might increase system costs when outperformance triggers incentive payments that exceed the underlying efficiency gains. To mitigate this risk, the regulator must rigorously assess the improvement potential and set performance targets and metrics that are both realistic and stretching.

As for DR, CRE has realised benefits in using the regulatory sandbox to test innovative solutions ahead of potential regulatory or legislative changes. Pre-application engagement with CRE enables proponents to identify and articulate regulatory issues early and de-risk project design. Two experiments have already progressed to the roll-out phase.

- **Lessons learned from using incentive and dynamic regulation in France**

In France, an incentive regime was introduced to support the nationwide rollout of smart meters. After the pilot phase, CRE established a bonus-malus mechanism to encourage Enedis, the DSO, to deliver the deployment to agreed targets and timelines. Enedis exceeded its targets, installing meters faster than expected and below budget.

Under DR, the "Reflex" project relaxed certain grid connection rules. This enabled cost savings for Enedis and renewable generators and accelerated connections without jeopardising system security. Following the pilot, CRE introduced an incentive scheme under which Enedis faces penalties of €25,000 per month per transformer if the rollout falls behind the agreed trajectory in the limit of € 4 million per year.

A dedicated connection window for projects exceeding standard capacity thresholds is scheduled to open in mid-2025.

- **Example of using dynamic regulation**

DR is being applied under the regulatory sandbox to Elax Energie's project, which monetises consumption shifting via France's NEBEF mechanism (a market scheme for trading blocks of demand response). The mechanism allows consumers to be remunerated for verified load reductions. Elax Energie equips households with control devices that optimise electricity use.

The sandbox derogation enables the remuneration of consumption deferrals (load shifting), not only curtailment. The customer portfolio covered by the trial is defined in the agreement and comprises two cohorts of residential consumers. The derogation has been granted for four years.

Key performance indicators track the quantities of energy curtailed and deferred. They compare total consumption and load curves for sites with and without monetised consumption adjustments, and quantify the financial gains associated with curtailment and deferral.

After six months, the first assessment showed measurable demand response impacts; both Elax Energie and its customers realised financial gains. The pilot began in August 2024. From then till the end of December 2024, Elax Energie monetised 1,261 MWh of load reduction and 499 MWh of deferred consumption.

Délibération de la CRE du 1er février 2024 portant décision sur l'octroi d'une dérogation à Elax Energie dans le cadre du dispositif d'expérimentation réglementaire prévu par la loi relative à l'énergie et au climat

- **Future plans for the use of dynamic regulation:**

DR already in use.

# 7. Greece: RAAEY

- **Regulatory model: Standard and incentive-based**

Greece uses a hybrid type of regulation comprising standard and incentive-based regulation.

- **Legal basis for dynamic regulation**

The Greek Energy Act that describes the competences of RAAEY does not explicitly use the term "dynamic regulation"; however, it establishes a broad and flexible regulatory mandate for RAAEY that allows such an approach, provided it complies with applicable national and EU law.

- **Application of dynamic regulation in RES integration**

DR has not yet been applied in Greece.

- **Contribution of dynamic regulation to attracting investors**

DR has not yet been applied in Greece.

- **Advantages and disadvantages of using incentive regulation**

Generally, incentive-based regulation promotes efficiency. In the Greek case, it promotes:

- Efficient grid operation and investment in grid modernisation
- Better maintenance and advanced technologies like smart meters
- Real-time monitoring and automated fault detection

In the long term, it reduces the costs borne by consumers and promotes innovation; for example, it incentivises HEDNO to adopt new approaches.

The disadvantages of incentive-based regulation are case-based. In the Greek case,

- Measurement challenges, as accurately distinguishing between technical and non-technical losses is complex, raising the risk of misreporting
- Risk of over-investment, where HEDNO, to maximise rewards or avoid penalties, might invest heavily in costly technologies that do not provide proportional benefits to consumers.
- Regulatory complexity, as it requires ongoing oversight, data analysis, and regular adjustments by RAAEY, increases administrative demands and resource requirements.

- **Example of using the incentive regulation**

Following RAAEY 1432/2020, the Greek DSO HEDNO is subject to regulatory mechanisms designed to incentivise the reduction of technical losses in the electricity distribution network. The Regulatory Authority for Energy, Waste and Water (RAAEY) has established a framework that links HEDNO's allowed revenue to its performance in minimising network losses. This mechanism includes:

- Loss Incentive Factor (LIF): A component that adjusts HEDNO's revenue based on the actual energy losses compared to predefined reference levels.

- Financial penalties and rewards: If HEDNO reduces energy losses below the reference levels, it receives additional revenue. Conversely, exceeding these levels results in revenue reductions.

- Annual and periodic caps: Limits are set on the maximum adjustments (both positive and negative) to ensure financial stability.

This regulatory approach aims to internalise the cost of energy losses, encouraging HEDNO to implement measures that enhance network efficiency and reduce losses to economically optimal levels.

- **Future plans for the use of dynamic regulation:**

No short-term plans to adopt DR.

# 8. Italy: ARERA

- **Regulatory model: Hybrid (incentive and dynamic)**

**For incentive regulation**

ARERA has applied a reward and penalty mechanism for electricity and gas service quality under Decision 646/2015/R/eel to encourage operators to reduce outages and delays.

ARERA has implemented an incentive mechanism for pilot projects on flexibility and innovation to support the development of innovative projects related to flexibility, storage, and grid digitalisation.

(Decision 300/2017/R/eel and subsequent updates).

Further, it has implemented incentives for reducing network losses (electricity/gas) to minimise technical and non-technical losses in networks.

**For dynamic regulation**

The rationale behind ARERA's adoption of DR schemes—such as pilot projects and experimental mechanisms—stems from the need to keep pace with fast-moving changes in the energy and environmental sectors.

- **Legal basis for the use of dynamic regulation**

DR is not explicitly mentioned in the law, but is enabled under the broad regulatory powers granted to ARERA by the following legal provisions:

**Law No. 481/1995: Article 1, Paragraph 1 mandates** the regulator to promote competition, efficiency, service quality, transparent tariffs, environmental protection, and efficient resource use.

**Article 2, Paragraph 5 grants** ARERA full autonomy and competence to regulate and control the electricity and gas sectors, covering all activities along the supply chain.

These provisions are interpreted to allow DR approaches as part of ARERA's mandate. Additionally, EU legislation (e.g. Directive 2019/944) reinforces this authority by requiring national regulators to adopt all necessary measures to meet EU energy policy goals.

In terms of challenges, while Italy has made substantial progress in adopting DR—particularly through ARERA's pilots—there are still some legal and institutional barriers that can slow down or complicate its broader and faster adoption in the electricity and gas sectors.

Many regulatory rules are grounded in primary laws (laws or decrees) rather than in flexible secondary regulations. This means that even experimental pilots or market innovations may require legislative changes, which take time and political consensus.

For instance, introducing full-scale local flexibility markets (like those tested in EDGE) may require adjustments to laws that currently vest TSOs and large generators with a dominant role.

Concerning institutional barriers, multiple entities share responsibilities (ARERA, MASE - Ministry of Environment and Energy Security, GSE (Energy Services Manager), TSO/DSOs, regions, municipalities), which can delay coordination and generate unclear mandates.

For pilot projects to scale, alignment is needed across:

- Planning (National Energy and Climate Plan)
- Incentives (GSE, fiscal authorities)
- Grid operations (TSO/DSO separation rules)

- **Application of Dynamic regulation in RES integration**

ARERA launched pilot projects for gas infrastructure optimisation (Decision 404/2022/R/gas)to enable the integration of renewable gases (biomethane, hydrogen) into local gas distribution networks through experimental investments and regulatory flexibility.

One of these projects, the BiRemi™ Plant (AS Retigas – AIMAG Group), allows continuous injection of biomethane into the gas grid—even when local consumption is low—via automated control and buffering. The plant includes components compliant with future hydrogen blends.

The plant was commissioned in March 2025 and connected to four local biogas producers. The pilot runs until 2026.

The main dynamic regulatory elements include:

- Special tariff-based funding authorised temporarily by ARERA
- Exemption from standard metering/remuneration rules
- Conditional continuation based on performance evaluation

- **Dynamic Regulation's contribution to attracting investors**

The use of DR has contributed to attracting more investors in Italy by:

- Enhanced market efficiency and investment climate
- Flexibility and adaptability to technological advances
- Improved grid stability and reliability
- Consumer empowerment and cost optimisation

DR (e.g. pilot projects, experimental schemes) provides a controlled and transparent environment for testing innovative solutions.

By offering temporary exemptions, dedicated funding, or fast-track evaluation, it offers investors greater certainty over:

- Cost recovery
- Technology acceptance
- Compliance boundaries

Companies are more willing to invest in non-traditional assets like demand response, hydrogen-ready infrastructure, or energy communities.

- **Advantages and disadvantages of using incentive regulation in Italy**

The following advantages and disadvantages are related to the incentive "price-cap (RPI-X)" regulation for electricity DSOs.

**Advantages**

- Encourages cost efficiency, with predictable tariffs and innovation incentives.

**Disadvantages**

- Risk of underinvestment, demand mismatch, information asymmetry, and limited quality focus.

To mitigate these issues, it is advisable to employ quality incentives, periodic reviews, benchmarking, and transparency improvements.

- **Advantages and challenges of using dynamic regulation in Italy**

**Advantages**

- **Promotes innovation:** Encourages experimentation with new technologies and business models in a controlled setting.
- **Flexibility and adaptability:** Allows regulatory frameworks to respond quickly to market or technology changes.
- **Risk mitigation:** Limits risks for operators by temporarily relaxing rules or providing incentives during pilot projects.
- **Better data and learning:** Generates real-world data that inform long-term regulatory design and reduce uncertainty.
- **Accelerates green transition:** Supports the integration of renewables, flexibility, hydrogen, and digitalisation effectively.
- **Engages stakeholders:** Encourages participation from new market players, boosting competition and service variety.

**Disadvantages**

- **Regulatory uncertainty:** Temporary or changing rules may confuse market participants and delay investments. **To mitigate this,** pilot timelines and transparent evaluation criteria should be clearly defined/adopted.
- **Complexity and costs:** Designing and managing pilots require significant resources from regulators and participants. **To mitigate this,** standardised frameworks and digital tools to streamline processes are suggested.
- **Risk of regulatory arbitrage:** Some actors might exploit pilot exemptions unfairly or delay compliance with full rules. **To overcome this, the** implementation of strict eligibility and monitoring mechanisms is recommended.
- **Limited scale and scope:** Pilot results may not fully represent large-scale operations or diverse market conditions. **To mitigate this,** phased scaling and complementary studies should be planned for robustness.
- **Potential for inequity:** Small players or consumers might have less access to or understanding of pilot benefits. **To mitigate this,** broad stakeholder engagement and transparent communication should be promoted.
- **Overreliance on pilots:** Excessive pilots without follow-up reforms can slow permanent regulatory progress. **To mitigate this,** it is suggested to commit to timely post-pilot regulatory updates based on evidence.

- **Lessons learned from using incentive and dynamic regulation in Italy**

Concerning incentive regulation, ARERA introduced the RISE (Regolazione Incentivante della qualità del Servizio Elettrico) framework in 2016. It combines price-cap regulation with quality of service (QoS) incentives to encourage electricity DSOs to improve both efficiency and service reliability. The regulation links part of the DSOs' allowed revenues to performance indicators such as outage frequency and duration, customer complaints, and connection times. This experience has demonstrated that balanced incentives and reliable data drive better utility performance.

Regarding DR, the lessons learned related to the EDGE project are explained in the following paragraph ("Example") below.

- **Flexibility markets are viable:** Demonstrated practical benefits in grid operation and cost savings.
- **Regulatory adaptability is key:** Temporary, iterative rules enabled rapid learning and adjustment.

- **Stakeholder engagement matters:** Co-design with market players helped refine the market set-up.
- **Data transparency is essential:** Real-time monitoring supports trust and informed decisions.
- **Coordination challenges exist:** Highlighted the need for clearer roles between DSOs and TSOs.

- **Example of using dynamic regulation**

**For the electricity sector:**

DR models have been applied to some DSOs to implement electricity flexibility pilot projects adopted under ARERA decision 365/2023/R/eel (EDGE – Energy Distributed Resources for Network Management Project), aiming at establishing local flexibility markets where residential, commercial, and industrial users, EV charging stations, and storage systems can offer flexibility services to the DSO. Participants bid in auctions (2024), adjusting consumption and production to support network resilience and decongestion. The main difference compared to standard regulation is that it applies only to some defined entities.

EDGE has successfully activated the first local flexibility tenders, marking Italy's (and Europe's) initial implementation of DSOs procuring distributed energy services.

The initiative is credited with:

- Empowering users—allowing them to earn from flexible consumption and production
- Helping the DSO manage grid resilience and congestion
- Supporting renewable integration and energy communities

**For the gas sector:**

ARERA has adopted Decision 404/2022/R/gas for gas optimisation pilot projects authorised by the regulator with a dedicated fund (starting January 2023) via a tariff component.

These pilots provide real-world evidence of how gas networks can evolve—reducing emissions, accommodating renewable gases, and optimising operations. By the end of 2026, ARERA will evaluate outcomes to determine which technologies merit adoption on a national scale.

- **Future plans for the use of dynamic regulation:**

DR is already in use.

# 9. Jordan: EMRC

- **Regulatory model: Standard**

Jordan mostly follows a standard regulatory model, although there are some general incentives, such as incentives for reducing electricity losses or for projects related to energy efficiency.

- **Legal basis for the use of dynamic regulation**

Currently, DR is not specified in the legal framework. However, there are no general obstacles; it requires a decision from the Prime Minister.

- **Application of dynamic regulation in RES integration**

DR has not yet been applied in Jordan in the RES sector. It may be applicable for hydrogen, but this will be clear after the enactment of the new law related to it.

- **Contribution of dynamic regulation to attracting investors**

DR has not yet been applied in Jordan.

- **Advantages and disadvantages of using incentive and dynamic regulation**

DR has not yet been applied in Jordan.

- **Lessons learned from using incentive and dynamic regulation**

DR has not yet been applied in Jordan.

- **Example of using the dynamic regulation**

Dynamic regulation has not yet been applied in Jordan.

- **Future plans for the use of dynamic regulation:**

Possible in the future, particularly in the green hydrogen sector.

# 10. Lebanon: LCEC

- **Regulatory model: Standard and incentive-based**

Lebanon's energy sector primarily operates under standard regulation, with fixed tariffs and centralised planning. Incentive-based approaches have emerged through donor-backed mechanisms (e.g. NEEREA), but DR is not yet institutionalised.

Establishing a fully operational and independent Electricity Regulatory Authority (ERA)—as mandated by Law No. 462/2002—is essential to enable adaptive and forward-looking regulatory frameworks, including DR tools.

- **Legal basis allowing dynamic regulation**

Law 462/2002 grants broad regulatory powers to ERA, which can be interpreted to include pilot programmes or flexible approaches. However, DR is not explicitly mentioned in the legal text.

Relevant article: Article 5 grants ERA authority to regulate generation, transmission, and distribution, including the setting of tariffs and licensing.

Concerning legal barriers, other than the establishment of the regulatory ERA, the absence of secondary legislation and implementing decrees for Law 462/2002 may delay the implementation of DR.

- **Application of dynamic regulation in RES integration**

DR has not yet been applied in Lebanon.

- **Contribution of dynamic regulation to attracting investors**

Although DR is not yet applied, incentive-based reforms have contributed to:

- Enhanced market efficiency and investment climate (e.g. NEEREA)
- Flexibility towards technological advances (e.g. hybrid systems)
- Consumer empowerment (via net metering)

- **Advantages and disadvantages of using incentive and dynamic regulation**

DR has not yet been applied in Lebanon.

- **Lessons learned from using incentive and dynamic regulation in Lebanon.**

DR has not yet been applied in Lebanon.

- **Example of using the incentive regulation**

While DR is not formally practised, a net-metering programme initiated by Electricité du Liban (EDL) and LCEC functioned similarly to a regulatory sandbox. It enabled the safe integration of solar PV systems under predefined conditions.

- **Future plans for the use of dynamic regulation**

Lebanon has outlined clear intentions to adopt DR in its energy sector, particularly in the framework of future regulatory reforms. However, these plans are entirely contingent on the operationalisation of the Electricity Regulatory Authority (ERA), as defined under Law No. 462/2002.

Legal foundation: Article 7 of Law No. 462/2002 mandates the creation of an autonomous ERA with the authority to regulate tariffs, licensing, and grid operations. Although DR is not explicitly mentioned, the broad regulatory powers envisioned for the ERA allow it to implement experimental frameworks for flexible policymaking.

# 11. Malta: REWS

- **Regulatory model: Standard**

The Maltese electricity supply operates under a standard regulatory framework. Due to a derogation from Article 4 (Free choice of supplier) of Directive (EU) 2019/944, the DSO (Enemalta plc) remains the sole license holder for electricity supply to final customers. All customers pay regulated retail tariffs, and the market is not open to competition. The retail tariff covers costs related to the distribution network, imported electricity, generation, and supply activities. There are no separate tariffs for the use of the network.

- **Legal basis for dynamic regulation**

No specific articles have been provided, as the concept is not currently applicable in the regulatory context.

- **Application of dynamic regulation in Renewable Energy Source RES Integration**

DR has not yet been applied in the renewable energy sector, including green hydrogen, in Malta.

- **Contribution of dynamic/incentive regulation to attracting investors**

DR has not yet been applied in Malta.

- **Advantages and disadvantages of incentive and dynamic regulation**

Not applicable (as DR has not been implemented).

- **Lessons learned from using incentive and dynamic regulation.**

Not applicable (as DR has not been implemented).

- **Example of using dynamic regulation**

Not applicable (as DR has not been implemented).

- **Future plans for the use of dynamic regulation.**

There are no current plans to adopt DR.

# 12. Montenegro: REGAGEN

- **Regulatory model: Incentive-based**

The current implementation of a regulatory framework for the electricity TSO and DSO is a hybrid regulatory method that determines their allowed revenues and prices. This method is implemented as a type of economic regulation that aims to limit allowed revenue, provide efficiency improvement incentives, and allow risk-sharing between operators and users of the system (risks related to changes in deployed capacity). The methodologies are also based on principles intended to improve transparency and non-discriminatory access, facilitate trading and competition, create favourable investment conditions and avoid cross-subsidies, reduce costs, and encourage efficiency improvements.

- **Legal basis for dynamic regulation**

DR has not yet been applied in Montenegro.

- **Application of dynamic regulation in RES Integration**

DR has not yet been applied in Montenegro.

- **Contribution of dynamic regulation to attracting investors**

DR has not yet been applied in Montenegro.

- **Advantages and disadvantages of using incentive regulation**

Advantages of incentive regulation include the following:

- Encourages cost efficiency
- Promotes innovation and technology
- Improves long-term planning
- Facilitates risk-sharing and flexibility
- Encourages performance improvements

Regarding the disadvantages of the incentive-based regulatory framework, one key concern is uncertainty, particularly during periods of energy crises or high inflation. In such cases, the framework must permit appropriate adjustments to ensure financial sustainability and operational continuity. Another significant risk is the potential for over-investment. The current regulatory framework encourages energy entities to increase CapEx, which can lead to over-investment.

- **Lessons learned from using incentive regulation in Montenegro**

The incentive-based regulatory framework that has been in place since 2012 has encouraged the TSO and DSO to invest in the development of the systems they operate, ensuring the system's long-term capacity to meet the requirements of electricity transmission and distribution in a secure and high-quality manner. Since the introduction of investment incentives in 2012 until the end of 2024, the value of realised investments in the transmission and distribution systems is approximately €570 million, while the value of the fixed assets of the TSO and DSO before the introduction of these incentives was approximately €319 million. The regulatory framework applied has provided sustainability for regulated undertakings, improved efficiency, and led to significant investments in the system, as well as stability in system usage prices. Future developments of the regulatory framework will focus on quality improvement.

- **Example of using the incentive regulation**

See above.

- **Future plans for the use of dynamic regulation**

Currently, there are no plans to implement DR.

# 13. Morocco: ANRE

- **Regulatory model: Standard and Incentive-Based**

The electricity sector in Morocco is primarily regulated through a standard regulatory framework. Just five years ago, the Kingdom had no operational regulator, which is why, as part of its initial mandates, the National Electricity Regulatory Authority (ANRE) has been actively establishing the foundations of this framework in full alignment with its mission.

Additionally, incentive-based mechanisms are already being implemented. For instance, the tariff decision on system services (TSS) introduces a partial exemption for operators deploying storage solutions, thereby encouraging greater grid flexibility and innovation.

Methodology – Use of the National Electricity Transmission Network (RENT)

While DR has not yet been institutionalised, ANRE remains highly attentive to international best practices and actively explores innovative tools and approaches to enhance regulatory efficiency. This reflects its commitment to continuous improvement and progressive adaptation to the evolving needs of the energy sector.

Importantly, ANRE's mandate has recently been expanded to cover the entire energy sector, further strengthening its role as a key actor in Morocco's energy transition.

- **Legal basis for dynamic regulation**

In December 2024, a strategic reform of ANRE was announced through a Royal Communiqué. This reform broadened the Authority's mandate beyond electricity to encompass the gas sector and the entire energy value chain. A new legislative and regulatory framework is currently under preparation to implement this expanded mission.

- **Application of dynamic regulation in RES integration**

DR has not yet been applied in Morocco.

- **Contribution of dynamic regulation to attracting investors**

DR has not yet been applied in Morocco.

- **Advantages and disadvantages of using dynamic regulation in Morocco**

DR has not yet been applied in Morocco.

- **Lessons learned from using dynamic regulation in Morocco**

DR has not yet been applied in Morocco.

- **Example of using incentive regulation**

ANRE has introduced an initial form of incentive-based regulation through its tariff methodology applicable to TSS. This framework provides for tariff reductions for operators contributing to the flexibility of the national electricity system, notably through the deployment of storage solutions. This approach is designed to encourage technological innovation while ensuring network reliability and performance.

Beyond this tariff-based incentive, incentive regulation is embedded in a clear legal framework. As per Article 12 of Law 48-15, ANRE is legally mandated to oversee the quality and performance of service delivery. This obligation is operationalised through the establishment of quality indicators that objectively measure the performance of electricity sector operators. ANRE is accountable to Parliament in fulfilling this responsibility, which reinforces the mandatory and strategic nature of its commitment to modern, outcome-oriented regulation.

This dynamic illustrates the Authority's determination to go beyond standard regulation and adopt a more progressive and adaptive approach, in line with technological advancements and the goals of the energy transition.

- **Future plans for the use of dynamic regulation**

ANRE is also engaged in ongoing internal reflections regarding the progressive integration of DR mechanisms, especially in fast-evolving segments of the energy sector, as it continues to align with international trends and practices.

# 14. Republic of North Macedonia: ERC

- **Regulatory model: Standard and Incentive-Based**

The Republic of North Macedonia employs a hybrid model, combining standard and incentive-based regulation.

- **Legal basis for dynamic regulation**

DR is not explicitly mentioned in the law, but is enabled under the broad regulatory powers granted to the Energy Regulatory Commission by the following legal provisions:

The Energy, Water Services, and Municipal Waste Management Services Regulatory Commission of the Republic of North Macedonia (hereinafter: Energy Regulatory Commission) is a sole, non-profit regulatory body, regulating and controlling the manner of performing energy activities in the fields of electricity, natural gas, district heating, crude oil, oil derivatives, and transportation fuels. It also sets the tariffs for water services and municipal waste management services.

The institution is independent in maintaining operations and decision-making processes within its competencies and has the capacity of a legal entity, which is separated and functionally independent regarding the organisation and decision-making from the bodies of the state and local authorities, as well as the entities performing energy activities.

**Energy Law (Official Gazette of the Republic of North Macedonia No. 101/2025, 135/2025)**

**Article 53:** By exercising its competence established by this Law and other laws, and taking into account the objectives of energy policy, the Energy Regulatory Commission enables:

- Competitive, secure, and sustainable energy markets in the Republic of North Macedonia and their inclusion in regional and international energy markets;
- Opening up markets for all consumers and suppliers in the Energy Community and the European Union;
- Removing restrictions on trade in electricity and gas, including ensuring adequate cross-border transmission capacities to meet demand and facilitating electricity and gas flows in the Energy Community and the European Union;
- Development of secure, reliable, competitive, and efficient energy systems oriented towards users;
- Strengthening the functions of markets in ensuring a secure and sustainable energy supply;
- Optimising the use of electricity and gas by energy system operators to improve energy efficiency;

- Facilitating access for new users to the electricity and gas transmission and distribution systems and the heat distribution system, as well as for participants in energy markets, particularly for producers of electricity from renewable sources and energy storage facilities;
- Increasing the efficiency of the systems and accelerating the integration of the markets through short-term and long-term incentive measures for the operators and users of the transmission and distribution systems of the appropriate type of energy;
- Protection and promotion of consumer rights and achievement of high standards in fulfilling the obligation of public and/or universal service in the supply of electricity, gas, and district heating;
- Achieving high standards in the provision of public and universal service in energy supply, especially regarding the protection and promotion of the rights of vulnerable consumers and the provision of necessary information to consumers, particularly on the procedure for changing electricity or gas suppliers; and
- Providing compensation for justified costs, including necessary information and communication technology costs and infrastructure costs, and enabling the operators of regulated energy activities to provide efficient and reliable regulated services.

The Energy Regulatory Commission is granted full autonomy and competence to regulate and control the electricity and gas sectors, district heating, crude oil, oil derivatives, and transportation fuels, covering all activities along the supply chain.

These provisions are interpreted to allow DR approaches as part of the Energy Regulatory Commission's mandate. Additionally, EU legislation implemented in the new Energy Law reinforces this authority by requiring national regulators to adopt all necessary measures to meet EU energy policy goals.

**In accordance with Article 46 of the Energy Law:**

The Energy Regulatory Commission is independent in its operations and decision-making and exercises its competence in the regulation of energy activities within the framework established by this and other laws and regulations adopted on the basis of law and in accordance with the principles of objectivity, transparency, and non-discrimination, applying the best international practices and experiences.

- **Advantages and disadvantages of using incentive regulation**

Such a regulatory approach motivates regulated entities (such as utilities) to improve their performance and achieve desired goals. It allows utilities more discretion in how they achieve these goals while also creating opportunities for them to benefit financially from their performance.

However, the purpose is to lower costs and motivate them to work and operate more efficiently.

- **Example of using incentive regulation**

The Energy Regulatory Commission, per Article 61 of the Energy Law, sets tariffs and prices for regulated energy activities.

The Commission determines the OPEX, which refers to the ongoing costs incurred by a business to run its day-to-day operations. If the company achieves less than the specified OPEX amount, the companies are left with the same amount.

Network losses are not recognised according to the actual figures, but according to the loss plan. This approach aims to prevent unjustified costs from being passed on to consumers, i.e. to protect consumers.

- **Future plans for the use of dynamic regulation**

Currently, there are no plans to use DR.

# 15. Palestine: PERC

- **Regulatory model: Standard**

Palestine primarily employs standard regulation. Currently, DRs are not explicitly addressed in the legal framework governing the electricity sector, as outlined in the General Electricity Law of 2009.

- **Legal basis allowing dynamic regulation**

Currently, DR is not explicitly addressed in the legal framework governing the electricity sector in Palestine, as outlined in the General Electricity Law of 2009, despite the absence of any provision in the law that prohibits the adoption of DR. No legal or institutional barriers currently prevent the adoption of DR.

- **Application of dynamic regulation in RES integration**

DR has not yet been applied in the renewable energy sector.

- **Contribution of dynamic/incentive regulation to attracting investors**

DR has not yet been applied in Palestine.

- **Advantages and disadvantages of using incentive and dynamic regulation**

Not applicable (as DR has not been implemented).

- **Lessons learned from using incentive & dynamic regulation**

Not applicable (as DR has not been implemented).

- **Example of using dynamic regulation**

Not applicable (as DR has not been implemented).

- **Future plans for the use of dynamic regulation**

DR will not be applied until incentive regulations are implemented as a first step.

# 16. Portugal: ERSE

- **Regulatory model: Hybrid**

The allowed revenues from electricity and gas regulated activities are incentive-based and will be fixed for a duration of four years, following consultation with the Tariffs Council[2]. Further, DR is used in several other processes.

- **Legal basis for dynamic regulation**

ERSE statutes (see Decreto-Lei n.º 97/2002, de 12 de abril - Link) contain provisions equivalent to those mentioned in the ARERA example. For example, Article 3, no. 1 states: "The purpose of ERSE's regulation is to promote the efficiency and rationality of the activities of the regulated sectors in an objective, transparent, non-discriminatory and competitive manner, through its continuous supervision and monitoring, integrated with the objectives of the internal market and the Iberian markets." From our viewpoint, this is a general provision of the regulator's competencies.

More specifically connected to the definition of DR provided above, we consider relevant the actual provisions in Portuguese law for the electricity sector, which improve the context for DR, while not explicitly mentioning it as "dynamic regulation". Specifically, please see Articles 216 to 225 of Decreto-Lei n.º 15/2022, de 14 de janeiro.[3]

These provisions introduced the concept of "technology free zones", dedicated to sandboxes in the electricity sector.

As a general principle, Article 216, no. 1 (unofficial translation) states, "The aim of technology free zones (ZLTs) is to promote and facilitate research, demonstration and testing activities in a real environment. These activities relate to technologies, products, services, processes, innovative models, concepts, business models and specific regulatory frameworks in the context of electric mobility production, storage and promotion, and electricity self-consumption."

Additionally, the regulations issued by ERSE were modified to clarify the framework of pilot projects. The Tariff codes for Electricity (Article 227 - Link) and Gas (Article 212 - Link) also include the rules for pilot projects. Specifically, the following steps apply to pilot projects: Presentation, approval, implementation, monitoring, and a final report with conclusions and assessment of results.

Tariff codes for electricity, Article 227, no.1 and for gas, Article 212, no. 1 (unofficial translation): Pilot projects are research or demonstration projects approved by ERSE that aim to test the

[2] Tariff Council is an advisory body of ERSE on tariffs issues, composed of the representatives of the main stakeholders.
[3] https://diariodarepublica.pt/dr/legislacao-consolidada/decreto-lei/2022-177634029#

technical and economic feasibility and applicability of innovative practices and technologies, including proposals for legal and regulatory development.

- **Application of dynamic regulation in RES integration**

DR has not yet been applied in RES integration.

- **Contribution of dynamic regulation to attracting investors**

As DR has not been extensively used in Portugal, but only in small project pilots, it is not possible to evaluate such contributions. A possible contribution of "technology-free zones" in attracting investors is not yet available.

- **Advantages and disadvantages of using incentive regulation in Portugal**
  - **Advantages**

    The advantage of incentive regulation lies in its ability to promote multiple forms of economic efficiency that traditional cost-plus regulation fails to achieve.

    Incentive frameworks can reward not only cost reduction but also innovation and improvements in service quality. In Portugal, incentive regulation has contributed to reducing unit costs of networks while maintaining good service quality standards.

  - **Disadvantages**

    Incentive regulation schemes can become extremely complex, creating opportunities for regulatory gaming and leading to unintended consequences.

    In the context of forward-looking incentive regulation, such as the TOTEX approach, companies may manipulate their cost forecasts, delay efficiency improvements until a favourable point in the regulatory cycle, or focus excessively on measured outputs at the expense of unmeasured aspects of performance.

  - **How to mitigate the disadvantages**

    The regulatory framework must be adequate and transparent, providing clear guidelines and reducing uncertainty. Effective mitigation of regulatory complexity and gaming requires an adaptive framework that can evolve in response to changing circumstances (at least every regulatory period). In Portugal, this is achieved through meaningful consultation processes with a range of stakeholders, including consumer representatives, network operators, other regulated companies, environmental organisations, and industry participants (non-regulated).

Moreover, ERSE seeks regulatory commitments that can provide reasonable assurance about the treatment of efficient investments over their economic lives, as well as improve benchmarking and apply its results in a balanced manner.

- **Lessons learned from using incentive regulation in Portugal**

Effective incentive regulation has shown that a well-calibrated regulatory framework and incentive mechanisms can deliver sustained cost reduction and operating efficiency gains. A key lesson is to design a balanced risk-sharing arrangement between utilities and consumers. Revenue caps with symmetrical sharing factors can enhance efficiency.

Moving to a TOTEX framework that treats operating and capital costs (applied in Portugal to electricity transport and distribution) mitigates the historic CAPEX bias and allows companies to choose the least total cost mix of digital (based on flexibility and intelligence) and physical (based on more capacity and less flexibility) solutions. An incentive-based regulatory methodology that applies to total costs, whether investment (CAPEX) or operating (OPEX), such as revenue cap TOTEX incentives, has the advantage of enabling companies to respond more efficiently to technological and organisational challenges due to the freedom it provides in allocating resources. However, if it focuses solely on cost control, it may discourage investment. It is also important to include some kind of innovation incentives to help operators to align their behaviour with wider energy policy goals while allowing them to retain a portion of efficiency gains arising from innovation.

Rigorous benchmarking is indispensable. Benchmarking carried out by ERSE or European regulators (e.g. via CEER) is of utmost importance for the calibration of incentive-based methodologies.

Experience shows that information asymmetry does not disappear under incentive regulation. Regulators must be equipped with robust analytical capacity, statutory data access, and secure budgets to better monitor, benchmark, and enforce rules, curbing gaming and political capture by the operators.

### Best practices

- Embed symmetrical cost-sharing and balanced risks.
- Apply TOTEX allowances to achieve OPEX-CAPEX neutrality.
- Make regulatory decisions and develop frameworks based on transparent, regularly updated benchmarking.
- Introduce targeted innovation rewards aligned with policy priorities.
- Ensure adequate resources for data analytics, audits, and enforcement.

- Commit to ongoing ex-post assessment so parameters evolve with evidence.

When these design choices are in place—and supported by capable, independent regulation—incentive frameworks can reliably drive efficiency, innovation, and consumer value while advancing broader energy transition objectives.

- **Example of using incentive regulation**

Both the Self-consumption Code for electricity and the Code for Electricity Network Operation foresee the development of pilot projects. ERSE approves these projects that must aim to test the technical and economic viability and the use of new practices and technologies, including legal and regulatory development proposals.

You can access the list of approved pilot projects here at ERSE's website and here, respectively.

Commercial Relations for the Electricity and Gas Sectors Code and Electric Mobility Code also foresee pilot projects; however, ERSE has approved only one pilot project for each. Information is available on the website concerning commercial relations and the electric mobility code.

This option allows ERSE to test the viability of new solutions submitted for approval under these conditions. The results of these pilots can influence new codes and regulations.

- **Future plans for the use of dynamic regulation**

ERSE codes are reviewed and adapted at the beginning of each regulatory period (four years long), and there are no specific needs for the explicit implementation of DR, considering that the framework for pilot projects is clear and provides an adequate environment for experimentation.

# 17. Spain: CNMC

- **Regulatory model: Hybrid**

Currently, depending on the circumstances, Spain regulates its energy sector through standard regulation, incentive-based regulation, and DR. In this sense, there is no single definition of energy regulation applicable to the Spanish regulatory framework.

- **Legal basis allowing dynamic regulation**

Although the term "dynamic regulation" does not explicitly appear in Spanish legislation, DR in the Spanish energy sector is supported by various laws and regulations that grant the CNMC the ability to adapt regulation to technological and market changes.

DR is intrinsically based on Law 3/2013 and Royal Decree-Law 1/2019, which allow the CNMC to modify methodologies related to tariff setting, market access, and supervision of energy markets in response to sectoral developments.

Moreover, according to Circular 3/2019, Article 24 establishes that "the CNMC shall approve, by resolution, the conditions and requirements for the implementation of demonstration projects (sandboxes) that may contribute to the improvement of the functioning of the wholesale electricity market and the operation of the system [...]". In this regard, the requirements to be fulfilled by regulatory sandboxes are as follows: (1) The product or service covered by the project must be innovative, not currently available on the market, or different from the model currently in use; (2) The applicant must be able to demonstrate that the innovation will benefit the consumers; (3) The System Operator or, where applicable, the distribution network operator, must justify the absence of risks to the operation of the system or to the distribution network concerned, respectively; (4) There is no requirement in the regulations that prevents the implementation of the innovation; (5) There is a fully developed plan to test the innovation. The plan should include clear objectives, criteria, and indicators of success, and a specific implementation period not exceeding thirty-six months.

Additionally, Article 16 of Circular 6/2019, on the methodology for calculating the remuneration of the electricity distribution activity, establishes the possibility of remunerating investments in pilot projects in the distribution sector. This legal provision is also included in Circular 5/2019 on the methodology for calculating the remuneration of the electricity transmission activity, in Article 9, which states that investments made by transmission companies in pilot projects may be considered singular investments.

Likewise, the Royal Decree-Law 23/2020 introduces the additional provision 23º in Law 24/2013 on the Electricity Sector, establishing that "Under the protection of this law and with the aim of

fulfilling its objectives, as well as those related to energy, climate, and environmental sustainability, regulatory sandboxes may be established to develop pilot projects intended to facilitate research and innovation in the electricity sector. To this end, such pilot projects must be supported by a call issued through a Royal Decree by the Government. This call may establish specific conditions and, where appropriate, certain exemptions from electricity sector regulations, without prejudice to the principle of the economic and financial sustainability of the electricity system."

Finally, Royal Decree 568/2022, of 11 July 2022, established the general framework for 'regulatory sandboxes' to promote research and innovation in the Spanish electricity sector. This test bed is a controlled environment designed to enable the development of innovative electrical technologies, products, or services under a flexible and experimental regulatory framework. The regulation seeks to facilitate the experimentation and deployment of new solutions, such as demand management, smart grids, or the integration of renewable energies, before they are rolled out commercially.

- **Application of dynamic regulation in RES integration**

In 2022, the CNMC launched its first "sandbox" for voltage control in the transmission electricity grid in a scenario of high renewable energy production. This project aimed to align the voltage control regulation with Directive (EU) 2019/944 on common rules for the internal electricity market, which provides that network operators must have the services available to ensure security of supply. The aforementioned Directive establishes that TSOs shall obtain these services through **market-based mechanisms**, thereby enabling the energy transition with maximum guarantees of security, efficiency, and minimum cost.

The CNMC approved a resolution establishing, at the proposal of the Spanish TSO (REE), the conditions and requirements for a regulatory voltage control demonstration project. This first sandbox aimed to gain experience in establishing the best model for solving voltage control problems in the transmission network in a high-RES penetration scenario. Moreover, this demonstration project was open to both demand and renewable and cogeneration energies to assess the potential of unconventional technologies in providing this service. In February 2024, the CNMC launched the second regulatory sandbox focused on solving electrical voltage control problems caused by the increase in renewable energy generation and the resulting shift in consumption patterns to certain hours, by adjusting the incentives that large consumers receive through tariffs. In February 2025, this second sandbox was extended for twelve more months.

On the other hand, some sandbox projects approved under Royal Decree 568/2022 aim to test the use of flexibility in electricity systems. In the provision of this service, renewable technologies, along with storage and demand, play a relevant role.

- **Contribution of dynamic regulation to attracting investors**

The use of DR in Spain has attracted further investors by enhancing flexibility and improving grid stability and reliability.

More concretely, last March, the Ministry for the Ecological Transition published the list of five projects that were positively evaluated as part of the call for access to the regulatory sandbox for the promotion of research and innovation in the electricity sector. The approved projects address key challenges of the energy transition, such as the flexibility of distribution networks, shared storage, and demand aggregation. Four of these five pilot projects are included in the proposed final resolution of the first call for grants for new business models in the energy transition under the Spanish Recovery, Transformation, and Resilience Plan.

- **Advantages and disadvantages of using dynamic regulation**

Among its advantages are its flexibility to incorporate new technologies (such as renewables, storage, etc.), its promotion of innovation, and a greater ability to align regulation with energy transition goals. It also enables faster responses to crises or unexpected market changes.

DR's disadvantages include potential regulatory uncertainty for investors, the necessity of having skilled regulators to carry out DR and supervise the energy markets, and the risk of regulatory capture, as some companies may exert pressure on the regulator to make fast and frequent regulatory changes to serve their interests.

To mitigate these issues, it is recommended to establish predictable but revisable regulatory frameworks, strengthen the technical capacity of regulators, ensure transparency, and apply regulatory sandboxes. It is also crucial to provide clear market signals about the direction of energy policy.

- **Lessons learned from using dynamic regulation in Spain**

In July 2022, the CNMC published an initial regulatory demonstration pilot project on voltage control to test a zonal market mechanism open to all generation and demand technologies. The development of this initial project took place between January and July 2023. The project was designed to be flexible both in terms of duration, as it could initially reach between 1 and 6 months depending on the results obtained, and in terms of specifications, as they could be modified throughout the course of the project with the aim of optimising it.

While this first sandbox managed to achieve the participation of renewable generation, demand did not participate, due to either its technical complexity or other regulatory issues, such as tariff design or the uncertainty in remuneration associated with any market mechanism.

Consequently, a new sandbox on voltage control was designed by the CNMC for encouraging participation of demand in this service: this new project was focused on incentives provided by tariffs in terms of billing for reactive energy.

The conditions and requirements for the second sandbox were established in November 2023, at the proposal of the Spanish TSO, and it was implemented in February 2024. This second sandbox has managed to assess the potential of demand response and analyse the impact of possible adjustments to the reactive power component in tariffs. Further, its findings will be crucial in designing the future voltage control market.

In early 2025, this project was extended for one year to further explore the capacity of large consumers to participate in the sandbox.

The CNMC is considering the launch of a new market—the voltage control market—in the months to come, despite the one-year extension. Its goal is to implement this voltage control market through pilot projects, to adapt the electricity system to the growing penetration of renewable energies, and ensure grid stability.

- **Advantages and disadvantages of incentive regulation in Spain**

One of its main advantages is that it promotes efficiency, as companies are incentivised to reduce costs and improve service quality. It also encourages innovation by allowing companies to reach their goals through creative solutions. Such regulation also aligns the interests of the regulator and the operator.

However, there are also significant disadvantages. The design of incentive schemes can be complex, as it requires setting clear goals, appropriate indicators, and effective control mechanisms. Another issue is inequality among operators, as larger companies usually have more resources to adapt and benefit from the system. Additionally, regulators may struggle to monitor and audit results effectively. Lastly, frequent changes in incentive structures can create uncertainty for the investing companies.

To mitigate these disadvantages, in the design of the incentives, the indicators should be simple, measurable, and transparent. To ensure a level playing field among operators, differentiated mechanisms can be applied depending on the size or context of each operator, and technical assistance provided to smaller entities. Strengthening the regulator's capacity is also critical, providing it with adequate resources, autonomy, and digital tools for monitoring. Finally, stability and predictability must be ensured, with clear rules, long-term plans, and regular review processes.

- **Lessons learned from using incentive regulation**

On the one hand, Circular 3/2025 establishes the incentives for the System Operator and their impact on remuneration. The incentive-based remuneration of the System Operator, established by the CNMC, is based on efficiency indicators related to system operation, technical management,

coordination between infrastructures, security of supply, third-party access, optimal use of facilities, and gas balancing. Circular 3/2025 updates and adapts these reference values to reflect recent changes in gas system flows and the growing uncertainty in demand in the context of the energy transition. Additionally, it introduces the possibility of adjusting the incentive calculation in exceptional circumstances, ensuring a fair assessment of the System Operator's performance.

On the other hand, Circular 6/2019 establishes the methodology for calculating the remuneration of the electricity distribution activity. The Circular introduces efficiency incentives, encouraging the improvement of the quality of supply and the reduction of losses in distribution networks. It promotes the extension of the useful life of facilities by making the necessary investments and expenses profitable, resulting in savings for the consumer and for the system as a whole.

- **Example of using hybrid regulation (Standard, Incentive, and Dynamic)**

**Standard regulation:** Sectoral laws consider such regulation as the main tool with which different energy sectors are regulated. In this sense, two examples stand out:

- Hydrocarbon Sector Law 34/1998 regulates hydrocarbon-related activities in Spain (such as oil and natural gas), to ensure a secure, competitive, and sustainable supply.

- Electricity Sector Law 24/2013 regulates the operation of the electricity system in Spain, to ensure a secure, efficient, sustainable, and reasonably priced electricity supply. It also establishes the regulatory framework for the Spanish electricity sector, regulating the generation, transmission, distribution, and commercialisation of electricity.

**Incentive-based regulation:** Circular 3/2025 amends Circular 6/2021, which establishes the incentives for the System Operator and their impact on its remuneration. This circular defines the indicators used to measure the System Operator's performance and, according to this measurement, determines the incentive-based remuneration corresponding to the level of performance achieved and its incorporation into overall remuneration.

This amendment aims to update and adapt the reference values of these indicators, considering the changes in the system's gas flows since the publication of Circular 6/2021, as well as the growing uncertainty in natural gas demand in the context of the energy transition and the decarbonisation of the gas sector.

**Dynamic regulation:** In 2022, the CNMC launched its first "sandbox" for voltage control in the transmission electricity grid in a scenario of high renewable energy production. According to Article 24 of Circular 3/2019, the CNMC "shall approve, by resolution, the conditions and requirements for the implementation of demonstration projects (sandboxes) that may contribute to the improvement of the functioning of the wholesale electricity market and the operation of the system [...]".

- **Future plans for the use of dynamic regulation**

DR is already in use.

# 18. Türkiye: EMRA

- **Regulatory model: Standard, Incentive-Based, and Dynamic**

Incentive-based regulation is being used for electricity distribution tariffs, while standard regulation (fixed tariffs) is applied to other tariffs in the electricity sector in Türkiye.

DR is in its nascent stages and is currently used only for smart meter deployment in Türkiye.

The tariff types subject to regulation in the electricity market are as follows:

- Connection tariff
- Transmission tariff
- Wholesale tariff (only for EUAS, the state-owned company)
- Distribution tariff
- Retail sales tariff
- Market operating tariff
- Last resort supply tariff

- **Legal basis for dynamic regulation**

There is no explicit provision in the law regarding the type of regulation. Therefore, DR is not explicitly mentioned in the law or in other secondary regulations. Nevertheless, there is no legal obstacle to DR. In fact, under the law, EMRA is responsible for framing regulations that best suit the conditions of the time.

**Law No. 4628,** titled *"Law on the Organisation and Duties of the Energy Market Regulatory Authority",* assigns the following responsibility to EMRA:

**Article 5 – subsection (6)-(c):** To make the necessary regulations to provide reliable, good quality, uninterrupted, and low-cost electricity service to consumers.

**Law No. 6446,** section four includes **"**Tariffs, Consumer Support, Privatisation, Expropriation and Supply Security".

### Tariffs and consumer support

**ARTICLE 17 – (1) (Amended: 4/6/2016-6719/21art.)**: The tariffs to be set within the scope of this Law and proposed to be applied for the ensuing period shall be prepared by the relevant legal entity in accordance with the procedures and principles designated by the Board, in a manner

to include all the costs and service charges applicable to the activity subject to tariff, and submitted to the Board for approval. The Board may request revisions in the tariff proposals, which it deems not compliant with the legislation, or, if necessary, may approve such proposals by revising them ex officio. The relevant legal entities shall be obliged to apply the tariffs approved by the Board.

On the other hand, the Electricity Market Tariffs Regulation states as follows in Chapter Three:

### Revenue regulation: Principles of revenue regulation

**Article 13 - (1)** The following principles shall govern the revenue regulation:

- Ensuring a reliable, adequate, high-quality, continuous, low-cost, environmentally friendly electricity supply to consumers;
- Establishing non-discriminatory, **incentive-based** regulation;
- Increasing service quality and efficiency with due regard to the security of supply regarding transmission and distribution services;
- Ensuring the financial sustainability of legal entities subject to tariff regulation, with due consideration given to regulations concerning efficiency;
- Facilitating efficient long-term investments;
- Facilitating the development of effective competition in the market;
- Ensuring the pass-through of gains from increased efficiency and competition to consumers; and
- Ensuring that cross-subsidies between activities are prevented.

There are no significant legal or institutional barriers preventing the adoption of DR.

- **Example of application of dynamic regulation**

DR is not mentioned in the law, and is not widely used in the sector. However, the MASS project within the framework of Türkiye's Smart Grids 2023 Vision is an example of DR.

This vision is the national roadmap aiming for the transformation of Türkiye's electricity grid from a conventional structure to a digital, automatic, flexible, and efficient 'smart grid' system.

The MASS (National Smart Metering Systems) Project is a strategic initiative developed entirely with domestic resources, aiming to transform Türkiye's energy infrastructure in line with the smart grid vision. It is designed to integrate electricity, water, and natural gas meters with components such as smart meters, modems, data concentrators, Headend software, and mobile applications in a secure, interoperable, and reliable manner. Initiated in 2019, the project prepared its technical specifications in 2020, carried out pilot applications across 21 distribution regions in 2022, and successfully tested its first implementation in Samsun (YEDAŞ region) and Gaziantep (Toroslar

EDAŞ region). Conducted in partnership with EMRA, TEDAŞ, TEİAŞ, EPİAŞ, and 21 electricity distribution companies, the project offers consumers the ability to monitor real-time and historical consumption, receive overconsumption alerts, and benefit from energy efficiency recommendations via a mobile application. From a technical standpoint, MASS is built on high data security, compliance with international standards, robust cybersecurity measures, and patented domestic software and hardware, to replace all outdated meters with MASS-compatible systems within seven years. The nationwide implementation date is set for January 1, 2026, foreseeing a mandatory and widespread smart metering transition throughout Türkiye from 2026 onwards.

The application results in the pilot regions of the MASS project include the successful testing and certification of smart meters and communication technologies produced with national capabilities. The system effectively manages real-time and historical energy consumption data, enabling consumers to understand their energy usage habits and effect savings. Technical issues are quickly identified, enhancing the efficiency of the electricity distribution system. With plans for nationwide implementation in the coming years, the project represents significant technological infrastructure gains in the energy sector.

The Electricity Market Measurement Systems Regulation, published by EMRA in 2023, represents an innovative and DR in the MASS project framework, providing a comprehensive legal foundation for the installation, operation, and management of measurement systems in Türkiye's electricity market. The regulation mandates the integration of MASS, specifying the technical features, communication infrastructure, and usage standards of the meters, thereby ensuring a robust and orderly legal basis for the project.

This regulation serves as the legal framework for the MASS project and will be further supported by a board decision, accelerating digital transformation and strengthening the technological infrastructure in the energy sector.

The MASS Project emerged from an R&D initiative within the scope of Türkiye's Smart Grids 2023 Vision. It has been implemented in two pilot regions and is expected to be rolled out nationwide by 2026. Thus, it differs from traditional regulations and exemplifies DR.

- **Application of dynamic regulation in RES integration**

DR has not yet been applied in RES integration in Türkiye.

- **Contribution of dynamic regulation to attracting investors**

As DR is still in its early stages, there is currently no data available regarding its ability to attract investors.

- **Advantages and disadvantages of using incentive regulation in Türkiye**

Among the advantages, when EMRA monitors data related to supply continuity and system reliability parameters, such as SAIDI and SAIFI, the regulator can observe improvements in these metrics following the implementation of incentive regulation in distribution. Similarly, theft and loss ratios in distribution have decreased since EMRA introduced such incentive mechanisms in Türkiye.

- **Example of using incentive regulation**

The table below presents examples of incentive regulation for electricity distribution companies in the electricity distribution tariffs. EMRA has established five-year distribution tariff periods in Türkiye, incorporating a bonus/penalty mechanism for distribution companies based on quality factor parameters (incentives), which include

- Supply Continuity Performance,
- Technical Quality Performance,
- User Satisfaction Performance,
- Occupational Health and Safety Performance

During the third tariff period (2016-2020), the mechanism was solely for bonus, but now employs both bonus and penalty mechanisms.

In the fourth tariff period, EMRA introduced additional incentives called quality indicators, detailed in the table below.

| Comparisonof 3rd and 4th Regulatory Period: Distribution | | |
|---|---|---|
| | 3rd Regulatory Period (2016-2020) | 4th Regulatory Period (2021-2025) |
| Quality Factor | Bonus mechanism based on performance (bonus ceiling:5%, penaltyceiling:0%) | A bonus/malus mechanism is introduced. Total quality parameter bonus ceiling is set as 6% of regulated revenue requirement for 2021 7% of regulated revenue requirement for 2022-2025. Penalty ceiling is set at - 2.05% for 2021 and -2.8% for 2022-2025 |
| Quality Indicator | None | New :Companies will be incentivized incase the shareof in-house sourcing is above 50%. The max.incentive is 1% of revenue requirement for each year, while bonus amount will depend on in-house sourcing share. |
| Quality Indicator | None | New: Electricity distribution and incumbent retail companies directly listed on Borsa İstanbul will be eligible for 1.0 %of their revenue requirement as an incentive. |
| Loss and Theft Target | Target rate 8% for the first cluster in target setting. | Target rate 7.5% for the first cluster as a part of dynamicT&L targeting. T&Ltarget is based on previous 3 years performance. For the first cluster, the T&L target formula is ((7.5%+w.avg(Y-2,Y-3,Y-4))/2 |
| R&D | Max. %1 regulated OPEX | Max. %2 regulated OPEX |

Another incentive is the Loss and Theft Targets. EMRA has regulations in place to reduce losses in the distribution system, which encompass both technical losses and theft. These regulations outline specific measures and standards for distribution companies to follow.

- A targeted loss and theft ratio is established for each distribution region.
- For instance, during the fourth tariff implementation period, loss-theft targets are defined for three different clusters: 1) loss-theft rate < 7.5%, 2) 7.5% < loss-theft rate < Türkiye average, and 3) others.
- Companies that remain below the target receive incentives, while those that exceed it may face penalties. Companies achieving lower loss and theft rates gain financial advantages.

Another incentive is for R&D projects:

- DSOs receive financial support to foster innovation.
- Projects aimed at increasing grid operational efficiency are supported.
- Incentives are provided for smart meters, remote monitoring systems, and digital transformation initiatives. This regulation aims to enhance the operational efficiency of distribution companies, optimise costs, and provide consumers with more reliable energy.
- DSOs can submit R&D projects to EMRA twice a year.
- The R&D commission is responsible for approving or rejecting project proposals. If accepted, a maximum of 2% increase in OPEX is permitted.

- **Future plans for the use of dynamic regulation:**

Türkiye has been employing a DR approach in the energy sector, inter alia. In the coming years, DR is expected to be more widely implemented as deemed appropriate according to the country's specific conditions. The MASS project, currently underway, can be regarded as the first application of DR in Türkiye.

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