ENERGY EFFICIENCY MECHANISMS AND ENERGY LABELLING

Empowering Mediterranean regulators for a common energy future

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Renewables Working Group (RES WG)

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ABSTRACT

This document assesses the energy efficiency mechanisms in the electricity system and the available technologies and instruments to be used on the supply-demand side. Additionally, it identifies the main barriers that delay the implementation of energy efficiency in the Mediterranean region.

The report represents the contribution of Mediterranean Energy Regulators (MEDREG) to the Union for the Mediterranean (UfM) Renewable Energy and Energy Efficiency (REEE) Platform Action Plan as a technical input to the UfM discussion.

The last chapter is enriched with the contributions of the Regional Center for Renewable Energy and Energy Efficiency (RCREEE) to energy labelling.

ACKNOWLEDGEMENTS

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DISCLAIMER

This document has been published with financial support from the European Union (EU). The contents of this publication are the sole responsibility of MEDREG and do not necessarily reflect the views of the EU.

ABOUT MEDREG

MEDREG, the association of Mediterranean Energy Regulators, unites 28 regulators from 23 countries across the EU, the Balkans, and the Middle East and North Africa (MENA) region.

Mediterranean regulators work together to promote greater harmonisation of regional energy markets and legislations, with the ultimate goal of achieving progressive market integration in the Euro-Mediterranean basin. Through constant cooperation and information exchange among members, MEDREG aims at fostering consumers' rights, enhancing energy efficiency, and driving infrastructure investment and development based on secure, safe, cost-effective, and environmentally sustainable energy systems. As a platform for information exchange and collaboration, MEDREG provides assistance to its members as well as offers capacity development activities through webinars, training sessions, and workshops. The MEDREG Secretariat is located in Milan, Italy.

MEDREG wishes to extend its gratitude to all the experts who have dedicated their time and expertise to preparing the report and sharing their knowledge.

For more information, visit www.medreg-regulators.org.

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INTRODUCTION

1.1. MEDREG's previous work on the energy efficiency measures and tools

The Renewable Energy Sources and Energy Efficiency Working Group (RES WG) under the Mediterranean Energy Regulators' (MEDREG) started analysing the energy efficiency in the Mediterranean region in its 2018 report on smart grids. This was followed by the new regulatory tools for the integration of RES, energy efficiency programmes, and electric mobility in Mediterranean countries. The 2018 report and analysis allowed MEDREG to provide an overview of energy efficiency in the Mediterranean region along with the national strategy, future vision, and policy targets for each country.

In the current report, MEDREG's RES WG deepens its analysis by extending it to the electricity efficiency systems, including the integration of energy efficiency measures in network development and energy bills.

1.2. Report objective

The Mediterranean region is a major electricity consumer, accounting for approximately 5% of the global electricity consumption[1] in 2021. Moreover, the region is a significant contributor to greenhouse gases, with energy-related emissions accounting for a considerable share of the total emissions.

It is also important to note that the region is facing several challenges in terms of energy efficiency, including:

- High energy consumption in the building sector
- Inefficient energy use in the industrial sector
- Reliance on imported energy

However, a number of opportunities for improving energy efficiency also exist there in the Mediterranean region, including:

- The adoption of energy-efficient technologies
- The implementation of energy efficiency policies and regulations
- The use of renewable energy sources (Though the use of renewable energy may not always have a direct role in increasing energy efficiency, it does guarantee the diversification of energy sources and promotes energy independence from foreign states.)

The Mediterranean region is at a critical juncture in terms of energy efficiency. The region has the opportunity to make significant progress in reducing energy consumption and emissions, but such progress will require a concerted effort from all stakeholders.

Through this report, MEDREG's RES WG explores some key mechanisms and tools that are being used in the Mediterranean region, on both the supply and demand sides, to improve energy efficiency, consumer awareness, and energy efficiency in buildings and appliances. Moreover, this report

[1] MEDREG MEMO+ 2022 and IEA world Energy Outlook 2022 (Global electricity: 36 390 TWh)

examines the implementation of energy efficiency measures and energy labelling in the context of electricity systems. The current mechanisms and tools of supply side as well as demand-side and awareness-raising tools are outlined. Furthermore, the last chapter will be enriched with a valuable contribution from the Regional Center for Renewable Energy and Energy Efficiency (RCREEE). This contribution will delve into energy labelling, exploring the financing constraints and lessons drawn from success stories in the field.

The report also presents case studies that showcase the application of energy efficiency measures in a few of the contributing countries. These case studies demonstrate the impact of energy efficiency measures on energy consumption and the environment.

Based on the findings, recommendations are developed to improve the implementation of energy efficiency measures. These include increasing public awareness, building proper funding mechanisms, and strengthening energy regulations.

The RES WG report is intended for policymakers and stakeholders, offering insights into the importance of energy efficiency measures and energy labelling in electricity systems. Additionally, it illustrates the collaboration and contribution of MEDREG members to enrich the discussion of Union for the Mediterranean (UfM) Renewable Energy and Energy Efficiency (REEE) platform.

1.3. Methodology

The methodology for this report involved a benchmarking exercise sent to MEDREG members to gather their experiences and knowledge related to the implementation of energy efficiency measures and energy labelling in the context of electricity systems. The benchmarking exercise was designed to identify best practices, challenges, and opportunities for improvement in the implementation of energy efficiency measures across the MEDREG region.

The responses received from the benchmarking exercise were analysed to identify common themes and trends related to energy efficiency measures and energy labelling. The findings of the analysis were used in further development of the report, including the case studies and recommendations.

Overall, the benchmarking exercise provided valuable insights into the experiences and knowledge of MEDREG members related to energy efficiency measures and energy labelling. This methodology ensured that the report was informed by the experiences and perspectives of stakeholders across the region. As a result, the recommendations were tailored to address the specific challenges and opportunities faced by MEDREG members.

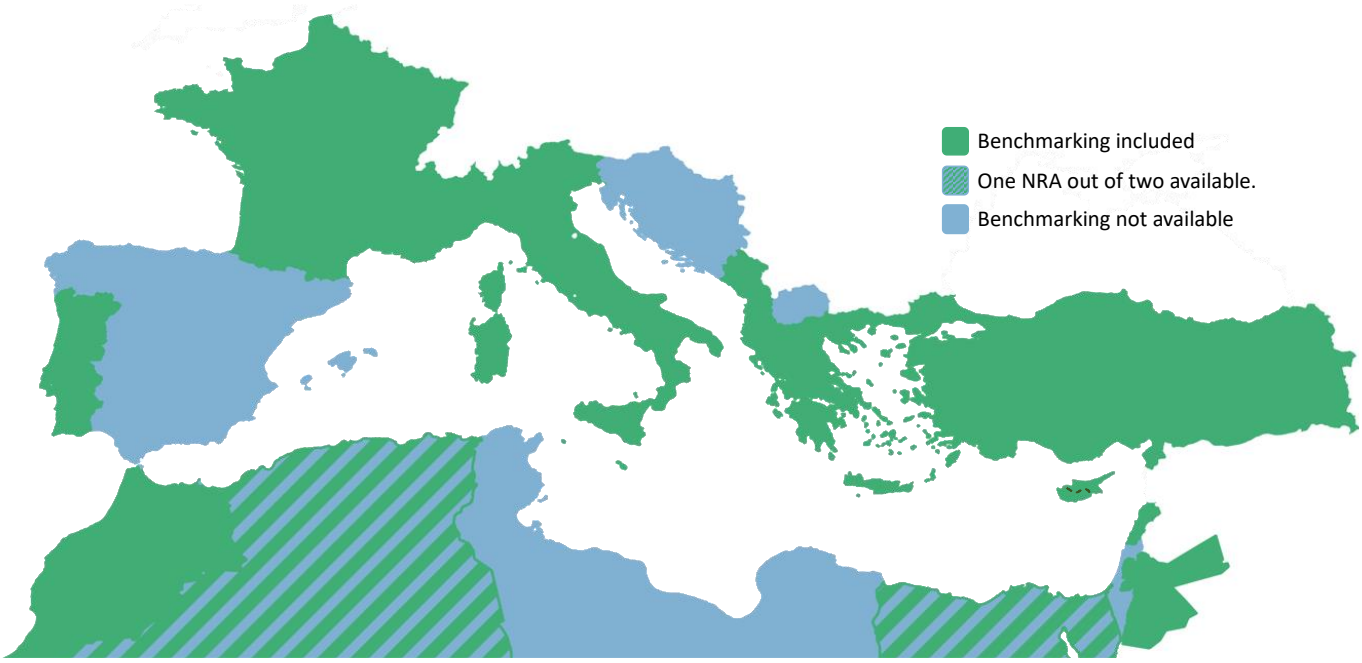


Figure 1. MEDREG's RES WG benchmarking replies

1.4. Definitions

Energy efficiency:

In our report, energy efficiency is defined as the ability to accomplish a certain service while minimising energy consumption. It can be achieved through a variety of measures, such as using more efficient appliances, improving insulation, and using RES (in this case, according to the specifications previously described).

- According to EU Directive[2] 2023/1791, energy efficiency refers to the ratio of the output of performance, service, goods, or energy to the input of energy. In addition, system efficiency entails the selection of energy-efficient solutions that not only facilitate a cost-effective decarbonisation pathway but also provide additional flexibility and optimise resource utilisation.
- Energy efficiency is called the "first fuel" in clean energy transitions, according to the International Energy Agency (IEA), as it provides some of the quickest and most cost-effective CO_2 mitigation options while lowering energy bills and strengthening energy security. Together, efficiency, electrification, behavioural change, and digitalisation shape global energy intensity – the amount of energy required to produce a unit of GDP, which is a key measure concerning the economy's energy efficiency.
- According to the World Bank[3], energy efficiency can be defined as a reduction in the amount of energy required to maintain or improve energy services to households, businesses, and

[2] Directive (EU) 2023/1791 of the European parliament and of the council of 13 September, 2023, on energy efficiency and amending regulation (EU) 2023/955 (recast)
[3] Approach Paper World Bank Group Support to Energy Efficiency: An Independent Evaluation of Demand-Side Approaches (2021)

communities. Energy efficiency improvements can be categorised into supply-side and demand-side approaches.

- On the research side, Murray G Patterson[4] defines energy efficiency in energy policy[5]. According to him, the efficient use of energy is utilising a lower amount of energy to achieve the same level of energy service. It can be achieved with improved behaviour or more efficient technology.

Energy labelling: Energy labelling typically provides information on the energy efficiency of a building's heating, ventilation, and air conditioning (HVAC) system and on products/appliances that use energy, such as refrigerators, lamps, TVs, and electric motors. This information can help building owners and tenants make informed decisions about energy efficiency upgrades. Furthermore, it provides information to consumers on the energy efficiency of appliances and other products.

Energy efficiency and energy labelling are important tools for reducing energy consumption and greenhouse gas emissions. By making it easier for consumers to choose energy-efficient products, energy labelling helps in driving demand for these products. This, in turn, can lead to increased investment in energy efficiency technologies and practices.

Network development plans: Network development plans (NDPs) refer to strategic documents or programmes that outline the expansion, enhancement, and maintenance of a country or organisation's infrastructure networks, particularly in sectors such as energy, transportation, and telecommunications. Energy efficiency in this aspect can be achieved through efficient measures in order to guarantee the system's adequacy and supply security. These measures are based on thorough consultations with all relevant stakeholders, considering both existing and expected supply and demand.

Network access tariffs: Network access tariffs refer to the charges levied by energy network operators for allowing energy producers, suppliers, and consumers to access their transmission and distribution networks. These tariffs cover the costs associated with operating and maintaining the network infrastructure, as well as the cost of expansion or upgrades. In most cases, the National Regulatory Authority (NRA) has either a direct (fix/approve) or indirect (presents an opinion) role in the network access tariffs[6].

Rate of return regulation: The rate of return regulation, also known as cost-of-service regulation, is a regulatory approach in which the energy regulator sets a fixed rate of return on the capital invested by the energy network operator in the network infrastructure. Under the rate of return regulation, the network operator has little incentive to minimise costs or improve efficiency beyond what is necessary to meet the regulator's requirements.

[4] Murray G Patterson Energy Policy, 1996, vol. 24, issue 5, 377–390
[5] Energy Policy, May 1996, vol. 24, issue 5, 377–390
[6] Please refer to the MEDREG's regulatory outlook for more details.

Cost-of-service regulation: This approach involves determining the revenues allowed based on the actual cost of providing network services, taking into account capital and operating expenses, depreciation, and other relevant costs.

Revenue cap regulation: With this method, a cap is set on the total revenue that network operators can collect from customers, based on the estimated costs of providing network services. This approach encourages operators to operate efficiently and reduce costs while ensuring they can recover expenses and attain a reasonable return on investment.

Price cap regulation: In this strategy, a cap is imposed on the prices charged by network operators for network access, considering the estimated costs of delivering services. This encourages efficient operation and cost reduction while maintaining affordable prices for customers.

Incentive-based regulation: This approach involves offering incentives to network operators for meeting or exceeding specific performance targets, such as reliability, safety, or customer service standards. This encourages investments in service quality improvement, cost reduction, and innovative solutions to meet customer demands.

Hybrid regulation: This approach, combining elements of cost-of-service regulation, revenue cap regulation, price cap regulation, and/or incentive-based regulation, is tailored to the specific policy objectives of the regulatory framework and the unique characteristics of the network and its customer base.

Cost-plus regulation: Cost-plus regulation is a regulatory framework that ensures electricity providers are compensated for their costs in providing electricity services in a fair and efficient manner. In a cost-plus regulatory environment, utilities are allowed to recover the costs they incur in providing electricity services, including the cost of operations, maintenance, and depreciation of assets. This approach is intended to ensure that utilities can recover their costs and maintain a stable financial footing while also encouraging them to operate efficiently and invest in infrastructure upgrades.

Revenue allowances: Revenue allowances are a regulatory approach in which the energy regulator sets a maximum revenue that the network operator is allowed to collect from energy producers, suppliers, and consumers over a specific period (usually spanning several years). Under revenue allowances, the network operator is responsible for managing its costs and investments to ensure that it can operate and maintain the network infrastructure while remaining within the revenue cap set by the regulator.

Cost recovery principles: Cost recovery principles refer to the principles that guide regulators in setting tariffs or rates to ensure that utilities can recover their costs while providing services to customers at reasonable prices.

Green energy offers: Green energy offers refer to electricity supply plans that obtain their electricity from renewable sources, such as wind, solar, hydroelectric, geothermal, and biomass. These plans typically come with a premium price compared to standard electricity plans, as generating renewable energy sources is currently more expensive. However, by switching to a green energy offer, one can

support the development of these environmentally friendly technologies and contribute to a cleaner energy future.

2

REGULATORY TOOLS ON THE SUPPLY SIDE

This chapter explores the role of the NRA in driving energy efficiency improvements on the supply side through a diverse set of regulatory instruments, from setting stringent performance standards to offering incentives and fostering innovation. By analysing these tools, we can better understand the dynamic relationship between regulation and energy efficiency, which paves the way for a greener and more sustainable energy future.

Energy efficiency measures on the supply side aim to reduce energy losses and increase the efficiency of electricity production, transmission, and distribution. Implementing these measures requires the deployment of appropriate mechanisms and tools. This chapter provides a theoretical definition and explanation of supply-side mechanisms and tools for energy efficiency.

Supply-side mechanisms and tools refer to a range of technologies, policies, and practices that aim to improve energy efficiency, encompassing the generation, transmission, and distribution of the electricity's value chain. These mechanisms and tools are designed to reduce energy losses and optimise the use of energy resources, thereby contributing to the overall efficiency of the energy system.

The supply-side mechanisms will entice further investments in renewable energy sources (RES), such as solar, wind, hydro, and geothermal, owing to enhanced yield and available produced energy. Thus, RES will help achieve a more efficient and sustainable energy mix.

One of the most important measures of energy efficiency on the supply side is the deployment of smart grid technologies. These technologies enable efficient management of energy resources by monitoring and controlling energy flows in real time. Smart grid technologies can help reduce energy losses and optimise the use of energy resources, improving efficiency and sustainability.

Other supply-side mechanisms and tools for energy efficiency include the deployment of high-efficiency power generation technologies, such as combined heat and power systems, and the use of energy storage technologies to store excess energy and redistribute it as needed. Additionally, power factor correctors can be used to enhance the service quality and reduce undesired power leakages. Moreover, an accurate maintenance programme for transformers and a good design of the electricity grid's architecture will help optimise the utilised routes and minimise energy losses.

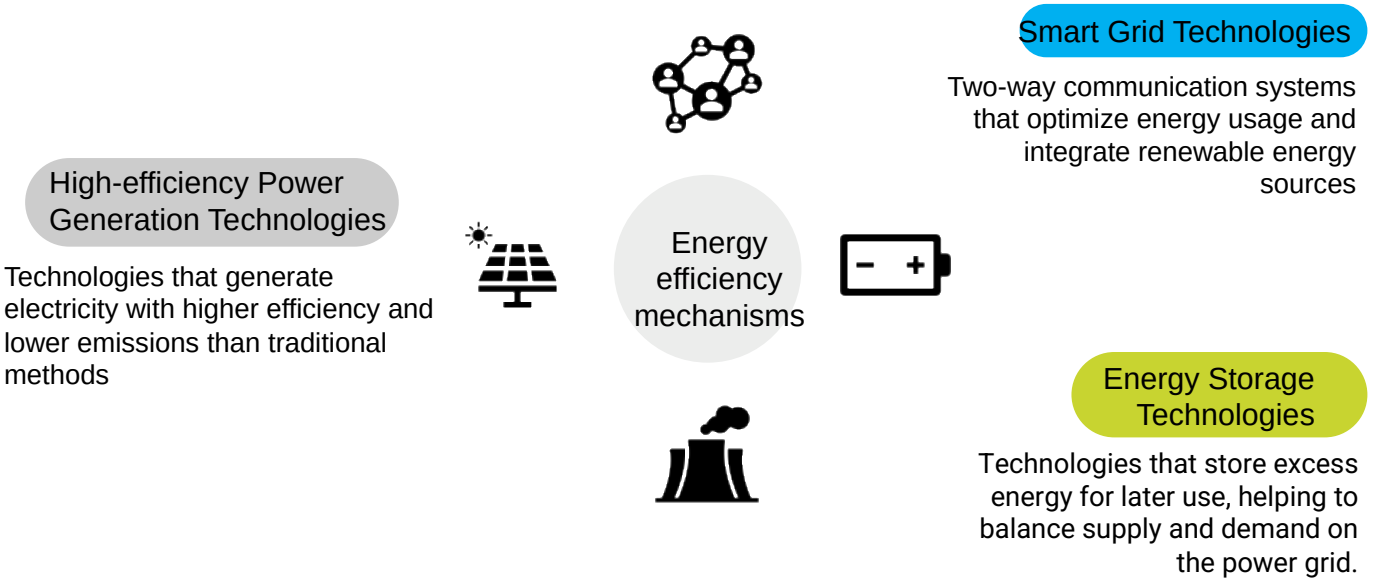


Figure 2. Examples of supply-side mechanisms and tools

2.1 Promoting efficiency through power market competition

To promote energy efficiency and drive innovation within the electricity sector, six fundamental strategies can be implemented through power market competition.

First and foremost, a robust regulatory framework is essential, with a strong emphasis on transparency and independent oversight to create an environment of fair competition. Second, the implementation of competitive market designs, such as wholesale electricity markets, allows generators and suppliers to actively engage in price and quality competition, stimulating efficiency improvements. Third, continuous monitoring and transparency play a vital role in curtailing any anti-competitive behaviour. Fourth, it is equally important to guarantee non-discriminatory access to grid infrastructure for all participants, enabling fair competition. Fifth, by utilising market-based pricing mechanisms reflecting supply and demand dynamics, pricing becomes more accurate and responsive. Finally, supporting innovation and renewable energy adoption through incentives and cross-border cooperation not only diversifies energy sources but also drives technological advancements.

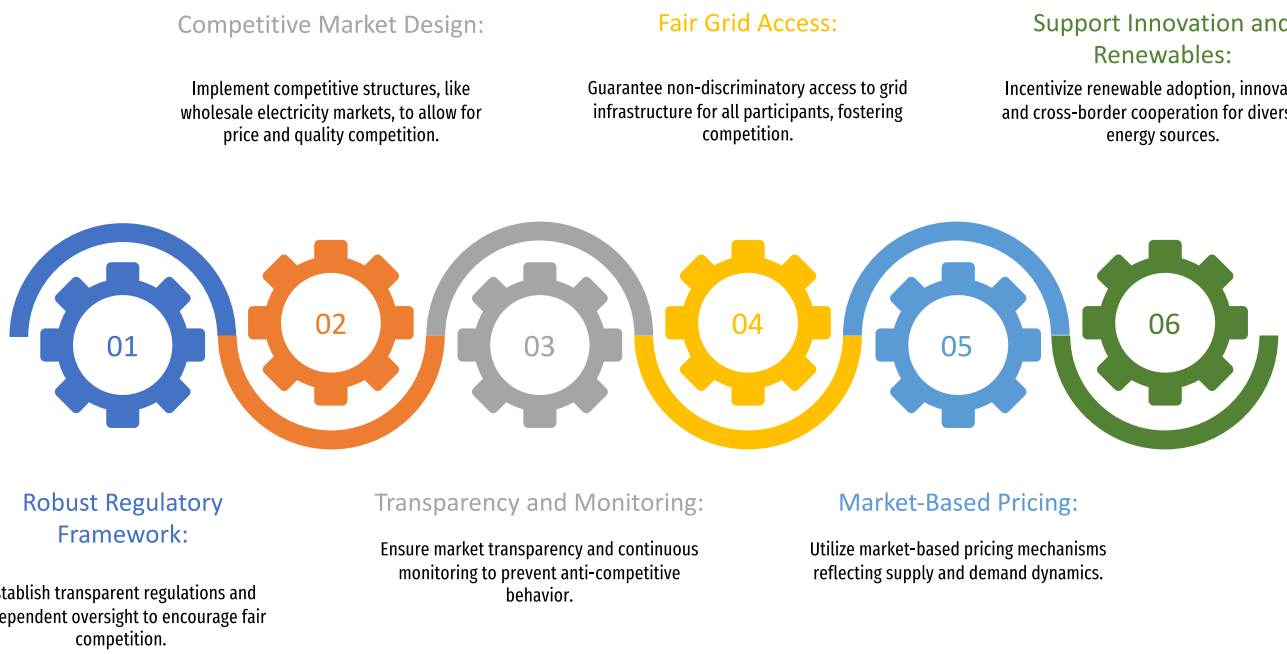


Figure 3. Strategies to promote energy efficiency through power market competition

A well-functioning competitive market encourages market actors to enhance their efficiency, leading to improved technologies while simultaneously enabling less efficient operators to be naturally phased out as they struggle to compete in this dynamic environment.

2.3. Network Development Plans

In today's rapidly evolving energy landscape, the need for sustainable and efficient energy consumption has become paramount. As nations strive to reduce their carbon footprints and mitigate the impact of climate change, the NRA has emerged as a critical driver in promoting energy efficiency within the energy sector. To achieve the green energy transition, regulatory tools on the supply side play a pivotal role in shaping and enhancing the energy efficiency practices of energy providers and industries.

National regulatory authorities act as custodians of energy policies, standards, and guidelines, wielding significant influence over energy markets, utilities, and industrial players. By leveraging an array of regulatory tools, these authorities can steer the energy sector towards adopting cleaner, more efficient technologies and practices.

Network development plans play a crucial role in shaping the growth and efficiency of the energy sector across various countries. These plans are overseen and approved by regulatory bodies to ensure alignment with national energy goals. Stakeholders, including system operators, transmission and distribution companies, regulators, and ministries, collaborate in the planning process, providing valuable expertise and input. The plans cover a specific time horizon, often a decade, and are updated periodically. They emphasise capacity and infrastructure requirements, energy efficiency, and reduction of network losses. Public consultation ensures transparency, and these plans are required to adhere to national energy policies. The implementation progress is monitored carefully, with long-term sustainability being a key focus.

The analysis of the benchmark replies allowed the identification of the following common aspects:

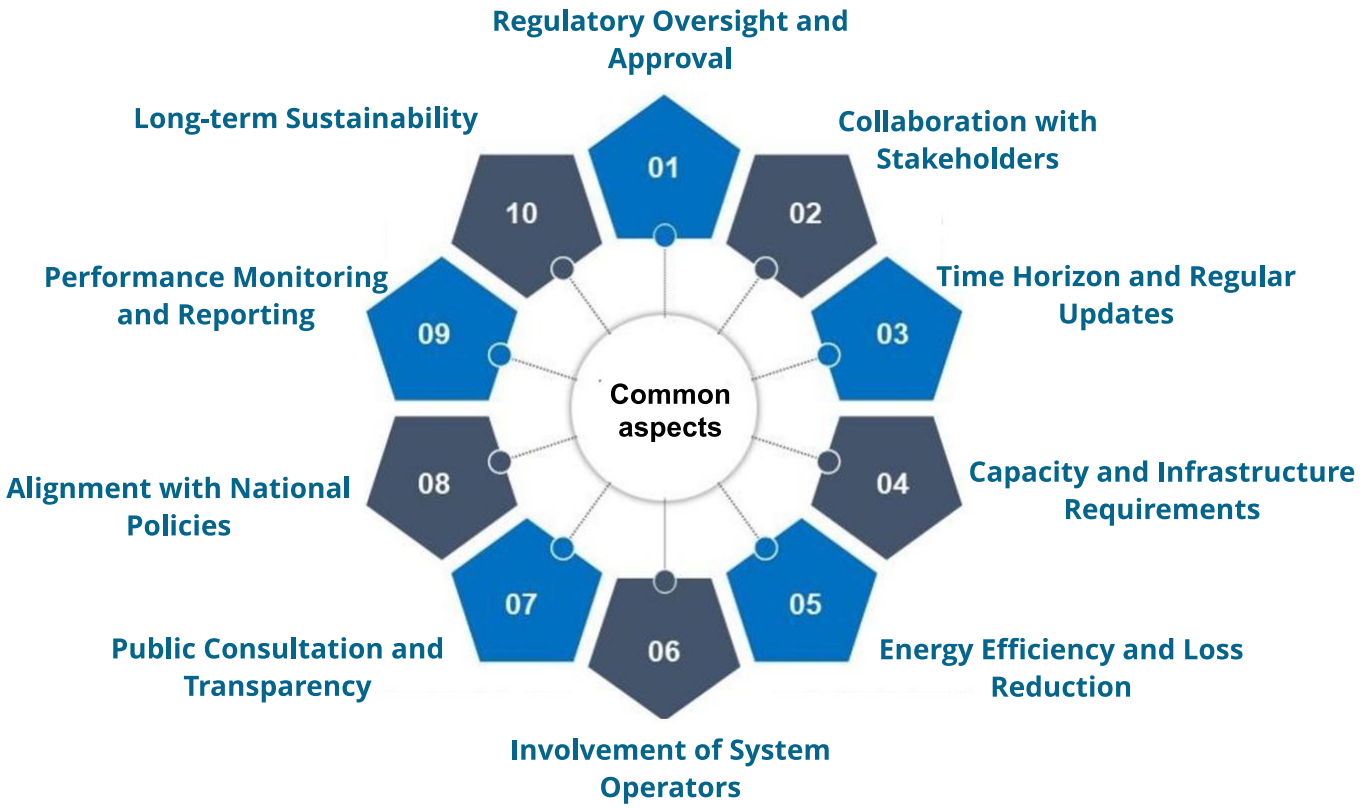


Figure 4. Common aspects of Network Development Plans in the Mediterranean region

- **Regulatory Oversight and Approval:**
  - In various countries, regulatory bodies play a significant role in overseeing and approving network development plans.
  - Regulatory bodies ensure that the plans align with national energy efficiency goals, policies, and financial sustainability objectives.
- **Collaboration with Stakeholders:**
  - Network development plans involve collaboration among various stakeholders, including system operators, transmission and distribution companies, regulators, ministries, and market participants.
  - Stakeholders contribute their expertise, data, and input to the planning process.
- **Time Horizon and Regular Updates:**
  - Network development plans typically cover a specified time horizon, often around 10 years and are adapted periodically (e.g. every two years) to accommodate changing circumstances.
  - Plans outline short-term, medium-term, and long-term objectives to guide network development and subsequent improvements.

- **Capacity and Infrastructure Requirements:**
  - Plans include estimates of capacity requirements for electricity transmission, distribution, and other related infrastructure.
  - The expansion and enhancement of transmission and distribution networks are key elements of the plans.
- **Energy Efficiency and Loss Reduction:**
  - Many plans emphasise energy efficiency measures, including reducing network losses and improving overall network quality.
  - Energy efficiency goals are integrated into the planning process, often taking into account energy demand forecasts.
- **Involvement of System Operators:**
  - System operators are usually responsible for drafting and implementing network development plans in collaboration with relevant stakeholders.
  - System operators work with transmission and distribution companies, market participants, and other entities to create comprehensive plans.
- **Public Consultation and Transparency:**
  - Public consultation is a common practice in the planning process, allowing stakeholders and the general public to provide feedback on proposed plans.
  - Transparency is emphasised to ensure that stakeholders have insight into and participate effectively in the planning process.
- **Alignment with National Policies:**
  - Plans must align with national energy policies and objectives, ensuring that network development supports broader energy goals.
- **Performance Monitoring and Reporting:**
  - Regulatory bodies monitor the implementation and progress of network development plans to ensure compliance with regulations and standards.
  - Performance data related to network quality, efficiency, and other metrics are consistently tracked and reported.
- **Long-term Sustainability:**
  - Plans often focus on achieving sustainable growth in the energy sector, including financial sustainability and reduction of environmental impact. The long-term strategies aim to ensure the resilience and reliability of energy infrastructure.

In examining the intricate landscape of network development plans across various countries, it becomes evident that while these plans share certain elements crucial for fostering energy sector growth and efficiency, each nation tailors its strategies to align with its unique regulatory framework,

energy goals, and operational dynamics. A detailed insight into how countries such as Albania, Algeria, Cyprus, Egypt, France, Greece, Italy, Jordan, Lebanon, Montenegro, Morocco, Palestine, and Portugal implement these common aspects within their distinct contexts can be gained from the table below.

Country	Specific details
Albania	**Regulatory Oversight and Approval:** In Albania, the NRA plays a central role in reviewing and approving the development of network plans. This includes both transmission and distribution networks. Additionally, they are responsible for monitoring the implementation of approved investments as part of the network development plans. This oversight ensures that the planned investments are carried out as intended.
	Capacity and Infrastructure Requirements: The NRA has the authority to approve network tariffs. These tariffs must take into consideration the developmental needs of both the transmission and distribution networks. The tariffs play a crucial role in funding network expansion and maintenance.
Algeria	**Regulatory Oversight and Approval:** The Commission de Régulation de l'Électricité et du Gas (CREG) approves the electricity transmission network development plans.
	Collaboration with Stakeholders: The plan is developed by the system operator in collaboration with various industry stakeholders.
	Time Horizon and Regular Updates: The plan covers a 10-year period and is adapted every two years.
	Capacity and Infrastructure Requirements: The plan encompasses detailed estimates of transmission capacity needs.
	Energy Efficiency and Loss Reduction: The plan outlines programmes for implementing energy efficiency measures.
	Involvement of System Operators: The system operator collaborates with the transmission system operator, market players, distributors, and sales agents.
	Alignment with National Policies: The plan's development and approval process is defined by law.
	Performance Monitoring and Reporting: The procedures for monitoring the execution of the plan are specified.

Country	Specific details
	Long-term Sustainability: The plan is drawn with an emphasis on efficiency and network quality improvement.
Cyprus	**Regulatory Oversight and Approval:** According to Article 5 of the National Laws Regulating the Electricity Market of 2021-2023 (N.130(I)/2021), the Cyprus Energy Regulatory Authority (CERA) approves the investment planning and multi-year network development plan submitted at least every two years by the transmission system operator (TSO). Following Article 50, the Distribution System Operator (DSO) also prepares a transparent 10-year distribution network development plan, which it submits to CERA every two years and publishes at least every two years.
Egypt	**Collaboration with Stakeholders:** The Egyptian Electricity Transmission Company (EETC) handles transmission-level development tasks, distribution companies handle distribution-level development activities, and the Electric Utility and Consumer Protection Regulatory Agency (EgyptERA) reviews and approves sector planning strategies.
	Involvement of System Operators: In Egypt, transmission and distribution entities manage network development.
	Alignment with National Policies: Each distribution company has to deliver a yearly energy efficiency action plan to the regulator under the Sustainable Energy Efficiency Action Plan (SEEAP)
	Long-term Sustainability: The National Energy Efficiency Action Plan (NEEAP) and the SEEAP programmes include four pillars: reducing losses, promoting renewable energy (RE) uses, energy efficiency, and network-related issues.
France	**Regulatory Oversight and Approval:** The French Energy Regulatory Commission (CRE) has the authority to receive and approve the SDDR (10-year network development plan), which is prepared every two years by the TSO. The plan is submitted to the French Ministry for Ecological Transition, the French Energy Regulatory Commission (CRE), and the Ministry for Ecological Transition as the Environmental Authority. The CRE has supervisory powers, including the ability to require plan modifications and monitor implementation. If investments are not carried out, the CRE can take measures to ensure their implementation.

Country	Specific details
	Capacity and Infrastructure Requirements: The CRE ensures that the SDDR incorporates interconnection projects and checks its compatibility with the 10-year network development plan at the European Union (EU) level, established by the European Network of Transmission System Operators (ENTSO).
	Collaboration with Stakeholders: The Réseau de transport d'électricité (RTE) is responsible for preparing the 10-year network development plan. The organisation consults various stakeholders in the sector, including producers, suppliers, distributors, NGOs, and institutions. Additionally, they conduct an environmental assessment. According to French law, the CRE may require gas and electricity transmission system operators to modify their 10-year network development plans or schemes. In addition, the CRE can issue formal notices to transmission system operators who have not carried out investments specified in the 10-year plan. If the operators fail to comply, the CRE may issue tenders to have these investments carried out by third parties.
Greece	**Regulatory Oversight and Approval:** The network development plan undergoes approval annually before the commencement of each new Regulatory Period. Additionally, it may be reviewed in any other year if the network operator deems it necessary. If the Regulatory Authority for Energy, Waste and Water (RAEWW) determines that a previously approved plan requires revision, it notifies the system operator to initiate the revision process. **Collaboration with Stakeholders:** The system operator is responsible for the preparation of the network development plan for each year in which it requires approval or revision. The plan must be submitted for public consultation by 31 March of the same year. The consultation period must last at least one month. Following the incorporation of comments, suggestions, and observations received during the consultation, the network development plan is submitted by the system operator to the RAEWW for approval by 30 June of the same year. Along with the comments from the consultation process, the submission includes a description of the project's needs, financing method, and economic efficiency. **Public Consultation and Transparency:**

Country	Specific details
	The RAEWW holds the discretion to introduce amendments to the network development plan if deemed necessary. The approval of the plan must be granted by the RAEWW before 30 September of the same year. Once approved, the network development plan is made accessible to the public on the system operator's website.
Italy	**Regulatory Oversight and Approval:** The DSO and TSO submit network development plans to NRAs for approval.
	Collaboration with Stakeholders: The NRAs, DSOs, and TSOs collaborate in the planning process of the development plan.
	Public Consultation and Transparency: Customers are consulted during tariffication and access-to-network regulation revisions.
	Alignment with National Policies: Plans must align with regulatory requirements and national energy objectives.
Jordan	**Collaboration with Stakeholders:** The Energy and Minerals Regulatory Commission (EMRC) collaborates with the Ministry of Energy, TSO, and DSO for energy efficiency plans.
	Alignment with National Policies: The EMRC ensures alignment with national energy efficiency initiatives.
	Performance Monitoring and Reporting: The EMRC monitors the plan's progress and implementation.
	Long-term Sustainability: The stakeholders involved collaborate on energy efficiency initiatives.
Lebanon	**Collaboration with Stakeholders:** Stakeholder consultation is essential for transparent insight into the network development process.
	Public Consultation and Transparency: Public consultation is emphasised in the planning process.
	Alignment with National Policies: Plans must align with governmental policies for implementation.
	Long-term Sustainability: The plan's long-term sustainability goals include reducing network losses and enhancing efficiency.

Country	Specific details
Montenegro	**Involvement of System Operators:** System operators produce investment and development plans, which are then approved by the regulator.
	Public Consultation and Transparency: Drafts of the plan are published for public consultation.
	Performance Monitoring and Reporting: The regulator approves the final draft based on the results of the public hearing.
Morocco	**Regulatory oversight and approval:** The Autorité Nationale de Régulation de l'Electricité (ANRE) are in charge of approving the pluriannual investment programme in the national electricity transmission network and its interconnections, as well as any modification brought to it. The ANRE shall follow up on the implementation of the TSO and DSO's investment programmes (Article 03, law 48-15).
	Involvement of the system operator: The transmission system operator (TSO) in Morocco draws up a pluriannual investment programme in the national electricity transmission grid and the interconnections, covering the five years to come. Regarding distribution activities, every operator of the electricity distribution network shall, on a yearly basis, communicate to the ANRE the pluriannual investment programme of the distribution activity planned for the five years to come, as duly approved by its deliberative body. Any modification to the investment programmes should be communicated to the ANRE (Article 03, law 48-15).
	Alignment with National Policies: Investment plans and programmes must be aligned with regulatory requirements and national objectives. They can be adjusted to consider new circumstances likely to significantly impact the electricity network during the five years under consideration.
	Energy Efficiency and Loss Reduction: The development plans aim to improve quality, reduce power losses, and optimise the network for renewable energies.
	Performance Monitoring and Reporting: The national TSO shall elaborate on the quality indicators that the national electricity transmission grid must meet in terms of security, reliability, and efficiency. The ANRE shall approve these indicators prior to their implementation.

Country	Specific details
	The DSOs shall elaborate on the quality indicators for the medium voltage electricity distribution network in terms of security, reliability, and efficiency. The DSOs will then communicate these indicators to the ANRE. The ANRE follows up and reports on the performance of the quality indicators of the transmission and distribution networks in its annual activity report (Article 12, law 48-15).
Portugal	**Public Consultation and Transparency:** In Portugal, network development plans are presented to the NRA and the Directorate-General for Energy and Geology (DGEG). The DGEG promotes consultation with municipalities and regional development and coordination commissions. The NRA conducts a public consultation for 30 days, making information available to the public on its website.
	Alignment with National Policies: The NRA and DGEG ensure that the plans adequately cover investment needs, promote competition, and align with EU-level network development (for the transmission network) or with the transmission network plan (for the distribution network).
	Collaboration with Stakeholders: The NRA and DGEG provide opinions and reports to the network operator, which the operator must consider in preparing the final proposal of the network plan.
	Regulatory Oversight and Approval: The network operator sends its final plan to the DGEG, which then submits it for approval to the ministry responsible for the energy sector. The ministry further discusses the network plan in the parliament.
Palestine	**Collaboration with Stakeholders:** The plans impact market performance and prices.
	Alignment with National Policies: The plans consider governmental policies for implementation.

Table 1. Breakdown of the aspects of network development plans in the Mediterranean region

2.4 Network Access Tariffs

In the realm of network access tariffs, NRAs possess the authority to employ a variety of mechanisms to incentivise market actors towards greater efficiency. One prevalent tool used in multiple Mediterranean countries is the application of cost recovery principles to network access tariffs.

In this report, we have identified several regulatory models used to calculate allowed revenues, as defined in the first chapter.

The implementation of these principles varies from one country to another, and the following graph illustrates how each country employs these principles in their regulatory practices.

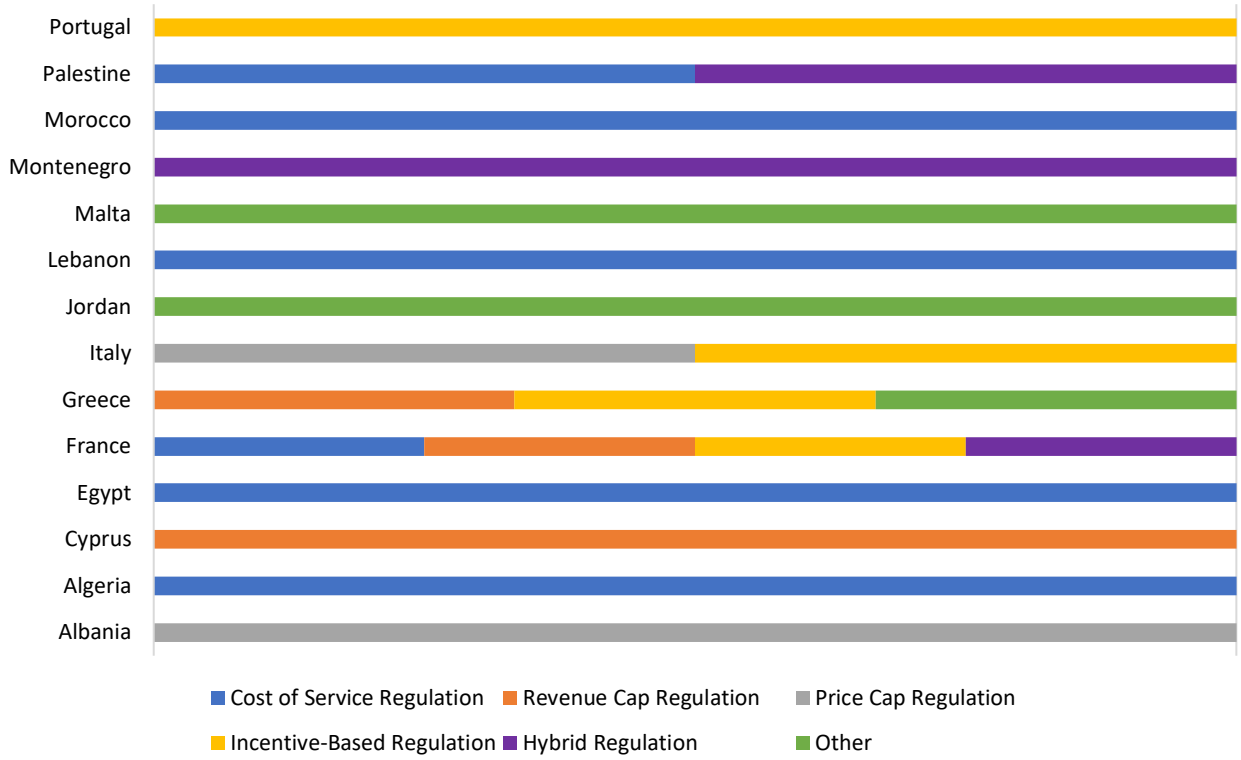


Figure 5. The regulation of network access tariffs in the Mediterranean region

In Malta, the distribution network is not open to third-party access (the derogation from the relevant EU provision is granted by Article 66 of Directive (EU) 2019/944). Therefore, the distribution costs are mainly covered by integrating the retail tariff that covers the wholesale price of electricity, distribution costs, and supply costs. The method applied for the retail tariff is known as cost-plus pricing.

In Jordan, the payment for new connections varies from one consumer category to another: the consumer pays the cost of new connections, as instructed by the EMRC. However, the charges in this instruction do not reflect the actual cost, leaving the EMRC to compensate distributors through the wholesale tariff.

In the case of prosumers, the consumer is responsible for paying the actual connection charges. However, for energy producers or suppliers, the connection is provided free of charge, with the National Electric Power Company (NEPCO) assuming the burden of this cost. It is important to note that this cost is included in the bulk tariff.

Network tariff design involves three basic steps: 1) determination of the allowed revenue of the regulated activity; 2) setting the tariff structure, which entails aligning the tariff components used for consumer billing (e.g. €/kWh, P€/kW) with specific consumer categories (e.g. low-voltage consumers); and 3) allocating the approved revenue to the components of the tariff structure.

It is imperative to establish tariff prices that align with the structure of the marginal costs of each regulated activity and enable the recovery of allowed revenues. The design of these tariffs, including billing variables, should be guided by the principles of tariff uniformity (so that the tariff system in place is universally applicable to all clients) and non-discrimination towards the energy's end-use. This means that all tariff options should be available to all consumers.

Different billing variables, such as energy-based charges or power-based charges, may be used for the main price signal of the cost model.

Tariffs should recover all the "efficient" costs associated with each activity, possess several billing variables that convey accurate price signals to consumers, and hold price structures adherent to marginal or incremental costs. Thus, the correctly defined tariffs may induce the efficient use of energy and other associated resources.

Time-of-use tariffs offer more advantages when compared to flat tariffs. In time-of-use tariffs, prices vary according to the time the service is used (e.g. by peak/off-peak, season, month, weekdays, weekends, hour) to encourage consumers to use electricity at times when more is available at a lower price, thus supporting a more flexible and sustainable electricity system. Therefore, tariffs should be higher in periods when the network utilisation is closer to its peak and vice versa. This enables consumers to benefit from lower prices under time-of-use tariffs, particularly if they can shift their electricity use, which offers significant benefits for both them and the system.

Time-of-use tariffs can be categorised as either static, where they are predefined, or dynamic, which allows for near real-time adjustments to accurately reflect the current system conditions. The primary purpose of implementing time-of-use tariffs is to ensure the cost reflectiveness of the network charges. However, it is crucial to have compatible meters installed to enable the utilisation of these tariff options.

In order to assess the benefits of time-of-use tariffs, countries should conduct pilot tests. For example, Portugal conducted a pilot project (2018/2019) to study changes to the time-of-use structure of the network tariff for large consumers (Very-High Voltage (VHV), High Voltage (HV), and Medium Voltage (MV)). The new time of use that resulted from the project is characterised by a stronger signal in the peak periods and time-of-use schedules with regional differentiation (separating the grid into three areas). This tariff was projected to earn a net benefit of 50 million euros over a time horizon of 23 years, predominantly due to the reduction or postponement of network investments.

Time-of-use tariffs can be included in the energy-based component or power-based component or both.

In Portugal, network access tariffs are charged to all electricity consumers for the use of the public service electricity network infrastructure. Generally speaking, these tariffs are paid by suppliers on behalf of their customers and passed on in the final price. The revenues generated from regulated activities are recovered through specific tariffs, each with its own tariff structure. These tariffs are characterised by a set of billing variables. The Energy Services Regulatory Authority (ERSE) approves the following access tariffs: Global Use of the System, Use of the Transmission Network at VHV and HV, and

Use of the Distribution Networks at HV, MV, and LV. The billing variables are capacity, active energy, and reactive energy.

The access tariff prices for each billing variable are determined by adding up the corresponding tariff prices per activity. Given that the tariffs contributing to this sum are based on marginal costs, an efficient use of resources is promoted and cross-subsidisation between consumers is avoided. This calculation methodology facilitates a detailed knowledge of the various tariff components by activity or service. Thus, each customer can be aware of exactly how much they pay for a given service (for example, for the use of the HV distribution network) and how that amount is considered in terms of billing (in the referred example, billing variables are capacity and active energy). Additionally, this methodology brings about transparency regarding the determination of revenues and tariffs by the regulator.

For Cyprus, the overarching objectives of tariff regulation are to maximise the long-term competitiveness of the Cypriot economy, protect the interests of consumers in the short and long term against prices established on a monopoly basis, meet public service obligations, safeguard the security of electricity supply, and promote the energy efficiency and quality of the services provided by the licensees. The tariffs are set ex-ante, and in some instances, adjustments are made on an ex-post basis based on the principles set out in the Tariff Methodology (Regulatory Decision 01/2021). The proposals and decisions about tariffs are evidence-based and formulated after thorough consultation with the parties concerned. CERA determines the allowed revenue in accordance with the periodic regulatory review and the aforementioned objectives of each generation activity by a dominant generator, transmission system ownership, transmission system operation, distribution system ownership, distribution system operation, and supply by a dominant supplier.

In Greece, different systems are applied for the determination of network tariffs. In particular, for the gas TSO (DESFA) and the electricity DSO (HEDNO), a cost-plus approach is followed. For the gas DSOs (EDA Attikis, EDA THESS, DEDA, and HENGAS) and the electricity TSO (IPTO), a revenue cap methodology is employed. An incentive mechanism for electricity, “Projects of Major Importance,” has been established, which refers to projects that the regulator acknowledges as having significant economic benefits for the network or market. If these projects are successfully completed within their planned schedule, the network operator may be eligible to receive a Weighted Average Cost of Capital (WACC) premium ranging from 0.5% to 2% for a period of four to seven years. This decision by the RAEWW serves as an incentive for the DSO to pay the project’s implementation cost and ensure its timely completion. The objective is to consider the overall benefit that the project will bring to the network users and evaluate its impact on distribution network charges. However, in case of delays in the implementation of the project, the RAEWW retains the authority to potentially reduce the level of the WACC premium.

- **Challenges to implementing effective network access tariffs**

There are several challenges or barriers to implementing effective network access tariffs in the Mediterranean region, such as regulatory complexity, stakeholder resistance, lack of investment incentives, political interference, limited data availability, and technical complexity.

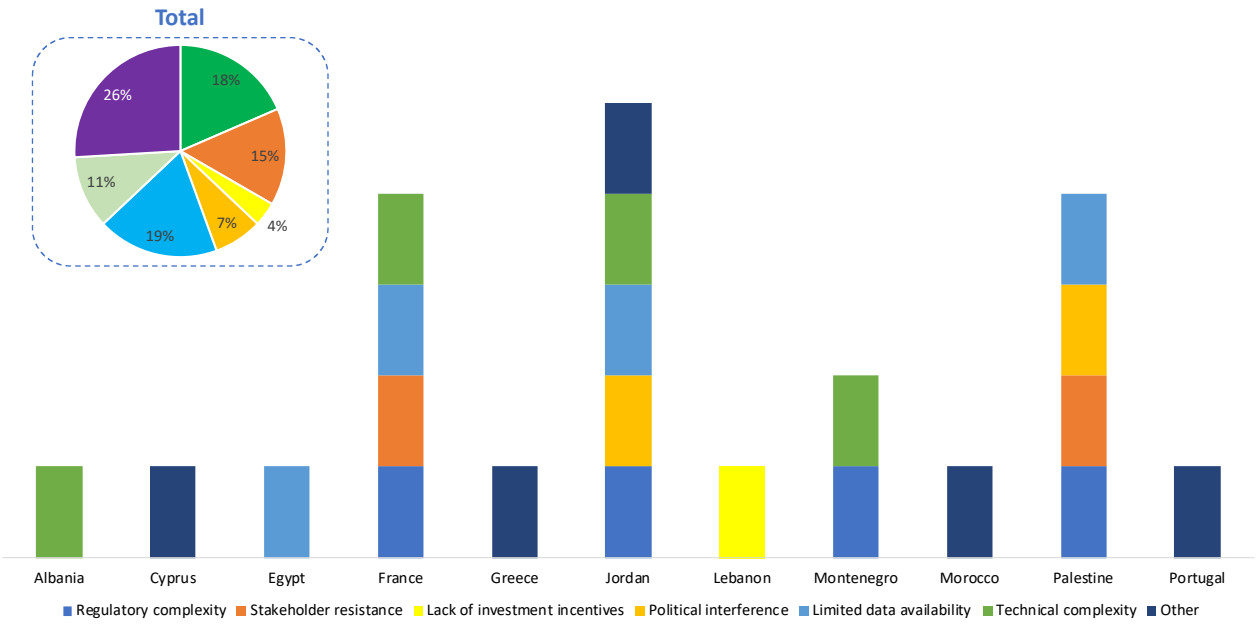


Figure 6. The challenges in the regulation of Network Access Tariffs in the Mediterranean region

In Cyprus, the challenge of implementing cost-of-service regulation stems from the absence of an advanced metering infrastructure and automation devices that provide control over demand-side management. Additionally, the presence of distributed energy resources (DERs) further contributes to the inefficiency of network tariffs. To address this issue, it is crucial to establish a well-operated electricity market that incorporates local flexibility markets and relies on real-time measurements across the whole network. This approach will facilitate the generation of accurate market signals, ultimately leading to the development of cost-effective network tariffs.

In Egypt, a cost-of-service regulation is implemented. The main challenge preventing the implementation of more cost-reflective network access tariffs is the limited availability of data. Currently, the EETC has partnered with a consultancy service to revise the current network charges.

In Greece, one of the key challenges in implementing an effective network is ensuring proper monitoring and auditing of investments by network operators. However, in Italy, no such barriers have been identified. Currently, the Italian regulatory body is in the process of introducing a new tariffication scheme for network usage, known as the "Total Expenditure" (TOTEX) methodology, which aims to establish the allowed revenues for network operators. This new methodology is expected to overcome the "excess investment strategies" that may be prevalent in the traditional tariffication system, which is based on separating current expenditure (price-capped) and investment costs (WACC-oriented). It is also anticipated to enhance efficiency as operators view network operation and development in terms of the end result for the users.

On the other hand, in Montenegro, the implementation of more effective network tariffs faces substantial challenges, both in terms of regulatory and technical complexity. However, the resistance and inertia exhibited by stakeholders (system operators) pose additional obstacles. Although penetration of smart meters is very high in Montenegro (over 80%), there remains an issue concerning the transfer and processing of such vast volumes of data required for more advanced tariffs. A few years ago, the regulator introduced a novel network access tariff model based on the connection capacity driver, which aimed to provide a more cost-reflective approach and ensure a certain income for system operators, as opposed to relying solely on measured energy and peak capacity. However, the implementation of this tariff encountered numerous difficulties. Not all customers had a connection contract that specified this capacity, making it challenging for the DSO to determine the appropriate tariffs. Furthermore, many customers with large connection capacities exhibited minimal utilisation, consuming only a small amount of energy compared to their reserved network capacity. These customers expressed dissatisfaction with the new tariff concept as it would result in an increase in their tariff. However, it is worth noting that their consumption regime actually generated higher costs for the DSO than the customers with higher utilisation rates.

In Lebanon, the first Policy Paper for the electricity sector published in 2010, as well as its update published in 2022, mention the rehabilitation of the grid as one major milestone to be crossed in order to reduce losses (transmission and distribution) and execute reinforcement projects. However, given the lack of investment, the grid has not yet been rehabilitated.

In fact, in 2021, the following was estimated based on the Electricité de France (EDF) report for 2019 and 2020): 18% Technical Losses (TL) and 27% Non-technical Losses (NTL), collection losses around 12% (due to public administrations and refugees failing to pay their bills), and destruction of the National Control Center.

The NEEAP 2016–2020 included different measures related to the improvement of the grid efficiency, such as increasing transformer efficiency, reducing the system's reactive power, modifying the distribution system's voltage level, and installing automated meter reading (AMR).

It is important to note that in the Lebanese case, only electricité du Liban (EDL) is operating the network, which commissioned three Distribution Service Providers (DSPs) to maintain and operate the electricity distribution grid.

In Portugal, all consumers pay the network access tariff, regardless of whether they are in a regulated market or a liberalised market. Access tariffs reflect the cost of infrastructures and all services used by all consumers in a collective manner. This tariff was the result of the sum of the global technical system operation tariff, transmission network tariff, distribution network tariffs, and supplier switching operation tariff. The ERSE defines all these tariffs[7].

[7] Consumers who are still in the regulated market pay the energy tariff and the supply tariff, which are set by the ERSE. In the liberalised market, each supplier defines freely the corresponding value, being in competition with other suppliers.
The government is responsible to define the VAT and other taxes, which are the same across the regulated and liberalised markets.

Besides the grid and system management costs, network access tariffs include, depending on the regulatory framework, additional global system costs related to the clearing of the costs of Contracts for Difference (CfD) established between the electricity system and renewable generation producers. Due to the volatility of the spot market price, the values resulting from the CfD represent a challenge for the settlement of network access tariffs. Additionally, it represents an opportunity to stabilise the market price volatility as those CfD adjustments injected in the network access tariffs partially compensate for the volatility of the electricity price.

In Jordan, we can identify some challenges, such as regulatory complexity due to the intricacy of the existing tariff structure, political interference, and limited availability of data and information necessary for designing and implementing effective network access tariffs. Accurate and up-to-date data on energy consumption, grid infrastructure, and system requirements are crucial for developing fair and efficient tariff structures. Additionally, due to the technical complexity, the lack of advanced grid infrastructure and system automation can present significant challenges to the implementation of effective network access tariffs. Without a robust and automated grid system, it can be difficult to accurately measure and allocate costs, which are essential for determining fair tariffs. Finally, the consideration of energy-efficient technologies and grids in these plans is crucial but can also present additional challenges. Integrating energy-efficient technologies and grids into tariff structures requires careful planning and coordination. This may involve additional investments and upgrades to the existing infrastructure, which can be a barrier due to financial constraints.

In Palestine, several challenges can be identified: regulatory complexity, stakeholder resistance, political interference, and limited data availability.

Lastly, in Malta, the challenges/barriers are not applicable as the distribution network is not open to third-party access.

- **Incentive Regulation:**

Incentive regulation can play a significant role in improving energy efficiency in the energy sector by providing incentives and mechanisms that encourage energy companies to adopt more efficient practices and technologies.

In the Mediterranean region, several approaches are used in this aspect. The following chart presents an overview of the mechanisms used to improve energy efficiency.

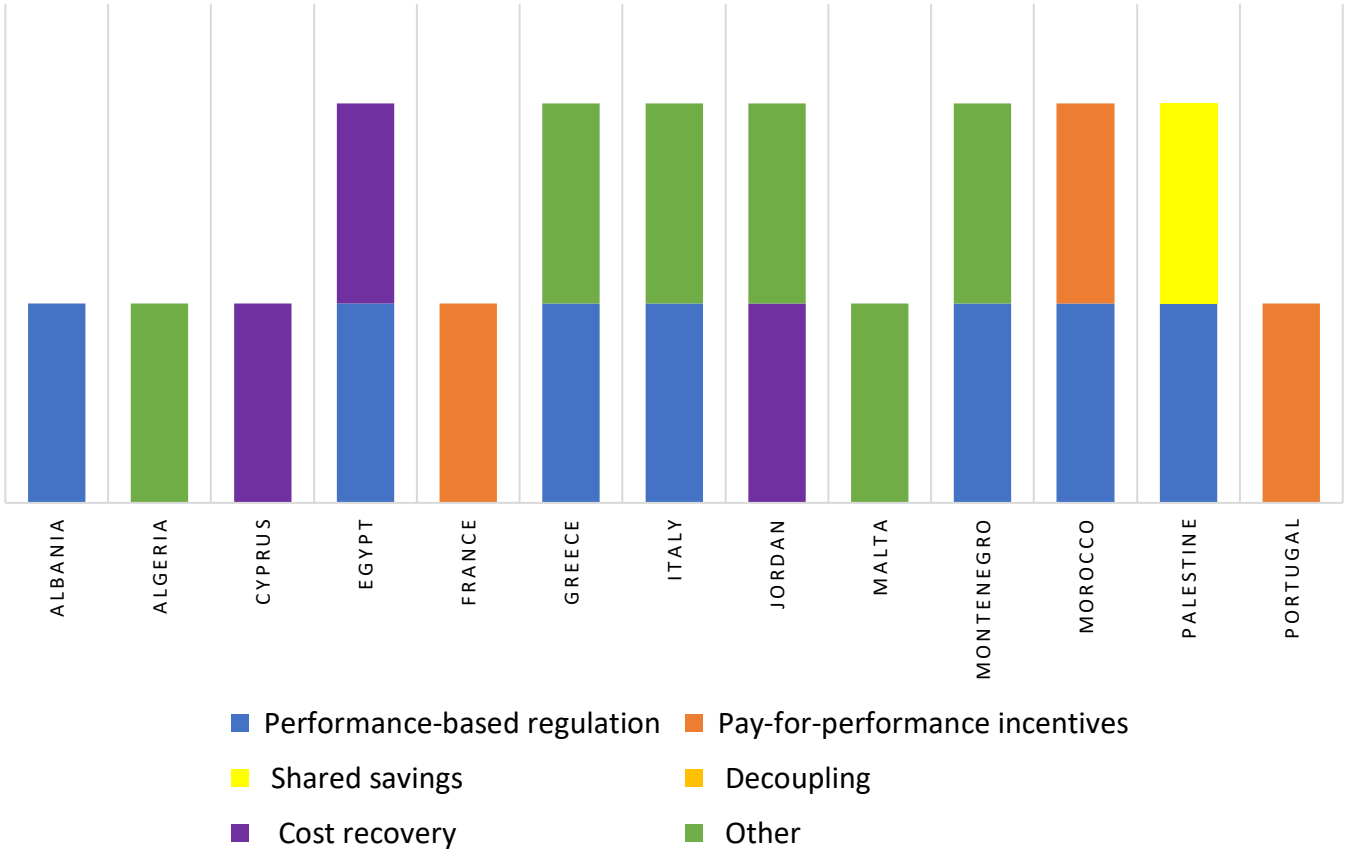


Figure 7. The approaches to Incentive Regulation in the Mediterranean region

In some cases, incentive regulation is not used due to the nature of the regulation used in the network tariff. In Algeria, the network access tariffs are set by the CREG on the basis of the calculation of the required income, which includes the operating and maintenance costs that the relevant network operator will incur to reduce TLs (joule losses, undistributed energy due to line overload, network separation, etc.) and NTLs (metering errors, etc.), increase network reliability, and so on. The same goes for Morocco, where the ANRE applies the cost-of-service regulation.

In Greece, in addition to the performance-based regulation (PBR) approach, three other approaches are used:

- Profit Orientation: Under the traditional cost-of-service regulation, network operators can recover their expenses and secure a predetermined rate of return on their investments. However, this system might not motivate operators to prioritise energy efficiency since their profits increase when they make more investments in infrastructure. On the other hand, incentive regulation provides operators with the opportunity to enhance their earnings by enhancing efficiency and minimising costs. This creates an incentive for them to embrace energy-saving measures and implement advanced technologies aimed at reducing energy consumption.
- Performance-Based Incentives: Incentive regulation often employs performance-based mechanisms, such as PBR or revenue cap regulation. These mechanisms link financial rewards

or penalties to specific performance targets. Energy efficiency targets can be set, and operators receive bonuses for exceeding them or face penalties for falling short. This drives operators to focus on energy-saving strategies to maximise their returns.

- Demand-side Response Initiatives: Incentive regulation may provide opportunities for operators to develop and implement demand-side management programmes. These programmes encourage consumers to use energy more efficiently by offering them incentives or rebates for reducing consumption during peak hours or adopting energy-efficient technologies. Network operators benefit from reduced demand, which can lead to cost savings and better network performance.

Italy's energy efficiency framework assigns objectives to electricity and gas distributors to reduce energy consumption, rewarding them with tradable energy efficiency certificates (white certificates) per saved ton of oil equivalent. These certificates can be traded on the market, and non-obliged operators can earn and sell them as well. These certificates are managed by the Italian Power Exchange (GME), which incentivises efficient actions, with targets for distributors serving over 50,000 customers, ensuring compliance and encouraging energy savings.

In Jordan, in addition to the cost recovery, the EMRC provides incentives for the continued improvement of the technical and economic efficiency with which the services are provided and for the continued improvement of service quality.

Similarly, in Montenegro, performance-based incentives are supported by a hybrid regulatory model for transmission and distribution tariffs, dividing costs into three categories influenced differently by TSO/DSO: 1. controllable costs, incentivising savings; 2. partially controllable costs; and 3. uncontrollable costs. The efficiency factor affects cost determination for the next period based on realised vs. determined costs and technology factors. PBR, introduced recently, ties TSO/DSO revenue to service quality (Average Interruption Time (AIT)/ System Average Interruption Duration Index (SAIDI) indicators), which provides rewards or penalties based on the deviation from targets up to a cap.

On the other hand, Malta does not implement any incentive regulation. Instead, the model used is cost plus regulation.

In terms of best practices for implementing incentive regulation to encourage energy efficiency in the mentioned countries of the previous figure, establishing clear and measurable performance targets and designing appropriate incentive mechanisms while ensuring transparency and accountability prove to be the most recurrent best practices, as shown in the figure below:

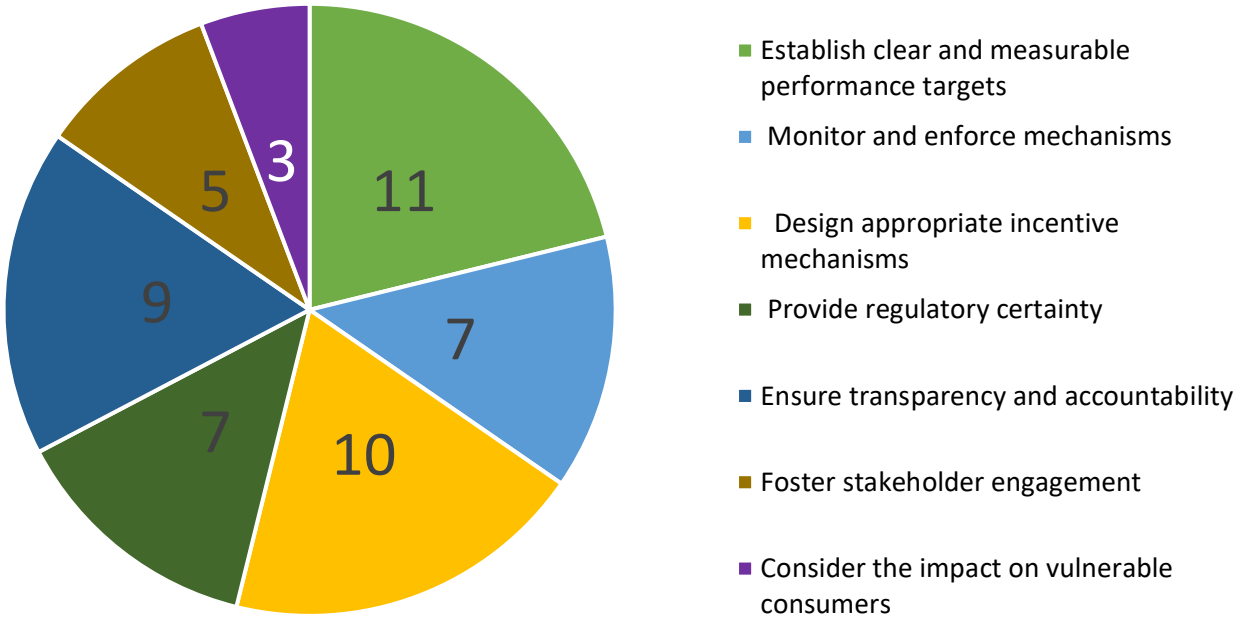


Figure 8. Incentive Regulation best practices in the Mediterranean region

Additionally, the Greek regulator recommends promoting research and innovation, adapting the global and EU energy transition targets (RepowerEU), maintaining dynamic regulation, and taking oriented decisions. This ensures flexibility in the regulatory framework to adapt to changing circumstances and new energy efficiency technologies.

However, NRAs face many challenges when implementing incentive regulation in their energy market. The most relevant are related to the regulatory complexity, lack of data, and resistance to change, as depicted in the figure below:

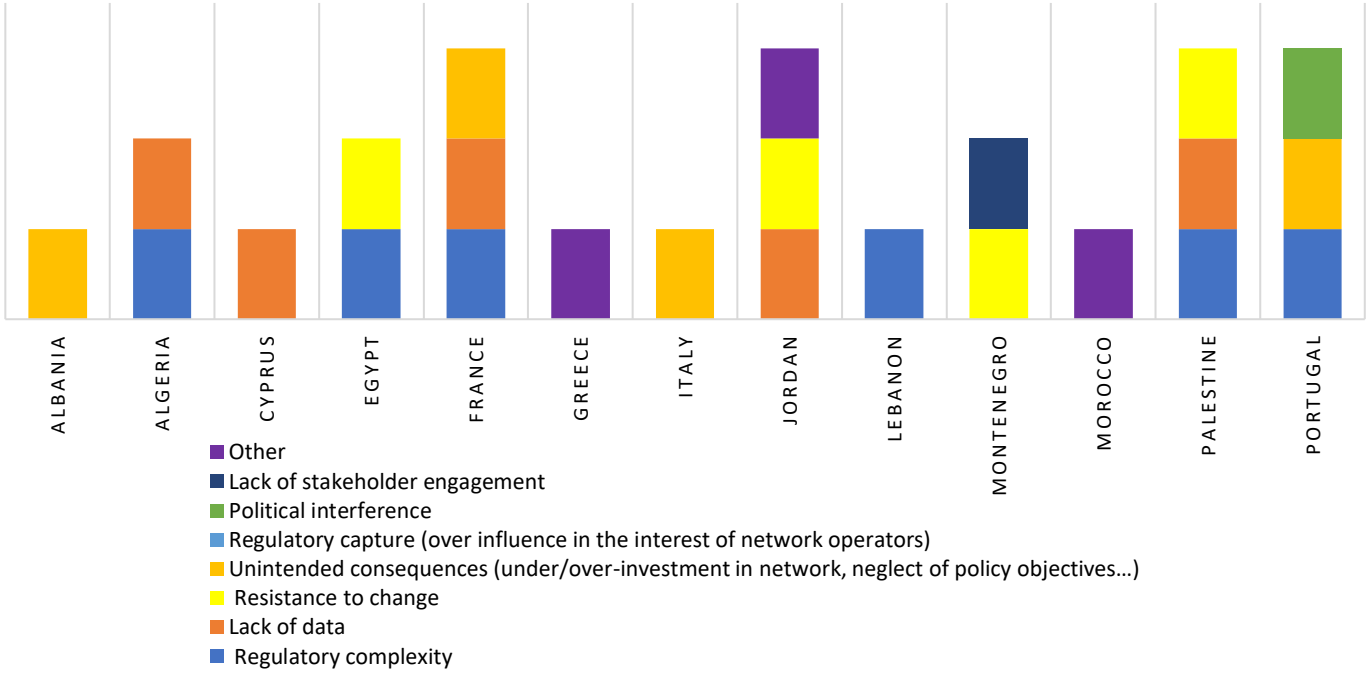


Figure 9. Challenges to implementing the incentive regulation

It is worth mentioning that, in some cases, other challenges have been listed. One of these cases is in Jordan, where the limited financial resources and funding available for implementing incentive regulation poses an additional challenge.

In Greece, the monitoring and auditing of investments by network operators make up the primary challenge when it comes to implementing efficient incentive regulation. In Morocco, as stated above, the methodology for setting the tariff for the use of the national transmission network adopted is cost-of-service regulation, which is the first tariff to be fixed by the ANRE. Therefore, Morocco currently has no experience in terms of incentive regulation to assess any concrete challenges.

3

REGULATORY TOOLS ON THE DEMAND SIDE

The demand side of energy efficiency encompasses a range of mechanisms and tools that focus on reducing energy consumption through changes in consumer behaviour and preferences. These tools aim to increase consumer awareness and encourage the adoption of more efficient technologies and practices, ultimately leading to reduced energy consumption and lower greenhouse gas emissions.

The demand side targets a majority of energy users and sectors, including transport, building, industry, and agriculture.

One of the key demand-side mechanisms is energy labelling, which provides consumers with information on the energy efficiency of appliances and other products. This information can help consumers make informed decisions and select products that utilise less energy, reducing energy consumption and lowering energy bills.

Other demand-side tools include smart building appliances, which can be automated to ensure the well-being of the building occupants while minimising their energy consumption and bills. This type of technology, in addition to increasing the energy efficiency of households, can help address the "duck curve" problem that is being exacerbated by erroneous consumer behaviours in most countries. Energy audits can identify areas of energy waste and provide recommendations for the improvement and implementation of these technologies. Public education campaigns can raise awareness among consumers about energy efficiency and promote behavioural change. Energy efficiency standards should be used to set minimum requirements for the energy efficiency of products and appliances.

In addition, demand-side tools can also include financial incentives, such as rebates or tax credits, which can encourage consumers to adopt more energy-efficient technologies and practices. These incentives can help offset the upfront costs of more efficient technologies, making them more accessible and attractive to consumers.

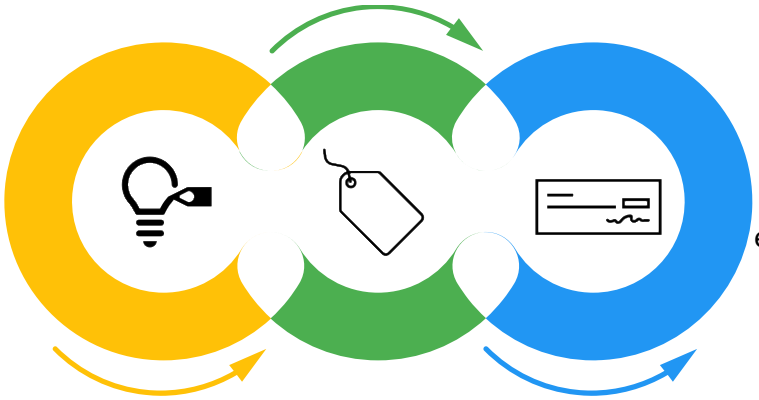


Figure 10. Demand-side mechanisms

In the pursuit of enhancing energy efficiency from the demand-side perspective, the benchmarking reports compiled by the RES WG provide invaluable insights into the approaches and strategies of various countries. These reports delve into key aspects of energy consumption, tariff structures, and energy performance regulations, shedding light on the methods employed to promote sustainable energy practices. Within the framework of each section, a series of essential subtitles contribute to a comprehensive understanding of energy efficiency mechanisms. These subtitles encompass topics such as energy tariff structures, utilisation of energy bills as tools for energy conservation, indicators for monitoring the impact of energy efficiency measures, energy mix disclosure on bills, and the role of certified guarantees of origin (CGOs). Additionally, the reports elaborate on green energy offers, including minimum requirements and the role of regulatory bodies in verifying their effectiveness.

Enti Rregullator i Energjisë (ERE) – ALBANIA

1. ENERGY BILLING

a. Energy tariff structure and the average energy tariff value for 2022:

In Albania, energy tariffs are regulated for different consumer categories. For low-voltage consumers and those supplied by the supplier of last resort, the following tariffs are imposed:

- The tariff for household consumers is 9 euro cents per kWh (VAT excluded).
- The tariff for non-household consumers is 14 euro cents per kWh (VAT excluded).

The energy tariff structure includes the following components, as detailed in the figure below:

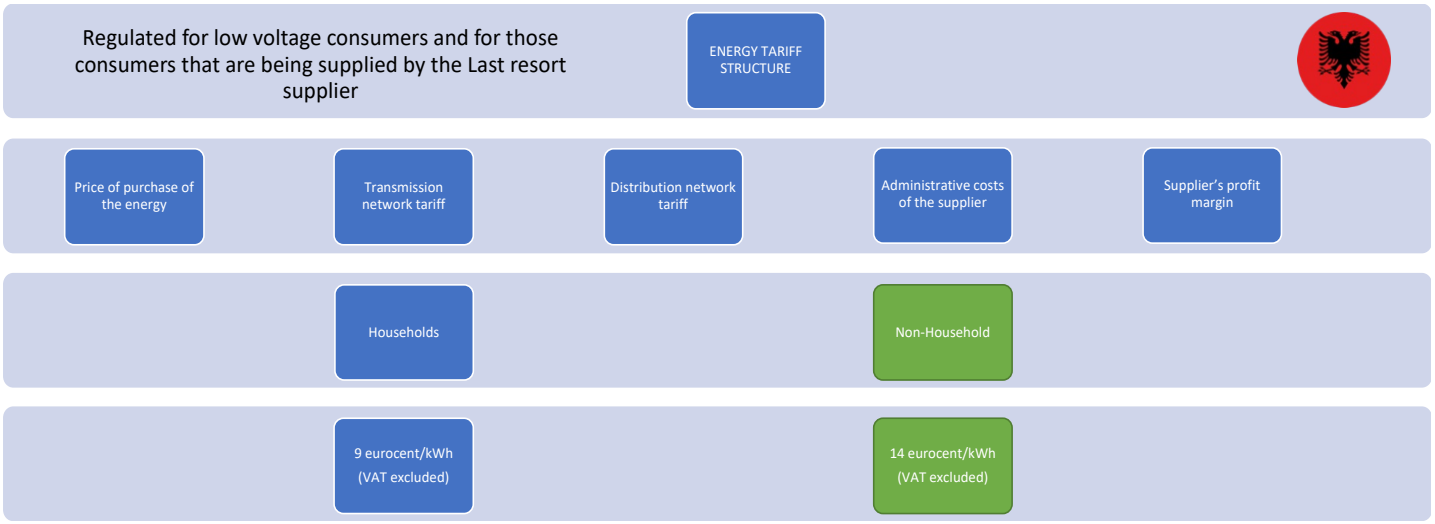


Figure 11. Energy tariff structure in Albania

b. Encouraging energy efficiency through energy bills:

Energy bills can be used as a tool to encourage energy efficiency by educating consumers on how to save money on their energy bills through efficient energy use. The average energy bills are used as an indicator in Albania to monitor the impact of energy efficiency.

c. Energy mix disclosure on bills:

- Methods for disclosing the energy mix on bills:

No specific information is provided regarding the methods for disclosing the energy mix on bills in Albania.

- Using certified guarantees of origin:

The benefits of using CGOs include providing accurate and transparent information on the origin of consumed energy, particularly regarding energy from renewable sources.

2. GREEN OFFERS

a. Minimum requirements for green energy offers:

This is not applicable in Albania.

b. Role of NRAs in verifying green energy offers:

In terms of green energy offers, NRAs may play a role in monitoring claims and enforcing regulations to ensure transparency and compliance.

3. ENERGY LABELLING OF BUILDING AND APPLIANCES

a. Energy performance of buildings:

- Guidance on tools/mechanisms:

Tools and mechanisms available to assess the energy performance of buildings in Albania include the Energy Performance Certificates (EPCs).

- Minimum rules:

The minimum requirements for energy performance of buildings in Albania call for compliance with EPCs.

- Monitoring and verification:

Compliance with energy performance rules can be monitored and verified through Energy Audits.

b. Energy labels for appliances:

- Guidance on tools/mechanisms:

The NRA does not have a role in the energy labelling for appliances in Albania.

- Minimum rules:

There are no specific minimum requirements for energy labels for appliances in Albania.

- Monitoring and verification:

The NRA also does not have a role in monitoring and verifying compliance with energy label rules for appliances in Albania.

Commission de Régulation de l'Électricité et du Gas (CREG) – ALGERIA

1. ENERGY BILLING:

a. Energy tariff structure and the average energy tariff value for 2022:

The structure of the energy tariff in Algeria was established by the CREG in the Decision D/22-15/CD of 29 December 2015 on the setting of electricity and gas tariffs[8].

The tariff differs depending on the nature of the consumers, as explained in the following scheme:

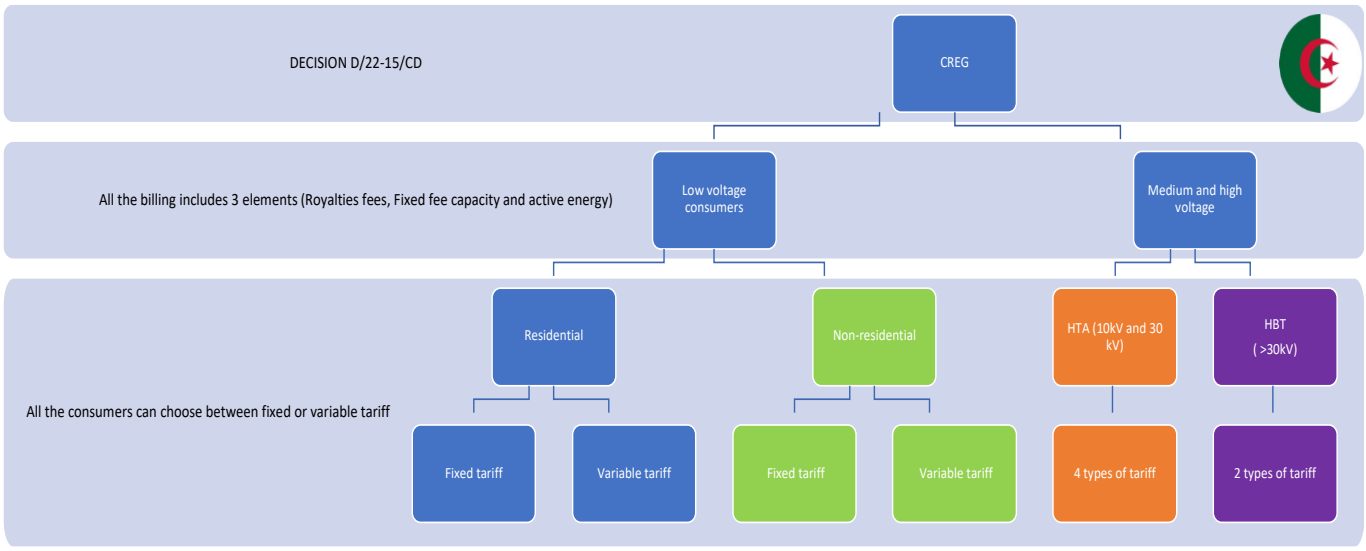


Figure 12. Energy Tariff structure in Algeria

The average energy tariff value for 2022 reached 394,38 cda(Centimes de Dinar Algerien)/kWh, which is equivalent to 0,0268 euro/kWh (at an exchange rate of 1 euro = 146,80 dinars).

b. Encouraging energy efficiency through energy bills:

The energy bills encompass information encouraging energy efficiency for the household customer by displaying the price per kWh per consumption bracket. This information is printed with the aim of encouraging the customer to reduce consumption.

For industrial customers, the energy bill includes a charge for reactive power and maximum power consumption, which are both monitored by a fixed threshold. This threshold is set to encourage industrial customers to regulate their consumption. If the threshold is exceeded, a penalty is imposed.

Additionally, the billing of maximum power consumption during peak load periods encourages customers to spread out their consumption and avoid peak power calls.

Moreover, the tariffs include an incentive system to reduce reactive energy consumption in the form of a bonus for reactive energy not consumed below 50% and a penalty if this threshold is exceeded.

[8] Available on the CREG website: https://creg.dz/tarification/decisions-tarifaires/

Furthermore, a tax is charged to industrial companies with excessive energy consumption. This tax is used to feed a national fund set up to develop renewable energies and energy-efficient products.

c. Energy mix disclosure on bills:

- Certified Guarantees of Origin for transparent information:

The current certification of origin system was initially designed to facilitate the provision of incentives by the state. However, it does not currently require information on the energy mix supplied to the end customer. There is now a consideration to introduce a certification system that aligns with international practices.

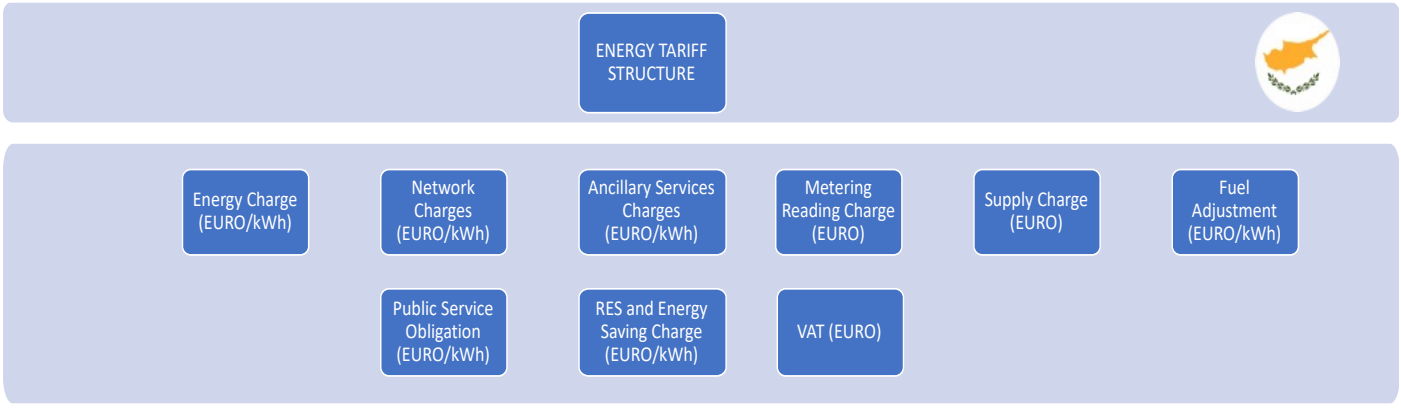
The rest of the benchmarking process is not applicable to the CREG as it falls outside their scope of responsibility.

Cyprus Energy Regulatory Authority (CERA) – CYPRUS

1. ENERGY BILLING:

a. Energy tariff structure and average energy tariff value for 2022:

The energy tariff structure in Cyprus includes the components outlined in the figure below. The average energy tariff value for 2022 is not available.



b. Encouraging energy efficiency through energy bills:

Increasing awareness of seasonal energy demand and providing end-users with access to illustrative comparisons of their consumption levels along with energy tips can potentially lead to consumers adopting a more energy-efficient approach.

c. Indicators monitoring energy efficiency impact:

For the time being, there are no performance indicators related to energy conservation.

2. ENERGY MIX DISCLOSURE ON BILLS:

a. Methods for disclosing energy mix on bills:

In Cyprus, the energy mix is presented as the fuel mix, which encompasses renewable generation. This information is provided in a comparison manner, indicating the contribution of energy sources from your supplier to the overall fuel mix of Cyprus. This information is presented on the back page of the electricity bill.

b. Certified Guarantees of Origin for transparent information:

According to the laws regarding the promotion and encouragement of the use of RES and the promotion of the cogeneration of electricity and heat, the creation and operation of an electronic registry is required through which the Guarantees of Origin of Production from RES and Cogeneration Electric Energy (CHP) will be issued, transferred, and cancelled.

CERA, by its Decision No 857/2013, published in the Official Newspaper of the Republic of Cyprus on 15 March 2013, sets the Transmission System Operator of Cyprus (TSOC) as the Authorised Issuer for the purpose of issuing CGOs for Electricity. These certificates are produced by RES for production facilities connected to both the transmission and distribution systems. Under the legislation, the TSOC is also the authorised issuer for all high-efficiency cogeneration plants.

3. GREEN OFFERS

a. Minimum requirements for green energy offers:

A guarantee of origin must specify at least:

(a) the energy source from which the energy was produced and the start and end dates of production,

(b) the identity, location, type, and capacity of the installation where the energy was produced,

(c) whether the installation has benefited from investment support and whether the unit of energy has benefited in any other way from a national support scheme, and the type of support scheme,

(d) the date on which the installation became operational, and

(e) the date and country of issue and a unique identification number.

Guarantees of Origin (GOs) enable final consumers to choose any type of electricity generation under the confidence that the electricity they receive will be from renewable sources. This provides a line of security and trust not only for the consumers but also for those who have environmental concerns. To this end, GOs promote RES and, subsequently, energy efficiency.

b. Role of NRAs in verifying green energy offers:

In order to ensure objectivity, transparency, and impartiality of the procedure for issuing, modifying, revoking, transferring, and cancelling guarantees for the origin of electricity from RES, CERA regulates, observes, monitors, controls, and oversees the functioning of the original guarantee system operated by the TSOC. Additionally, CERA determines the necessary measures to improve the procedure through regulation or provides correction guidelines. No challenges have been identified in the case of Cyprus.

4. ENERGY LABELLING OF BUILDINGS AND APPLIANCES:

a. Energy performance of buildings:

As a competent authority, the Ministry of Energy, Commerce and Industry (MECI) has published a report on the "Calculation of cost-optimal levels of minimum energy performance requirements for buildings in accordance with Article 5 of Directive 2010/31/EU on the energy performance of buildings," which helps interested stakeholders in identifying and addressing related issues with building energy efficiency. In addition, MECI has published the "Building Energy Performance Calculation Methodology" and the "Building Thermal Insulation Guide (2nd edition)" to determine the energy performance calculation method that must be followed by all qualified Experts for issuing the Building Energy Efficiency Certificate. The software programme SBEMcy is available free of charge from the Energy Service for calculating the energy efficiency of a building and issuing a Building Energy Efficiency Certificate.

- Minimum rules for the energy performance of buildings:

The requirements are set based on a specific energy performance methodology followed according to the National Law of 2021 on the "Regulation of Energy Efficiency of Building", by which a Building Energy Efficiency Certificate is issued.

The methodology considers parameters such as the annual primary energy consumption of the building or building unit per square meter of total useful surface (floor) and the ratio of the actual building's annual primary energy consumption from conventional energy sources to its annual primary energy consumption reference building. Moreover, parameters related to the annual carbon dioxide emissions of the building or building unit per square meter of total useful surface (floor), as well as the percentage of the annual total primary energy consumption of the building or building unit per square meter of total useful surface (floor) covered by RES and conventional energy sources are determined. The specific minimum requirements can be found in the link below (in Greek).

https://energy.gov.cy/assets/entipo-iliko/Διάταγμα%20Απαιτήσεων%20Ελάχιστης%20Ενεργειακής%20Απόδοσης%202020%20.pdf

- Monitoring and verification of building energy performance:

In accordance with Regulation 19(3/b) of the Energy Efficiency of Buildings (Building Energy Efficiency Certificate) Regulations of 2009 and 2014 (K.D.P. 164/2009 and K.D.P. 39/2014), an inspection of the building related to a Building Energy Efficiency Certificate can be carried out by certified independent licensed inspectors. The inspector shall report back to the competent authority with specific recommendations.

b. Energy labels for appliances:

In the case of Cyprus, energy labels are mandatory for all appliances and their supplier according to the National Law of 2021 on the "Labelling of Energy Efficiency, Energy Consumption and other resources by energy-related products during their use". According to this law, the Energy Service of the Ministry is the competent authority. The Energy Service informs the stakeholders through awareness campaigns

on any updates related to energy labels using reliable information. In case a complaint is filed for a specific product or there are reservations related to a specific product, the competent authority can enter any premises where a product is available for sale or other premises and inspect products which are available at such premises or other premises, including products offered for sale remotely or via the internet.

- Minimum requirements for energy labels for appliances:

Energy Efficiency is clustered by letters from A to G, where Class A (green) consumes the least energy and Class G (red) consumes the most. Currently, the top-class A remains vacant to make room for the more energy-efficient devices that will be produced in the future. To derive the energy efficiency, the annual energy consumption of the products is estimated and compared with similar products and then added to the corresponding energy class. This energy class, together with the other information included on the label (other resources such as water consumption, noise, volume, etc.), helps consumers choose products with high energy efficiency. The labels cover 16 product categories, with most appliances coming under household appliances. The energy label covers appliances with the greatest energy-saving potential, which consume most of the household's energy.

- Monitoring and verification of energy label rules:

In the event of a violation of any provision of this National Law on the "Labelling of Energy Efficiency, Energy Consumption and other resources by energy-related products during their use" and/or delegated acts, the competent authority has the power to impose administrative fines to the supplier or administrative person, taking into account the nature, gravity, and duration of the violation.

Electric Utility and Consumer Protection Regulatory Agency (Egypt ERA) – EGYPT

1. ENERGY BILLING:

a. Energy tariff structure and average energy tariff value for 2022:

The Egyptian energy tariff structure[9] involves key components, including Operating Expenses (OPEX), Depreciation, and Regulatory Asset Base multiplied by the Return on Rate Base, which collectively forms the Revenue Requirement. The specifics of this structure are detailed in the methodology accessible on the regulator's website. The energy tariff values for 2022/2023 are segmented for Residential, Commercial, and Heavy Industries. For Residential customers, the tariff is stratified into tiers based on consumption levels[10].

[9] http://egyptera.org/ar/download/pdf/cost_of_service_methodology.pdf
[10] http://egyptera.org/ar/Tarrif2022N.aspx

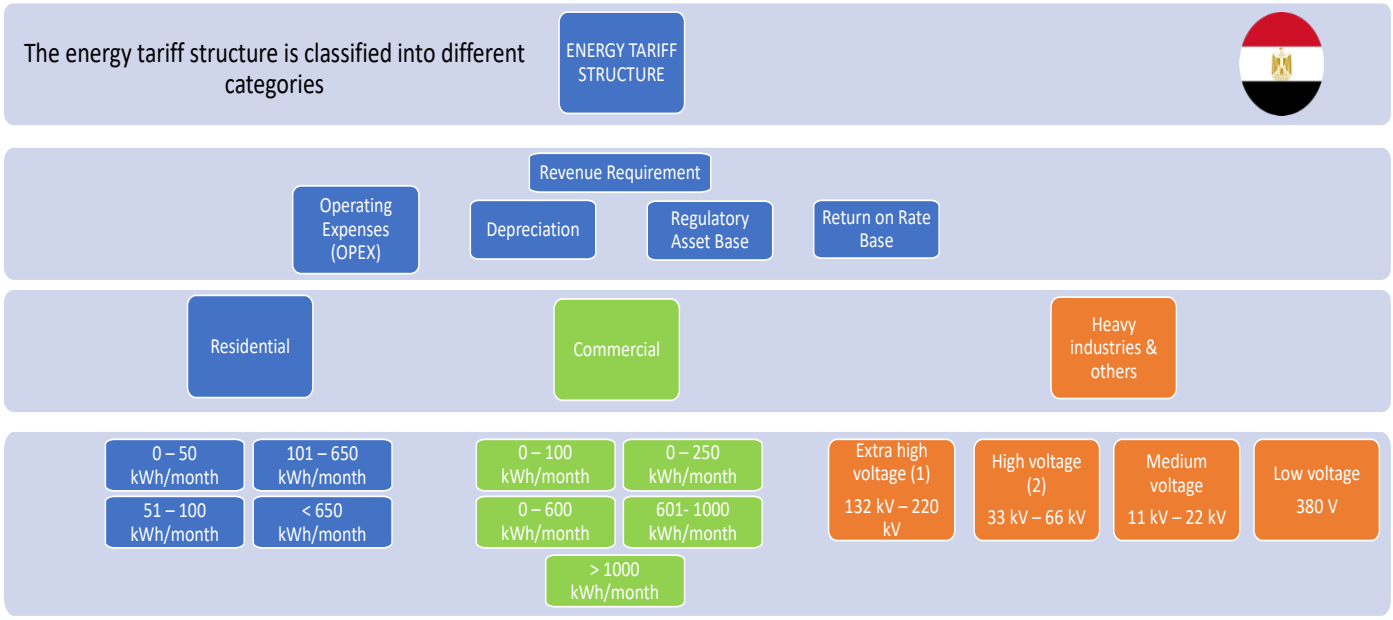


Figure 13. Energy Tariff structure in Egypt

The residential sector, for the category >650 kWh, is classified into:

A. from 0 to and below 1000 kWh,
B. from 0 to and above 1000 kWh.

Additionally, the revenue requirement is added to the figure, giving the impression that it is part of the structure, but they are components, not a classification, that can be omitted or represented in another form.

b. Encouraging energy efficiency through energy bills:

Egyptian electricity bills contain energy conservation tips on their reverse side. However, the bills do not include information about the energy mix, including RES. Incorporating the true cost of energy and highlighting subsidies could assist customers in reducing their energy consumption.

c. Indicators monitoring energy efficiency impact:

EgyptERA employs average energy bills as the primary indicator of monitoring energy efficiency implementation. Customer feedback and interactions on EgyptERA's Facebook page also contribute to promoting awareness, offering insights on how customers can decrease consumption to reduce bills.

2. ENERGY MIX DISCLOSURE ON BILLS

a. Methods for disclosing energy mix on bills:

Currently, the energy mix is not displayed on the bills.

b. Certified Guarantees of Origin for transparent information:

As per Egypt's Electricity Law 87/2015, EgyptERA is responsible for issuing Certificates of Origin. Although preparations, such as training and regulations, are underway, the system is yet to be

implemented. Moreover, the Ministry of Environment collaborates with the organisation to ensure carbon credit certificates do not overlap with the Certificates of Origin.

3. GREEN OFFERS

c. Minimum requirements for green energy offers:

Egypt aims to achieve 42% of its total production from RE by 2030. Schemes promoting RE exist, including licenses, requirements, and regulations on EgyptERA's website. A 2023 regulation permits the New and Renewable Energy Authority (NREA) to sell RE production. Additionally, the development of a PV-HUB website simplifies access to PV plants. EgyptERA facilitates the sale of RE from NREA to the end-users for various purposes.

d. Role of NRAs in verifying green energy offers:

EgyptERA and NREA jointly oversee and verify green energy offers. EgyptERA enforces regulations and monitors claims, while NREA allocates land for these offers.

4. ENERGY LABELLING OF BUILDINGS AND APPLIANCES

c. Energy performance of buildings:

Multiple tools and mechanisms assess building energy performance, including EPCs, building energy modelling, audits, green building certification, and smart building technologies.

- Minimum rules for energy performance of buildings:

Buildings should adhere to Building Energy Codes. However, pursuing a green building certificate is optional.

- Monitoring and verification of building energy performance:

Article 48 of Electricity Law 87/2015 mandates subscribers with over 500 KW contractual capacity to appoint officials for improved power usage efficiency. The subscribers' compliance is monitored through energy audits, energy performance indicators, and building energy management systems.

d. Energy labels for appliances:

Energy labels for appliances were established through cooperation between the NREA, the United Nations Development Program (UNDP), and local regulations. The labels communicate monthly energy consumption and efficiency levels, aiding consumers in selecting energy-efficient products.

- Minimum requirements for energy labels for appliances:

Energy labels for appliances indicate the Energy Efficiency class based on consumption as well as provide product information.

- Monitoring and verification of energy label rules:

Market surveillance, manufacturer audits, import inspections, label verification, and consumer complaints all contribute to monitoring and verifying energy label compliance. Penalties for non-compliance are stipulated in Electricity Law 87/2015, Article 51.

Commission de Régulation de l'Energie (CRE) – FRANCE

1. ENERGY BILLING

a. Structure of the current energy tariff and average energy tariff value for 2022:

In France, the retail electricity price components include the following:

- Fixed costs, such as network access, regulated by the CRE,
- Variable costs, including electricity generation or supply cost, commercial costs, and supplier's profit margin,
- Contributions and taxes, including the Transmission Tariff Contribution (CTA) and the Electricity Public Service Contribution (CSPE) that are used to finance specific pension entitlements and the costs of electricity provision as a public service, respectively,
- Taxes on end electricity consumption (TCFE) determined by municipalities and administrative departments,
- VAT at different rates based on the subscribed capacity.

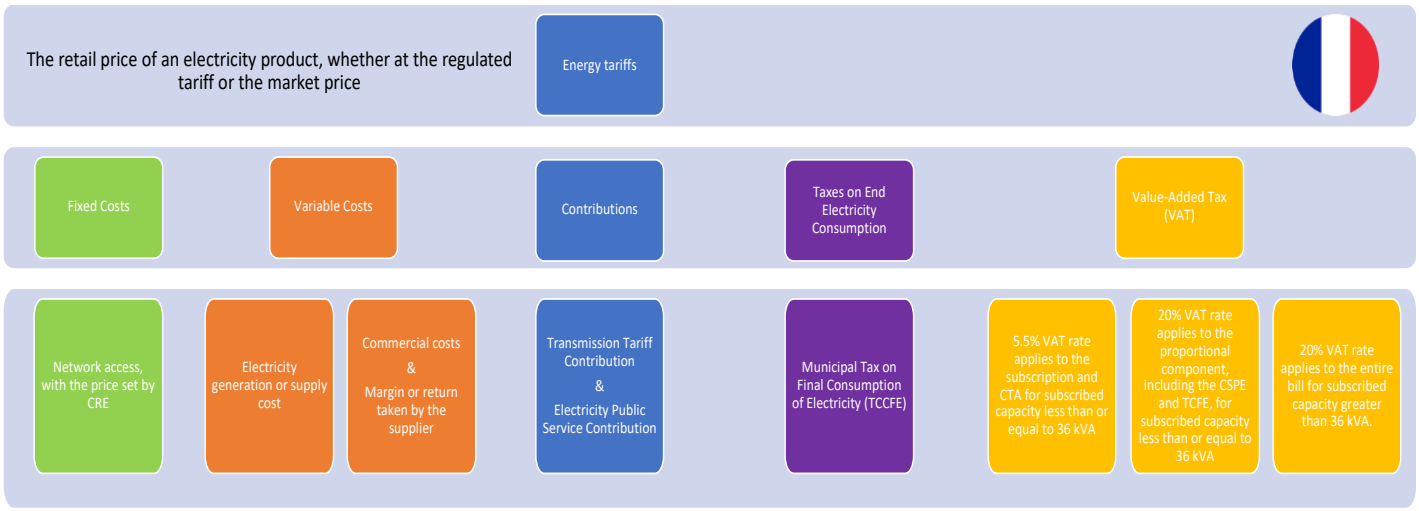


Figure 14. Energy Tariff structure in France

The average energy tariff value for 2022 is not available.

b. Indicators for monitoring energy efficiency impact:

This is not applicable to France.

2. ENERGY MIX DISCLOSURE ON BILLS

a. Methods for disclosing the energy mix on bills:

France uses various methods for disclosing the energy mix on bills:

- **Fuel Mix Disclosure:** Invoices indicate the various primary energy sources used to produce the electricity supplied to end consumers, along with the respective contribution of each source over the preceding year.
- **Carbon Intensity Disclosure:** Information on the quantity of carbon dioxide or radioactive waste generated from the production of 1 kWh by all the primary energy sources used is made available to customers.
- **Renewable Energy Certificate Disclosure:** Guarantees of Origin (GOs) are used to prove the renewable origin of energy produced from renewable sources, ensuring transparency in green offers.
- **Difference in Effectiveness:** All these methods are complementary and efficient in fulfilling their objectives. GOs, in particular, are used to guarantee the green origin of energy and provide accurate and transparent information to consumers. They also play a role in financing the development of RES.
- **Responsibility of Stakeholders:** The main stakeholders and their responsibilities are outlined below:
    - **NRA (CRE):** The CRE is involved in the surveillance of the retail market, assessing and providing consultation on energy market operations.
    - **Ministry:** The ministry is responsible for establishing the regulatory framework as well as monitoring and evaluating the mechanism, including designating the independent body maintaining the national register of GOs.
    - **Operator of the Register:** The operator is responsible for issuing, transferring, and cancelling GOs, maintaining an electronic register of GOs, and ensuring transparency and accuracy in the GO mechanism.
    - **TSO-G or DSO-G:** These entities provide data related to biogas production certificates for monitoring and verifying GOs.
    - **Users:** Those involved in GO-related operations must open an account, and all operations related to GOs must be recorded electronically on the register.

3. GREEN OFFERS

a. Minimum requirements for green energy offers:

The requirements for green energy offers encompass distinguishing different types of energy on websites, ensuring RES are certified by GOs, and adhering to specific criteria defined by regulations. The certified RES are defined to include various types of RES.

b. Role of NRAs in verifying green energy offers:

The National Energy Ombudsman is responsible for implementing and updating the comparator of energy prices, which includes essential information regarding GOs to ensure transparency and inform consumers about the green origin of energy.

4. ENERGY LABELLING OF BUILDING AND APPLIANCES

The CRE does not have a role in the energy labelling of buildings and appliances.

Regulatory Authority for Energy, Waste and Water (RAEWW) – Greece

1. ENERGY BILLING

a. Energy tariff structure and average energy tariff value for 2022:

Greece does not offer any incentives for consumers to use their energy more efficiently. The tariff structure is given below:

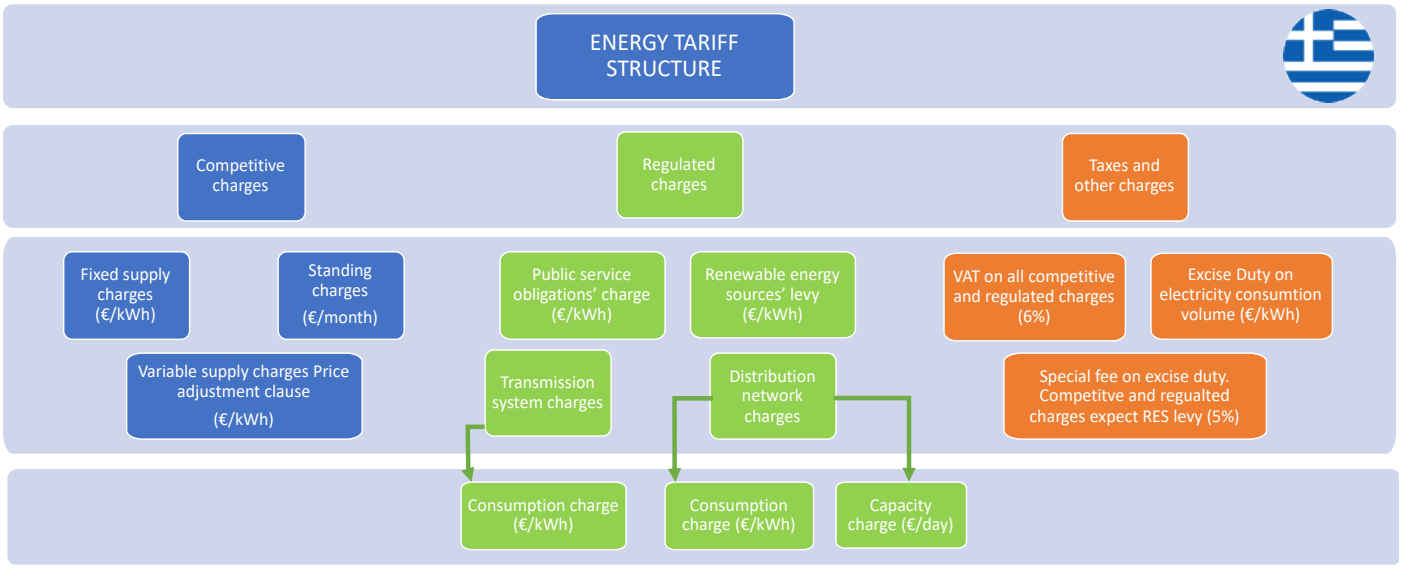


Figure 15. Energy Tariff structure in Greece

b. Energy efficiency incentives in energy billing:

Currently, in Greece, there are no energy efficiency initiatives or dynamic spot offers provided to consumers by the energy suppliers concerning the demand response to price signals due to the lack of smart meter rollout. However, in 2022, the RAEWW approved a bill template that all suppliers are anticipated to gradually adopt. This bill provides additional information to consumers, increasing transparency and enhancing the simplicity of the charges and contractual obligations. Most importantly, it enhances the comparability of the suppliers' offers. In the future, when smart meters and energy initiatives become available in the market, these templates will be amended to fit into the new market specificities.

c. Indicators for monitoring energy efficiency impact:

Such energy efficiency indicators are not monitored by the RAEWW.

2. ENERGY MIX DISCLOSURE ON BILLS

a. Methods for disclosing energy mix on bills:

The disclosure of fuel mix and carbon intensity is made available to Greek consumers. Particularly, Article 48 (2) of Law 4001/2011 states the following: "The suppliers shall provide the customers with the following information either through the consumption bill and pricing information, directly or by reference to a specific source, or in a separate document attached to the consumption bill, regarding: (a) The contribution of each energy source to the total fuel mix of the respective Supplier in the previous year, in an understandable and clearly comparable manner, both at the national level and at the level of the Supplier, if the Supplier operates in more than one Member State of the European Union; (b) Information on the environmental impact, at least in terms of CO2 emissions, resulting from the production of electricity from the Supplier's overall fuel mix in the preceding year."

b. Certified Guarantees of Origin for transparent information:

Certified GOs offer a valuable means of providing accurate and transparent information about the origin of consumed energy. These GOs function as a tracking and verification system for renewable energy production sources. When a renewable energy facility generates electricity, it is issued one GO for each megawatt-hour (MWh) of electricity produced, which can be traded separately from the electricity itself. GOs contribute to transparency and accuracy in energy consumption information by the following means: 1) Proof of Renewable Source: GOs act as credible proof that a specific quantity of electricity was generated from renewable sources, such as wind, solar, hydro, or biomass. Through GOs, consumers and businesses can verify that the energy they utilise comes from environmentally friendly and sustainable sources, thereby effectively encouraging the adoption of cleaner energy options; 2) Traceability: Each GO is uniquely identified, enabling a clear trace of the RE's origin back to the exact facility where it was generated. This robust traceability ensures the reliability of information about the energy source, preventing any potential false claims; 3) Disclosure and Compliance with National, EU, and Global Rules: GOs empower energy suppliers and distributors to openly disclose the proportion of RE in their energy mix. This transparency enables consumers to make informed decisions based on the environmental impact of their energy consumption; 4) Monitoring Renewable Energy Targets: For nations like Greece, which have established RE targets, GOs serve as a valuable tool for tracking progress towards these goals. Stakeholders can monitor the percentage of RE within the overall energy supply and identify areas where further investment in renewable infrastructure may be necessary; 5) Financial Support for Renewable Projects: The sale of GOs generates additional revenue for RE producers. This financial influx can be reinvested in expanding and establishing new RE projects, further propelling the growth of clean energy generation; 6) Harmonisation with Green Initiatives: Utilising GOs aligns with global efforts to combat climate change and transition towards a low-carbon economy. Companies and countries showcasing their commitment to using RE through GOs can enhance their environmental credentials and contribute to worldwide sustainability objectives.

In accordance with Article 118 of Law 4001/2011, as added by Article 97 of Law 4512/2018, the RES and GOs Operator (DAPEEP) is designated as the competent authority for the calculation of the total fuel mix of each electricity supplier and the residual fuel mix of the country, as well as for the monitoring of

the use of GOs for suppliers' disclosure of the origin of electricity to consumers, as provided for in the Code of the RES and GOs Operator (DAPEEP Code).

In accordance with the provision of Article 118A (3) of Law 4001/2011 and as provided for in Article 19 (2) of Chapter 5 of the DAPEEP Code, the RAEWW shall define by its decision the implementation details regarding the calculation of the country's Residual Energy Mix and the Energy Mix of Suppliers, upon the recommendation of the RES and GOs Operator.

3. GREEN OFFERS

a. Minimum requirements for green energy offers:

Retail green energy offers are not yet regulated and, therefore, have no minimum requirements.

b. Role of NRAs in verifying green energy offers:

NRAs could play a crucial role in verifying and overseeing green energy offers to ensure their accuracy, reliability, and compliance with relevant national and EU regulations. There are many responsibilities and challenges that they may be faced with in this role. One of the most important roles that NRAs could undertake is claim verification. Regulators could verify the claims made by energy suppliers regarding the green and renewable nature of their energy offers. This involves confirming the authenticity of certifications, such as Certified GOs, and ensuring that the energy sources declared are indeed renewable.

Consumer Protection is always one of the goals of the NRAs, as they must protect consumers from deceptive practices and false advertising related to green energy offers. They should confirm that consumers receive accurate and transparent information about the origin of the energy they are purchasing.

Since their inception as a concept, NRAs have been aiming to promote the integrity of the energy market: in particular, regulators could play a role in maintaining market integrity by monitoring and preventing greenwashing – the practice of making false or misleading claims about the environmental benefits of products or services.

Regulatory authorities could monitor energy suppliers to ensure they comply with the requirements and standards for offering green energy. This includes checking that the percentage of RE matches the claims made and ascertaining that RE certificates are properly accounted for.

NRAs can encourage the adoption of green energy by creating supportive policies, offering incentives, and facilitating the integration of RES into the national energy grid.

Challenges:

One of the major challenges that authorities are faced with regarding green offers is verification complexity. Validating the renewable origin of energy can be complex and may require access to data from multiple sources, including energy producers, grid operators, and certification bodies.

Accurate data on the energy mix and sources can also be challenging to obtain, especially when dealing with cross-border energy transactions. Many regulatory authorities may lack the resources, expertise, or technology to effectively verify and oversee green energy offers. The lack of standardisation and harmonisation of legislation between countries may also pose an additional challenge to information gathering. The absence of uniform standards across different countries and regions can hinder the consistent verification and comparison of green energy offers.

Ensuring compliance with green energy regulations can sometimes be difficult, and penalties for non-compliance may not be sufficient to deter deceptive practices.

As the energy sector evolves, new technologies and business models may emerge, creating additional challenges in verifying the green credentials of energy offers. Additionally, there are greenwashing risks as unscrupulous actors may attempt to misrepresent their products as green, making it essential for regulators to remain vigilant and responsive to potential greenwashing practices.

Addressing these challenges requires collaboration among regulatory authorities, energy market participants, certification bodies, and relevant stakeholders. By implementing effective verification processes and promoting transparent information, NRAs can foster trust in green energy offers, stimulate renewable energy adoption, and contribute to global sustainability efforts.

4. ENERGY LABELLING OF BUILDING AND APPLIANCES

a. Energy performance of buildings:

The energy performance of buildings is not applicable in Greece.

b. Energy labels for appliances:

The energy performance of appliances is not applicable in Greece.

Autorità di Regolazione per Energia Reti e Ambiente (ARERA) – ITALY

1. ENERGY BILLING

a. Energy tariff structure and average energy tariff value for 2022:

The Italian energy tariff structure comprises an energy component in the total amount paid by customers, which is determined by suppliers in the liberalised energy market. A “protected market” serves households without a chosen supplier, which is expected to conclude by 2023. From 2024, all customers should select a market supplier, ending regulated NRA pricing. The electricity prices for different quarters (2022–2023) vary based on hourly pricing (M, F1, F23). In 2022, the average regulated peak/off-peak tariff for households was 0,38 EUR/kWh, aligned with high wholesale market electricity prices (304 EUR/MWh).

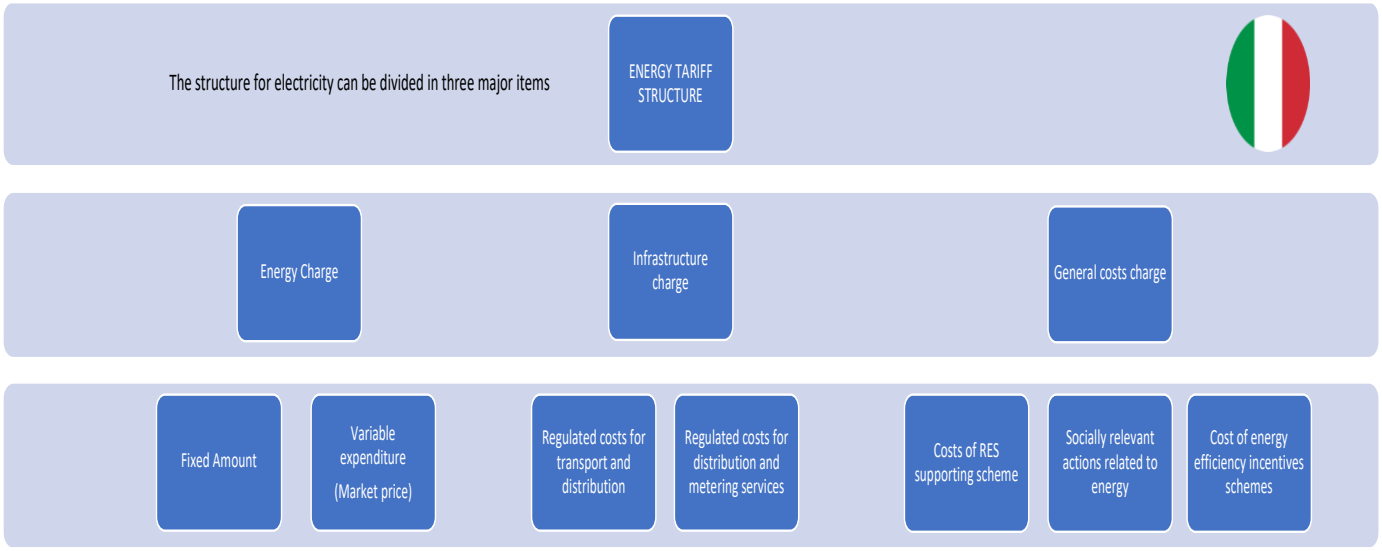


Figure 16. Energy Tariff structure in Italy

2. Energy efficiency incentives in energy billing:

Energy prices serve as inherent energy efficiency incentives. However, the shift to "fixed component-oriented" tariff systems and prior low energy prices hindered efficiency awareness. The NRA has addressed this by promoting initiatives guiding consumption models that factor in energy efficiency. For instance, tariff regulation permits customers to use off-peak hours for electric vehicle (EV) charging in order to substantially reduce fixed component charges. This measure benefits systems where EV charging necessitates meter updates, thus reducing customer costs.

3. Indicators for monitoring energy efficiency impact:

The savings potential of projects in the Energy Efficiency Certificates scheme is showcased through certificates awarded to them based on achieved energy savings. The Gestore dei Servizi Energetici (GSE) monitors projects "before" and "after" implementation, evaluating success and certificate issuance appropriateness.

4. ENERGY MIX DISCLOSURE ON BILLS

a. Methods for disclosing energy mix on bills:

The EU and national legislation mandate energy providers to disclose the primary fuel mix of produced and sold electricity on bills. The GSE calculates the fuel mix on the basis of producer and supplier information, accounting for the origin of imported electricity and origins warranties for RES-generated "green" electricity.

b. Certified Guarantees of Origin for transparent information:

GOs inform consumers of the "green" origin of labelled electricity. The GSE, in line with EU Directive 28/2009, issues GOs for RES-generated electricity, verifying their use. Suppliers offering "green energy" must obtain GOs equivalent to sold green MWhs, securing green energy authenticity.

5. GREEN OFFERS

a. Minimum requirements for green energy offers:

No specific minimum requirements exist for "green offers" in a free electricity marketplace where suppliers can provide RES-generated electricity contracts. Green energy offers are not explicitly linked to energy efficiency; instead, efficiency relies on specific regulations, incentives, and price dynamics.

b. Role of NRAs in verifying green energy offers:

Green energy requirements are minimal, with the obligation to accompany labelled green energy with Origin Guarantees overseen by the GSE as per NRA regulations. The GSE maintains a GOs Register for each RES-generated MWh, ensuring a balance between green electricity sold and produced.

6. ENERGY LABELLING OF BUILDING AND APPLIANCES

a. Energy performance of buildings:

Building energy performance is assessed via audits releasing EPCs, which are necessary for property transactions and grant requests.

- Minimum rules for energy performance of buildings:

Regulated by the EU Directive 2010/31/EU, building energy performance aligns with international standards and EU Green Deal goals.

- Monitoring and verification of building energy performance:

Properties lacking compulsory EPCs face penalties. Real estate managers and agencies receive fines for failing to disclose the energy performance class in property ads.

b. Energy labels for appliances:

- Guidance on tools/mechanisms for energy labels:

EU Delegated Regulation n. 340 of 2020 establishes energy labelling requirements, introducing the European Product Registry for Energy Labelling (EPREL) EU-wide database for easy QR-code-based verification.

- Minimum requirements for energy labels for appliances:

These minimum requirements are defined in the EU regulation, with Italy having energy labels for appliances since 1998.

- Monitoring and verification of energy label rules:

The monitoring and verification of energy label rules come under the purview of ministerial authority.

Energy and Minerals Regulatory Commission (EMRC) – JORDAN

1. ENERGY BILLING

a. Energy tariff structure and average energy tariff value for 2022:

The structure of Jordan's current energy tariff and the average energy tariff value for 2022 are outlined in the official tariff guide provided by the EMRC[11]. The average tariff value for 2022 is 0,1166 EUR/kWh, which is equivalent to 0,091 Jordanian Dinars (JD) per kWh. The following figure only includes the main categories. For further details, please refer to the tariff guide published by the EMRC.

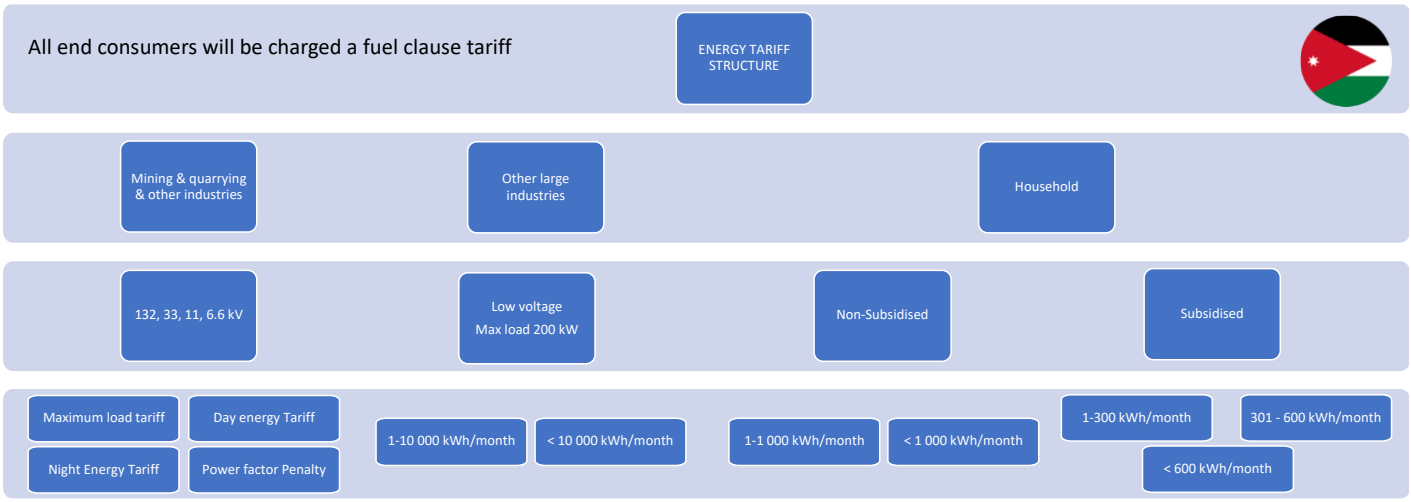


Figure 17. Energy Tariff structure in Jordan

b. Energy efficiency incentives in energy billing:

Energy bills can serve as effective tools to encourage energy efficiency. Implementing best practices in energy bill design can motivate consumers to adopt energy-efficient behaviours. These key strategies include:

- **Consumption Information:**

Providing clear consumption data, historical usage, and comparisons to averages empowers consumers to identify areas for energy-saving improvements.

- **Time-of-Use Tariffs:**

Introducing time-linked electricity tariffs, like the recently implemented time-of-use tariff in Jordan, encourages energy use during off-peak hours, balancing the grid load.

- **Comparative Feedback:**

Offering consumers comparative feedback on their energy usage compared to peers can inspire competition and efficiency.

- **Incentives and Rewards:**

Incorporating incentives, rebates, or discounts for energy-saving efforts can drive consumer engagement.

c. Indicators for monitoring energy efficiency impact:

[11] https://emrc.gov.jo/echobusv3.0/systemassets/tarrifguide-0.pdf

Several indicators help regulators monitor the impact of energy efficiency measures on energy bills in Jordan:

- Average Energy Bills
- Energy Consumption per Capita
- Energy Intensity
- Energy Savings
- Customer Feedback

2. ENERGY MIX DISCLOSURE ON BILLS

a. Methods for disclosing energy mix on bills:

Energy mix disclosure is not currently practised on bills in Jordan.

b. Certified Guarantees of Origin and energy origin transparency:

The concept of CGOs to provide transparent information about the energy consumed is not applicable in Jordan.

3. GREEN OFFERS

a. Minimum requirements for green energy offers:

Jordan promotes RE self-consumption through programmes like the Electric Power Wheeling Scheme and Net Metering. These programmes guide large consumers and individual users in developing RE projects, reducing energy costs and increasing competitiveness.

b. Role of NRAs in verifying green energy offers:

The EMRC enforces regulations for interconnecting RE systems and monitors compliance with established guidelines. These monitoring activities include overseeing Distribution Companies (DISCs) to ensure adherence to procedures and facilitating the development of RE and energy efficiency measures.

4. ENERGY LABELLING OF BUILDING AND APPLIANCES

a. Energy performance of buildings:

Several tools and mechanisms are available to assess the energy performance of buildings in Jordan:

- **Energy Performance Certificates:**

EPCs provide comprehensive insights into a building's energy use, systems, and equipment.

- **Energy Monitoring Systems:**

These systems utilise sensors and meters for real-time energy consumption tracking and optimisation.

- **Green Building Certification Systems:**

These certification systems recognise and rate building sustainability through frameworks like Leadership in Energy and Environmental Design (LEED) or Estidama.

- Minimum rules for energy performance of buildings:

The Jordanian Energy Conservation Building Code (ECBC) sets minimum energy efficiency standards for buildings. Jordan is working to align its codes with international standards and best practices to enhance energy efficiency.

- Monitoring and verification of energy performance rules:

Energy audits serve as a tool to monitor and verify compliance with energy performance rules for buildings.

b. Energy labels for appliances:

- Guidance on tools/mechanisms for energy labels:

Jordan's Ministry of Energy and Mineral Resources (MEMR) leads the Jordan Energy Labelling Program (JELP). JELP utilises standardised labels for appliances, displaying energy efficiency ratings and consumption information.

- Minimum rules for energy labels for appliances:

Energy labels in Jordan include essential information such as energy efficiency class, energy consumption, product details, and noise levels. Jordan has aligned its labelling programme with the EU's energy labelling system.

- Monitoring and verification of energy label rules:

The MEMR cooperates with the Jordan Standards and Metrology Organization (JSMO) to conduct inspections, testing, and market surveillance to verify compliance with energy efficiency standards and maintain the reliability of energy labels.

Lebanese Center for Energy Conservation (LCEC) – LEBANON

1. ENERGY BILLING

a. Energy tariff structure and average energy tariff value for 2022:

In November 2022, Lebanon removed all subsidies from electricity tariffs, resulting in significant increases in energy bills for end-users. The tariffs are differentiated based on consumption levels. For consumptions lower than 100 kWh per month, the tariff was increased to 0,1 USD/kWh, whereas consumptions exceeding 100 kWh per month are charged at 0,27 USD/kWh. Additionally, a fixed monthly rehabilitation fee of 4,3 USD and a fee of 0,21 USD per ampere subscribed is imposed. Bills are paid in Lebanese Pounds (LBP), and the exchange rate is linked to the Sayrafa rate plus 20%. This increase in tariffs led to users considering the termination of their subscriptions. The board of directors of the Electricité du Liban (EDL) later reduced the rehabilitation tariff and energy charges for consumption above 100 kWh.

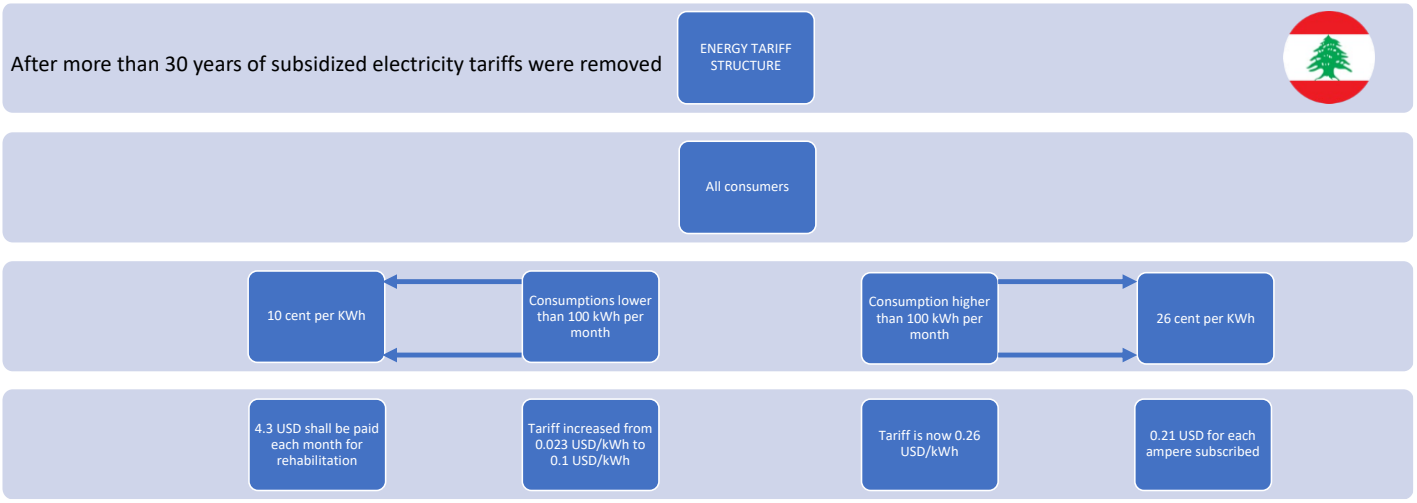


Figure 18. Energy Tariff structure in Lebanon

b. Using energy bills to encourage energy efficiency:

The increase in tariff rates resulted in significant changes in user behaviour, leading to the increased installation of solar photovoltaic (PV) systems and the adoption of energy-efficient appliances, especially air conditioners.

c. Indicators for monitoring energy efficiency impact:

Due to supply shortages, Lebanon does not have indicators to monitor the impact of energy efficiency measures on energy bills.

2. ENERGY MIX DISCLOSURE ON BILLS

Energy mix disclosure is not applicable in Lebanon, but International Renewable Energy Certificates (IRECs) are promoted, with the LCEC as the national issuer.

3. GREEN OFFERS

a. Minimum requirements for green energy offers:

Amid supply shortages and subsidy removal, Lebanon's solar PV sector experienced substantial growth, with 663 MW installed in 2022. Quality control initiatives and the emergence of new companies address the demand for solar PV. The demand for energy-efficient products, primarily air conditioners, is notable, although overall energy behaviour shifts are observed due to high costs and supply constraints.

b. Role of NRAs in verifying green energy offers:

Market surveillance, quality control through the Industrial Research Institute (IRI), and a pending Energy Conservation law are the established mechanisms for monitoring products and promoting energy efficiency in Lebanon.

4. ENERGY LABELLING OF BUILDING AND APPLIANCES

a. Energy performance of buildings:

Currently, energy performance assessment tools and mechanisms are not mandatory in Lebanon. However, once the Energy Conservation law is approved, energy audits and certificates for buildings will become mandatory. Rating systems such as LEED, Building Research Establishment Environmental Assessment Method (BREEAM), and High Environmental Quality (HQE) exist in the market.

- Minimum rules for energy performance of buildings:

Lebanon is awaiting the approval of the Energy Conservation law to establish minimum rules for the energy performance of buildings.

- Monitoring and verification of energy performance rules:

Currently, energy performance rules are non-mandatory and, thus, not applicable. However, energy audits are usually performed.

b. Energy labels for appliances:

- Guidance on tools/mechanisms for energy labels:

Energy labels are currently not applicable in Lebanon as the country is awaiting approval for the Energy Conservation law. However, it is important to note that Imported appliances retain their original labels (e.g. EU labels).

- Minimum rules for energy labels for appliances:

Energy labels are currently not applicable in Lebanon as the country is awaiting approval for the Energy Conservation law.

- Monitoring and verification of energy label rules:

Energy labels are currently not applicable in Lebanon as the country is awaiting approval for the Energy Conservation law.

Regulator for Energy and Water Services (REWS) – Malta

1. ENERGY BILLING

a. Energy tariff structure and average energy tariff value for 2022:

Energy tariffs in Malta are governed by the Electricity Supply Regulations[12]. Tariffs are organised in separate electricity bands, with prices rising based on usage to encourage responsible energy consumption. The regulated tariffs include fixed annual service charges and kWh consumption tariffs. Non-residential consumers with high demand may also have a maximum demand charge. No network use tariffs are imposed. Consumers exceeding 60 Amps/phase pay a maximum demand tariff, while kWh consumption tariffs differ between primary residence, domestic, and non-residential premises. An

[12] Electricity Supply Regulations (S.L. 545.01)

eco-reduction discount is available to households based on consumption tiers. The average electricity prices for specific consumption bands are biannually published by Eurostat.

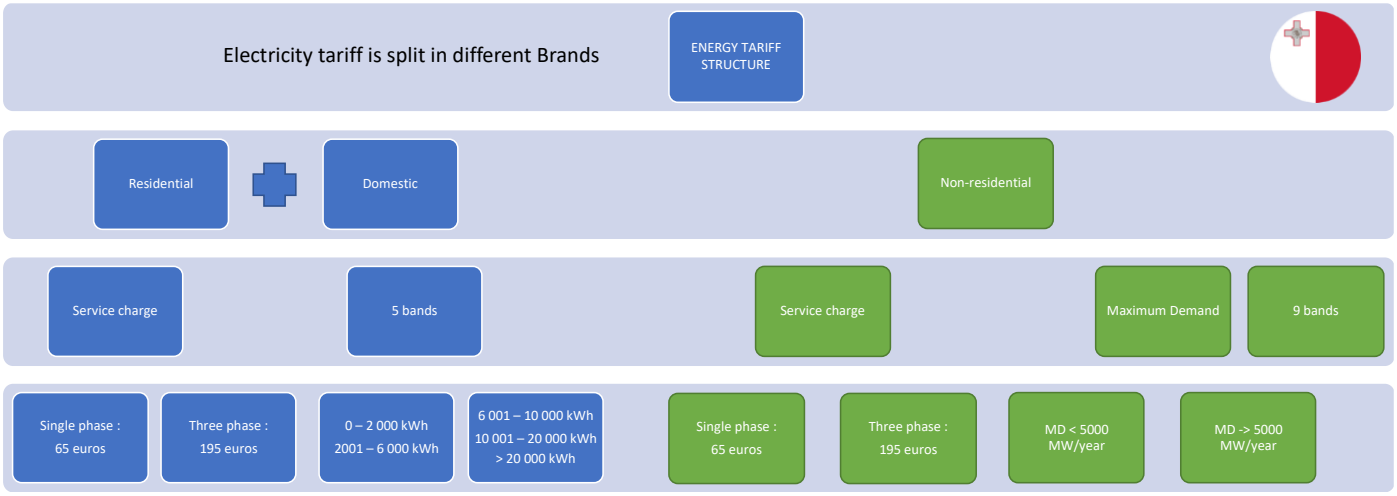


Figure 19. Energy Tariff structure in Malta

b. Using energy bills to encourage energy efficiency:

The tiered tariff structure discourages excessive consumption. An eco-reduction discount and a visual consumption trend chart on bills incentivise customers regarding responsible energy use.

c. Indicators for monitoring energy efficiency impact:

There are no indicators in Malta to monitor the impact of energy efficiency measures on energy bills. This monitoring is not within the regulator's scope.

2. ENERGY MIX DISCLOSURE ON BILLS

a. Methods for disclosing the energy mix on bills:

Malta specifies energy source contributions in bills as per the Electricity Regulations. The calculation of CO_2 emissions related to consumer consumption is displayed on bills. This awareness helps consumers make energy-efficient choices.

b. Using Certified Guarantees of Origin:

In Malta, the current system based on smart meter data, which is verified by the regulator, satisfies accuracy and transparency requirements. Therefore, the extensive use of GOs proves unnecessary.

3. GREEN OFFERS

a. Minimum requirements for green energy offers:

No minimum requirements for green energy offers are applicable in Malta as the sole electricity supplier does not offer green energy options due to regulatory provisions.

b. Role of NRAs in verifying green energy offers:

This is not applicable due to the regulatory context in Malta.

4. ENERGY LABELLING OF BUILDING AND APPLIANCES

a. Energy performance of buildings:

The energy performance of buildings is not within the remit of the regulator (REWS).

b. Energy labels for appliances:

Energy labels are not within the remit of the regulator (REWS).

Energy and Water Regulatory Agency (REGAGEN) – Montenegro

1. ENERGY BILLING

a. Energy tariff structure and average energy tariff value for 2022:

Montenegro's electricity tariff structure includes network fees (distribution and transmission system usage tariff and losses) and electricity costs. While the price of electricity remains consistent for all households, it varies for other consumers based on their agreements with suppliers. Network tariffs differ depending on voltage levels. In 2022, the average overall price for households was 9,82-euro cents per kWh, including the VAT[13].

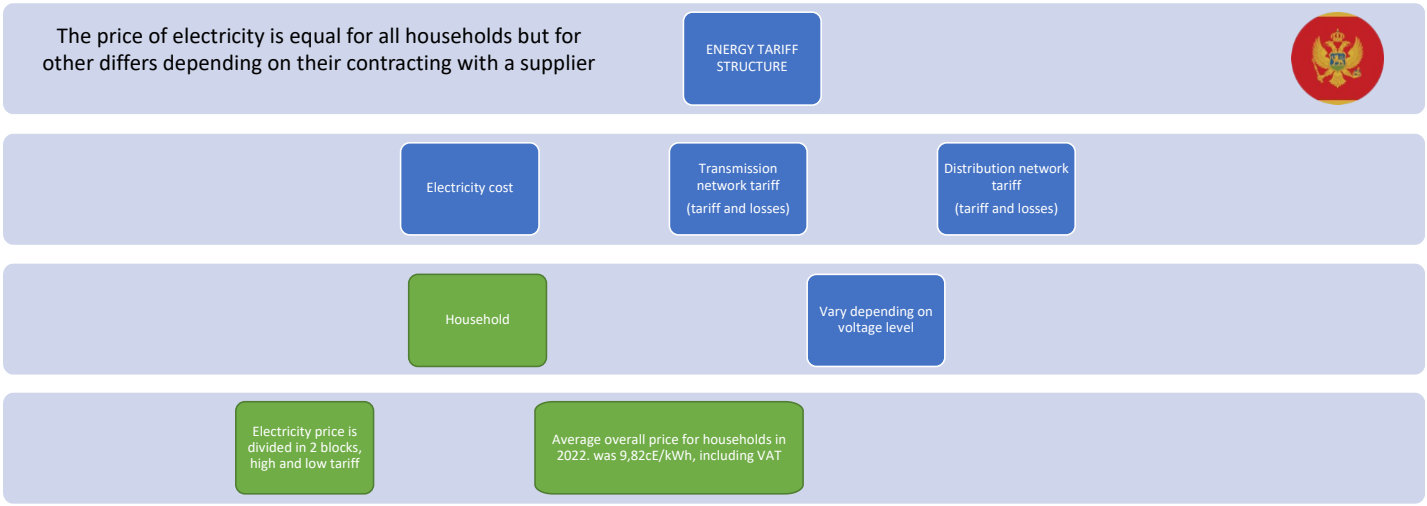


Figure 20. Energy Tariff structure in Montenegro

b. Using energy bills to encourage energy efficiency:

Montenegro employs a two-block electricity pricing system, dividing it into high and low tariff periods. This approach encourages consumers to be efficient by consuming more during the low tariff period and achieving financial savings. Furthermore, electricity bills sent to consumers by their suppliers contain 10 pieces of advice on becoming more energy-efficient and achieving cost savings.

[13] https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Electricity_price_statistics#Electricity_prices_for_household_consumers

c. Indicators for monitoring energy efficiency impact:

The electricity price is divided into high and low tariff blocks, promoting efficient consumption during low tariff periods.

2. ENERGY MIX DISCLOSURE ON BILLS

a. Methods for disclosing the energy mix on bills:

Montenegro uses GOs for energy mix disclosure, following the EU model. Suppliers are obligated to publish this disclosure annually and deliver it to end consumers with their electricity bills.

b. Using Certified Guarantees of Origin:

GOs, a certificate system, have been used in Montenegro since 2014. This system operates in accordance with the EU RES Directive and is managed by the Association of Issuing Bodies (AIB) organisation. It is considered reliable, harmonised, and compliant with EU-level standards. The responsibilities are distributed among various stakeholders, with the government responsible for legislative aspects and the market operator issuing GOs and producing a National Residual Mix, which the regulator approves. Suppliers are required to produce yearly disclosures.

3. GREEN OFFERS

a. Minimum requirements for green energy offers:

The regulator does not have responsibilities in this field, and there is no available information or data on green offers. Prosumers have been introduced in the Energy Law, benefiting from net-metering (yearly netting) and exemptions from network fees for the electricity they produce.

b. Role of NRAs in verifying green energy offers:

The regulator does not have responsibilities in this field, and there is no available information or data.

4. ENERGY LABELLING OF BUILDING AND APPLIANCES

a. Energy performance of buildings:

- Guidance on tools/mechanisms:

The regulator does not have responsibilities in this field, and there is no available information or data regarding tools and mechanisms for assessing the energy performance of buildings.

- Minimum rules:

The regulator does not have responsibilities in this field, and there is no available information or data on the minimum requirements for assessing the energy performance of buildings.

- Monitoring and verification:

The regulator does not have responsibilities in this field, and there is no available information or data on monitoring compliance with energy performance rules or penalties for non-compliance.

b. Energy labels for appliances:

- Guidance on tools/mechanisms:

The regulator does not have responsibilities in this field, and there is no available information or data regarding tools and mechanisms for creating and displaying energy labels for appliances.

- Minimum rules:

The regulator does not have responsibilities in this field, and there is no available information or data on the minimum requirements for energy labels for appliances.

- Monitoring and verification:

The regulator does not have responsibilities in this field, and there is no available information or data on monitoring compliance with energy label rules or penalties for non-compliance.

Autorité Nationale de Régulation de l'Electricité (ANRE) – MOROCCO

1. ENERGY BILLING

a. Structure of the current energy tariff and average energy tariff value for 2022:

Energy tariffs in Morocco vary depending on user types (big consumers, industrials, professionals, residents, etc.). The tariff structure provided in this document is for residential users. The rates per consumption band can be found in the legal document[14].

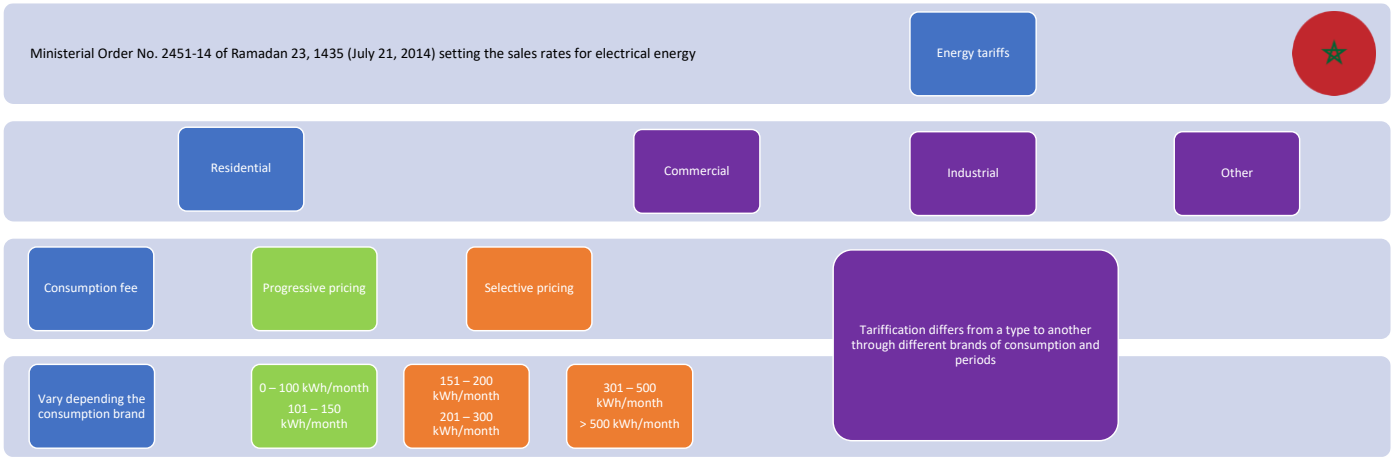


Figure 21. Energy Tariff structure in Morocco

b. Using energy bills to encourage energy efficiency:

Energy bills can encourage energy efficiency through various methods:

- **Time-of-Use Pricing:** By varying electricity costs based on the time of day (peak and off-peak hours), consumers are incentivised to shift their energy usage to non-peak hours, reducing the strain on the grid and promoting efficiency.

[14] https://www.sgg.gov.ma/BO_6288_Fr.pdf

- **Incentives and Education:** Bills can educate consumers about energy-saving practices and offer incentives for adopting energy-efficient technologies and practices, such as efficient appliances, insulation, and energy-efficient lighting.
- **Energy Efficiency Ratings:** Bills can include information on the energy consumption and efficiency of appliances, enabling consumers to make informed choices when purchasing new products.
- **Detailed Energy Usage Information:** Smart meters can provide consumers with detailed information about their energy consumption, allowing them to benchmark and reduce energy usage based on their behaviour.

c. Indicators for monitoring energy efficiency impact:

The Moroccan energy bills for the residential sector do not provide this information.

2. ENERGY MIX DISCLOSURE ON BILLS

a. Methods for disclosing the energy mix on bills:

Introducing carbon intensity disclosure, energy efficiency, and demand response disclosure on bills can help consumers grow more aware of their energy consumption and make informed decisions to reduce it.

b. Using Certified Guarantees of Origin:

CGOs can enhance transparency on the origin of consumed energy by verifying RES. By doing so, they can empower consumers to actively support RE generation and track their carbon footprint.

3. GREEN OFFERS

a. Minimum requirements for green energy offers:

Minimum requirements for green energy offers may include specifying an energy mix and RE target, providing certificates of origin, and implementing carbon taxes to encourage sustainable choices.

b. Role of NRAs in verifying green energy offers:

NRAs can play a role in enforcing regulations, monitoring and reporting compliance, setting certification and labelling standards, and overseeing the green energy market to ensure fair competition and prevent market manipulation.

4. ENERGY LABELLING OF BUILDING AND APPLIANCES

a. Energy performance of buildings

- Guidance on tools/mechanisms:

The tools and mechanisms for assessing the energy performance of buildings in Morocco include building energy audits, building energy modelling, and green building certification, which may involve international certifications such as LEED and BREEAM.

- Minimum rules:

The minimum requirements for assessing the energy performance of buildings in Morocco are set by the Building Energy Code (RTCM) and may include obligations related to project management, structure quality, ventilation, water consumption, and thermal characteristics of the building components.

- Monitoring and verification:

Compliance with energy performance rules is monitored through mandatory energy audits, building energy management systems, compliance checks, and reporting requirements. Penalties for non-compliance with energy efficiency are stipulated in Law 47.09.

b. Energy labels for appliances

- Guidance on tools/mechanisms:

Energy labels for appliances in Morocco are indicated based on national standards, and the energy performance/consumption must be displayed on appliances.

- Minimum rules:

Minimum Energy Performance Standards (MEPS) have been established for heating and cooling systems and refrigerators, defined in accordance with the RTCM.

- Monitoring and verification:

Compliance with energy label rules is monitored through market surveillance by designated authorities, and financial penalties are established by law 47.09 for non-compliance with energy efficiency rules related to appliances.

Energy Services Regulatory Authority (ERSE) – PORTUGAL

1. ENERGY BILLING

a. Structure of the current energy tariff and average energy tariff value for 2022:

The average electricity tariff price for 2022 in Portugal was €0,1553/Wh for electricity. The structure of the electricity tariff is given in the figure below:

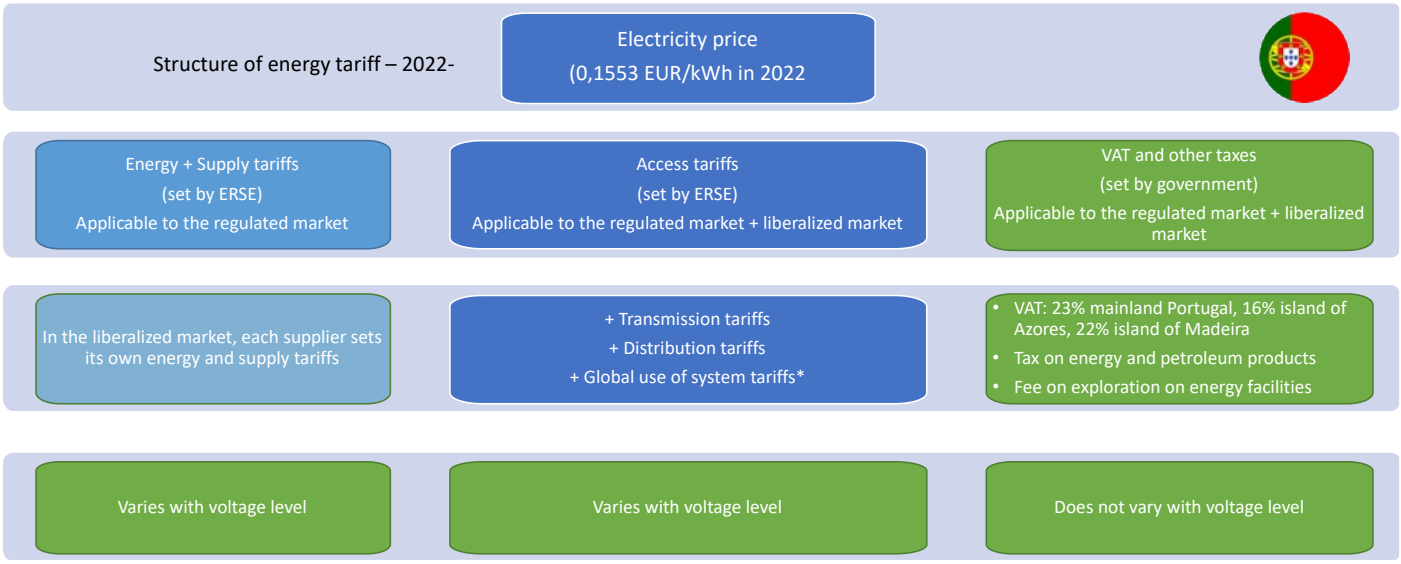


Figure 22. Energy Tariff structure in Portugal

* Includes a parcel for the General Economic Interest Costs (CIEG), which is set by the government. The most significant CIEG are the Costs for the Maintenance of Contractual Equilibrium, which gives producers the right to receive compensation for the end of the Power Purchase Agreement (PPA); the remuneration of energy generated by renewable resources or cogeneration (except for large hydropower plants); the concession of rents paid by the distribution network operator in Low Voltage (LV) to municipalities; and the compensation paid to the companies of the islands via the application, in these regions, of a tariff level equal to that of mainland Portugal. In 2022, the total value of the CIEG reached a negative figure due to the fact that in that year, the extra costs associated with production with guaranteed remuneration were lower than the wholesale electricity market prices as a result of the sharp increase of those prices.

b. Using energy bills to encourage energy efficiency:

Energy bills can encourage energy efficiency by providing detailed information on prices and consumption. Consumers can use this information to shift consumption to off-peak hours or reduce their overall consumption. Additionally, energy bills should include information on energy labelling and CO2 emissions to raise consumer awareness. Furthermore, simplified invoices are essential to ensure consumers can understand them.

c. Indicators for monitoring energy efficiency impact:

The Portuguese energy bills do not provide this information.

2. ENERGY MIX DISCLOSURE ON BILLS

a. Methods for disclosing the energy mix on bills:

Energy bills in Portugal should disclose information about the energy mix, including sources such as wind, hydro, natural gas, and coal.

b. Using Certified Guarantees of Origin:

CGOs play a crucial role in the energy labelling process in accordance with the ERSE Directive no. 16/2018. These CGOs are a mechanism used to certify that a certain percentage of consumed energy is derived from renewable sources.

The ERSE, as the regulatory authority, verifies the authenticity and accuracy of CGOs to ensure the reliability of the information provided to consumers. To help consumers verify the renewable content of their energy consumption, the ERSE provides an energy labelling simulator on its website. This tool allows customers to cross-reference the information on their energy bills with the ERSE's certified data and even assess different energy offers based on their environmental impact, considering factors like the percentage of renewables and CO2 emissions.

The regulatory framework governing the organisation and operation of the national electricity system has assigned Redes Energéticas Nacionais (REN) as the authority responsible for issuing CGOs. REN, as the Guarantees of Origin Issuing Body (EEGO), is entrusted with the implementation and management of the system for issuing CGOs. These certificates serve as proof that the energy produced originates from renewable sources. REN's responsibility encompasses the registration, issue, transfer, and electronic cancellation of these certificates.

The EEGO's activity is subject to regulation, monitoring, and supervision by the ERSE in accordance with the rules set out in the EEGO procedures manual already approved by the ERSE. Additionally, the ERSE is responsible for establishing the labelling rules that are integrated into the operationalisation of the EEGO's activities.

3. GREEN OFFERS

a. Minimum requirements for green energy offers:

The ERSE's Directive No. 16/2018 defines "green supply" as the energy sourced from non-emitting sources, primarily renewables. To empower consumers and ensure transparency, the electricity sector regulations require energy labelling. This labelling system aims to provide end consumers with information about the origin of the energy they use and its associated environmental impact. It also allows for the differentiation of "green" and "non-green" energy consumption. GOs, which can complement this labelling process, can either be integrated directly into the process, characterising the supplier's overall energy portfolio, or they can have specific implications for individual customer accounts. This flexibility allows consumers to make informed choices about their energy consumption.

b. Role of NRAs in verifying green energy offers:

The ERSE's energy labelling simulator serves as a valuable tool for consumers to validate energy offers and assess their environmental impact. Additionally, to maintain transparency and accountability, suppliers must adhere to the ERSE's labelling rules. These rules are subject to periodic audits conducted every three years, as outlined in Directive No. 16/2018, Article 18. This audit process ensures that suppliers comply with the regulations and provide accurate information to consumers, further enhancing the trustworthiness of the energy market.

4. ENERGY LABELLING OF BUILDING AND APPLIANCES

a. Energy performance of buildings:

- Guidance on tools/mechanisms:

In Portugal, the general rules and framework for EPCs are backed up by the EU regulatory framework for the Energy Performance of Buildings Directive, transposed into national law by Decree-Law no.101-D/2020, December 7, and related Ordinances, Orders and Technical Guidelines, which establishes the requirements for buildings to improve their energy performance and regulates the performance and Energy Certification System (SCE) for Buildings. This legal framework sets requirements in terms of qualification of experts, energy certification of residential and non-residential buildings, and issue of EPCs.

The Portuguese Energy Performance of Buildings Directive (EPBD) transposition establishes a comprehensive methodology for the issuance of EPCs by independent and certified experts. These certificates provide information on the energy performance of buildings, including reference values and minimum energy performance requirements. This enables building or building unit owners and tenants to compare and assess the energy performance of their properties. In the case of large non-residential buildings, the methodology should encompass building energy modelling. All new buildings should follow the standards of near-zero energy buildings (NZeb) as a minimum energy performance requirement. Additionally, non-residential buildings should comply with building automation and control system requirements. Big non-residential buildings are subjected to energy audits and a minimum energy performance threshold, below which it is mandatory to implement a plan for improving their energy performance. For non-residential buildings with a heating/cooling thermal power exceeding 290 kW, whether newly constructed or undergoing major renovations, the installation of building automation control systems (BACS) is obligatory.

- Minimum rules:

All the requirements for issuing EPCs stem from the specific national legal framework referred to in the previous paragraph, which is in line with international standards and best practices.

- Monitoring and verification:

The national level Decree-Law no.101-D/2020, December 7, contains general requirements, including applicable administrative offences and fines. It assigns specific responsibilities at the national level, as outlined below:

- The DGEG is in charge of the broad supervision of the SCE;
- The Portuguese National Energy Agency (ADENE), which is a Portuguese Energy Agency, is responsible for the management of the energy certification system, which includes, among other duties:
  - performing the exams and registering the SCE technicians;
  - managing the central register of energy certificates on the SCE Portal, as well as other documentation produced within the scope of the SCE;
  - verifying the quality of the information produced within the scope of the SCE through the analysis of the data recorded by the SCE's technicians and identifying possible situations of non-compliance of the processes carried out by the same technicians.

b. Energy labels for appliances

- Guidance on tools/mechanisms:

Portugal's framework for Energy-related Products (ErPs) adheres to EU regulations, including Directive 2009/125/EC for eco-design and Regulation (EU) 2017/1369 for energy labelling. These regulations form the basis for product-specific rules governing ErPs. They encompass manufacturing requirements for energy efficiency (eco-design) and energy labelling provisions, such as the obligation to register products in the EPREL database[15].

This dual approach ensures that ErPs meet energy efficiency standards and provide consumers with clear information about their energy performance. The EPREL database[16] allows consumers to not only access detailed information through QR codes on the energy labels of the actual products but also to browse and compare ErPs in the comprehensive database.

Moreover, it is relevant to state that following the rescaling of the energy label provided by the EU framework regulation (EU) 2017/1369, a lot of guiding information directed to Portuguese professionals and the general public was provided through the site https://pt.label2020.eu/.

These regulations are directly applicable in Portugal as well as in all member states[17].

Within this framework, energy labelling is part of a product regulatory approach, which has energy efficiency and internal market provisions (free movement of goods) as its essential vectors. This dual aspect constitutes the essential regulatory matrix of this matter.

Thus, in a product-by-product approach, we have EU regulations (directly applicable to national law) for the following:

- manufacturing/placing on the market requirements, i.e. eco-design regulations, directed towards suppliers/manufacturers/importers;
- energy labelling, through regulations that provide for energy efficiency classes and other product characteristics, the energy label itself, the obligations of suppliers and distributors, etc.

For B2C products that are in direct contact with the consumer, such as household appliances, or for those where there is no such direct contact, there is an interest in using this mechanism in more professional markets. This regulatory approach is applied in tandem, i.e. for the respective product, an eco-design regulation for the manufacturing requirements and an energy labelling regulation for the requirements of the respective energy label is imposed. Therefore, there are well-established regulatory obligations to follow to create and display energy label for ErPs, including appliances.

- Minimum rules:

[15] Regulation (EU) 2017/1369 and national Decree-Law 28/2021, April 20
[16] https://eprel.ec.europa.eu/
[17] Energy efficient products | European Commission (europa.eu)

All the requirements for energy labels are common at the EU level because they stem from the specific product regulations mentioned in the previous paragraph and are in line with international standards and best practices.

- Monitoring and verification:

At the level of verification, it is important to acknowledge that the EU product-specific regulations for energy labels specify the methodologies related to the verification that must be followed, in case of an actual verification of the product, by national Market Surveillance Authorities (MSAs).

The national level, as already mentioned in the national Decree-Law no. 28/2021, April 20, contains general requirements, including applicable administrative offences and fines. Specific responsibilities are also assigned at the national level, as follows:

- The DGEG is in charge of the broad coordination of energy label-related issues at the national level as well as for providing information and clarification to the stakeholders and public;
- The Autoridade Tributária e Aduaneira (AT) is responsible for import control and inspection.
- The Autoridade de Segurança Alimentar e Económica (ASAE), which is the Portuguese Market Surveillance Authority, oversee the market and label verification.
- The Directorate-General for Consumer Affairs or ASAE address consumer complaints.

Palestinian Electricity Regulatory Council (PERC) – PALESTINE

1. ENERGY BILLING

a. Structure of the current energy tariff and average energy tariff value for 2022:

The structure of the current energy tariff in Palestine follows a cost-of-service regulation model, as shown in the figure below.

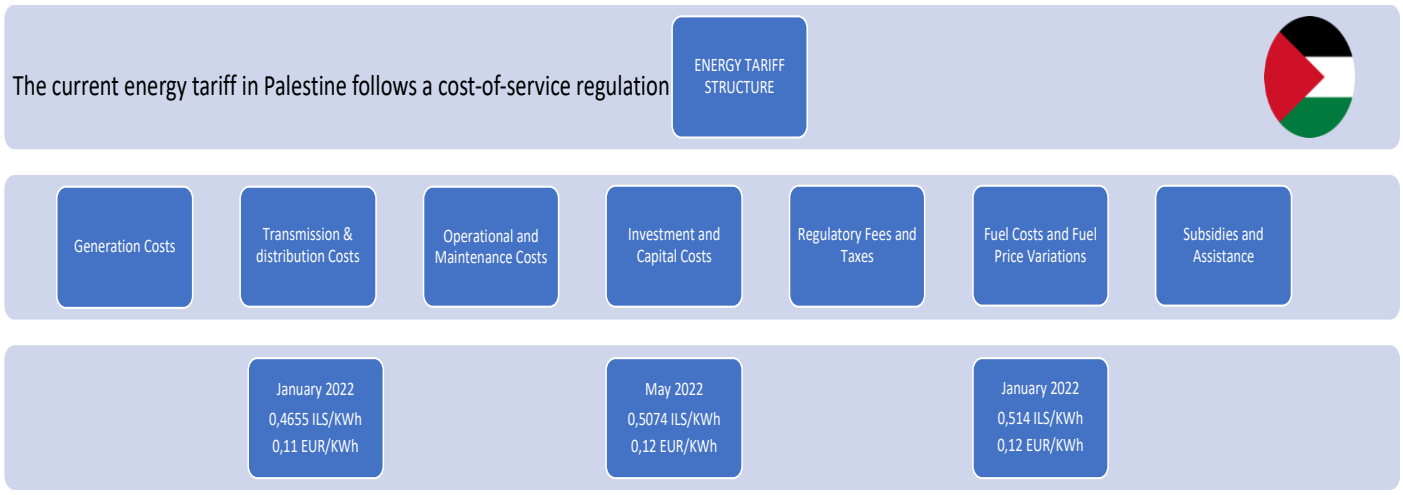


Figure 23. Energy Tariff structure in Palestine

b. Using energy bills to encourage energy efficiency:

Energy bills can encourage energy efficiency by including recommendations to decrease energy costs. The bill design should be simple but informative, highlighting key figures and cost-saving recommendations.

c. Indicators for monitoring energy efficiency impact:

Indicators that can help regulators monitor the impact of energy efficiency measures on energy bills in Palestine include:

- Energy Intensity
- Energy Savings
- Customer Feedback
- Renewable Energy Implementations and Portion
- Energy Losses

2. ENERGY MIX DISCLOSURE ON BILLS

a. Methods for disclosing the energy mix on bills:

Effective methods for disclosing the energy mix on bills may include:

- Energy Efficiency and Demand Response Disclosure
- Simplified Bill Design to Avoid Misleading Information

b. Using Certified Guarantees of Origin:

Details regarding the use of CGOs and the responsibilities of stakeholders (NRA, Ministry, TSO) are not applicable in Palestine.

- **GREEN OFFERS**

a. Minimum requirements for green energy offers:

Specific minimum requirements for green energy offers are not applicable in Palestine.

b. Role of NRAs in Verifying Green Energy Offers:

NRAs can play a role in verifying green energy offers through the:

- Verification of Sources
- Monitoring of Claims
- Enforcement of Regulations

Challenges in overseeing green energy offers may include ensuring the accuracy of claims and compliance with established standards.

3. ENERGY LABELLING OF BUILDING AND APPLIANCES

a. Energy performance of buildings

- Guidance on tools/mechanisms:

The tools and mechanisms available for assessing the energy performance of buildings in Palestine include:

- Building Energy Modelling
- Building Energy Audits
- Green Building Certification

- Minimum rules:

The minimum requirements for assessing the energy performance of buildings may include compliance with:

- Building Energy Codes
- Green Building Certification

- Monitoring and verification:

Compliance with energy performance rules can be monitored and verified through:

- Energy Audits
- Reporting Requirements

Penalties for non-compliance with energy performance rules should be outlined in relevant regulations.

b. Energy labels for appliances

- Guidance on tools/mechanisms:

The tools and mechanisms for creating and displaying energy labels for appliances in Palestine may involve regulations for importing appliances.

- Minimum rules:

The minimum requirements for energy labels for appliances may include:

- Energy Efficiency Class
- Energy Consumption
- Product Information
- Noise Levels

- Monitoring and verification:

Details regarding the monitoring and verification of compliance with energy label rules are not applicable to Palestine.

4

REGULATORY INDICATORS FOR SUSTAINABLE ENERGY

This chapter represents the contribution of the Mediterranean Association of National Agencies for Energy Management (MEDENER) and RCREEE to the report. This technical report serves a dual purpose as it provides valuable technical insights and contributes to the ongoing discussions among policymakers at the UfM REEE. Recognising the significance of this platform, essential findings are included from the Regulatory Indicators for Sustainable Energy (RISE) tools, focusing on the Mediterranean region. Furthermore, key lessons learned from the collaborative efforts of MEDREG, MEDENER, and RCREEE are outlined, adding a rich dimension to the policy discourse.

In its efforts to advance sustainable energy practices within the Arab region, the RCREEE, along with the MEDENER's support, contributed to the RISE initiative[18] by including the data of the Mediterranean south shore countries.

RISE is a tool policymakers use to compare national policy frameworks for sustainable energy and identify opportunities to attract investment. RISE assesses different countries' policy support for each of the four pillars of sustainable energy – access to electricity, access to clean cooking (for 54 access-deficit countries), energy efficiency, and renewable energy. With over 30 indicators covering 140 countries and representing over 98% of the world population, RISE provides a reference point to help policymakers benchmark their sector policy and regulatory framework against those of regional and global peers, thereby serving as a powerful tool to help develop policies and regulations that advance sustainable energy goals.

For the purposes of this report, we provide an overview of the results of the indicators within the Mediterranean region. These findings do not represent MEDREG's official stance since they are solely intended for informational dissemination.

4.1 Regulatory Indicators for Sustainable Energy within the Mediterranean region:

RISE is a set of indicators utilised to compare national policy and regulatory frameworks for sustainable energy. It assesses countries' policy and regulatory support for each of the four pillars of sustainable energy: access to electricity, access to clean cooking, energy efficiency, and renewable energy.

For the purpose of this report, the focus lies on indicators related to the theme of energy efficiency. In that aspect, RISE includes 11 indicators to compare and assess the level of Energy Efficiency[19]:

- National energy efficiency planning
- Energy efficiency entities
- Incentives & mandates: Industrial and commercial end users
- Incentives & mandates: Public sector
- Incentives and mandates: Energy utility programmes
- Financing mechanisms for energy efficiency
- Minimum energy efficiency performance standards
- Energy labelling systems

[18] https://rise.esmap.org/
[19] In annex for more information regarding the indicators.

- Building energy codes
- Transport sector
- Carbon pricing and monitoring

The analysis classifies the country based on a score ranking; the scores vary from 32 as the lowest to 84 as the highest. The results are presented in the annexe.

4.2 Fifth Edition of the Guide to Renewable Energy and Energy Efficiency in Arab Countries

In addition to the contributions of the RISE tool, the RCREEE developed its fifth edition of the Guide to Renewable Energy and Energy Efficiency in Arab Countries. This guide serves as a tool for monitoring the progress achieved in the RE and energy efficiency sector by covering the related technical, economic, environmental, and legislative aspects.

Overview of the Renewable Energy and Energy Efficiency Guide in the Arab Countries

The fifth edition of the Renewable Energy and Energy Efficiency Guide in the Arab Countries serves as a comprehensive tool for monitoring progress within the RE and energy efficiency sector. It encompasses the technical, economic, environmental, and legislative aspects related to this sector. The guide highlights the approved national strategies crucial for developing objectives in the energy sector and promoting the widespread adoption of RE and efficiency measures in the short, medium, and long term. Additionally, it provides a clear view of the status of the energy sector in Arab countries.

The guide offers a set of indicators to describe the state of the RE and energy efficiency sector until 2018. This data forms the foundation for future planning based on accurate facts, statistics, and insights for Arab nations. Its significance lies in systematically assessing the state of RE and energy efficiency in the Arab region while also understanding the reasons behind the challenges faced by the energy sector. Furthermore, the guide addresses the increasing demand for energy, particularly electricity, and the need to reduce the environmental impact of this growth while maintaining a reliable database for analysis and diagnosis.

The primary objectives of the guide include:

1. Identifying policies and programmes in Arab countries to enhance energy production and consumption efficiency, and foster cooperation and financial incentives,
2. Developing unified strategies and Arab action programmes to promote collaboration in RE and energy efficiency,
3. Providing statistical data to support the design of energy policies and programmes in Arab nations,
4. Facilitating knowledge exchange among Arab countries with varying levels of development.

The Secretariat of the Arab Ministerial Council for Electricity, within the General Secretariat of the League of Arab States, oversees the preparation of the guide every two years. The process involves creating an interactive national data form, which is filled out by national contact points designated by

the League of Arab States member states. The data is then analysed, and the guide's final version is produced. Over time, the guide's methodology has evolved to include new indicators that align with the latest developments in Arab countries' RE and energy efficiency policies and technologies, owing to its collaborations with the RCREEE.

Data and Statistics

The statistics in this report present new data, including environmental indicators related to carbon dioxide emissions, energy consumption development, population and GDP statistics, and water desalination activities. The data covers primary energy consumption, final energy consumption, electrical energy production, capacity, peak electricity demand, and peak times in summer and winter for Arab countries. The data allows for comparisons and analysis to track development trends.

The key data points are outlined below:

- Total installed capacity in 2018 reached approximately 175 gigawatts (GW), depicting a 9% increase from 2017,
- Conventional energy capacity in 2018 was about 166 GW, up by 9% compared to 2017,
- RE capacity grew by 9% in 2018, reaching 7,965.34 GW,
- RE contributed to approximately 8% of the total installed capacity in 2018, encompassing hydroelectric, solar, and wind energy,
- Electrical energy production in 2018 totalled around 407 terawatt-hours, presenting an 8% decrease from 2017.

Policies and Strategies

This section delves into the strategic objectives of RE and energy efficiency in Arab countries, encompassing laws, legislations, incentives, programmes, and national plans. Additionally, it discloses energy policies, such as independent energy producers, power purchase agreements, net metering, and feed-in tariff policies, as well as energy efficiency policies in lighting, buildings, and transportation.

Many Arab countries have set ambitious goals to increase the share of RE in their energy mix. A few countries aim to achieve 100% RE use by 2035, while others focus on improving energy efficiency.

As of 2019, eight Arab countries have developed national plans for energy efficiency, and six have plans for RE.

Studies and Projects

This section presents various studies and projects related to RE and energy efficiency in Arab countries, including investments and national plans. It covers a wide range of research and construction projects, highlighting their diversity in size and technology.

By the end of 2018, the number of RE projects in the 10 included countries reached 138, with a focus on solar, wind, and hydroelectric energy. The total installed capacity of RE, including hydroelectric energy, amounted to approximately 23 GW.

- Solar power plants had an installed capacity of 6.3 GW.
- Wind power plants had an installed capacity of 13.3 GW.
- Concentrated solar thermal energy had an installed capacity of 1.5 GW.

Methodology for Monitoring National Plans

This section provides a detailed presentation of the methodologies used to monitor the progress of preparing RE and energy efficiency reports in Arab countries. These methodologies were approved by the Arab Ministerial Council for Electricity in 2016 to serve as a guide for monitoring and assessing the status of RE and energy efficiency in Arab nations.

4.3 Financing constraints: Success story and lessons learnt

Several financing constraints have been identified in the Mediterranean region, as well as success stories and lessons learnt from efforts to address these challenges. Here are a few examples:

1. **Limited access to finance:** Many small and medium-sized enterprises (SMEs) in the Mediterranean region struggle to access financing for energy efficiency projects due to a lack of collateral, high interest rates, and limited availability of financing products tailored to their needs.

Success story: In Tunisia, the National Agency for Energy Management (ANME) has established a credit line for SMEs that offers favourable interest rates and flexible repayment terms for energy efficiency projects. This programme has aided SMEs in overcoming some of the financing barriers they face in the country.

Lesson learnt: To increase access to financing for energy efficiency projects, it is important to develop financial products that are tailored to the needs of different types of borrowers, providing favourable terms and conditions.

2. **Risk perception:** Many investors perceive energy efficiency projects to be risky, particularly in developing countries where there may be concerns about political instability, currency risks, and regulatory uncertainty.

Success story: In Egypt, the European Bank for Reconstruction and Development (EBRD) has helped mitigate risks for investors by providing guarantees to local banks that finance energy efficiency projects. This has led to an increase in the availability of financing for these projects, thereby attracting more private-sector investments to the sector.

Lesson learnt: To attract investment in energy efficiency, it is important to develop mechanisms that help mitigate risks for investors, such as guarantees or insurance products that protect against currency or political risks.

3. **Lack of awareness and technical expertise:** Many lenders and investors in the Mediterranean region may lack a proper awareness of energy efficiency opportunities or the technical expertise to evaluate the feasibility of energy efficiency projects.

Success story: In Morocco, the Sustainable Energy Financing Facility (MorSEFF) has provided training and technical assistance to local banks and financial institutions, raising their capacity to evaluate and finance energy efficiency projects.

Lesson learnt: To increase financing for energy efficiency, it is important to build awareness and technical capacity among lenders and investors through training programmes, technical assistance, and other capacity-building efforts.

Overall, these examples demonstrate that several financing constraints must be addressed to promote energy efficiency in the Mediterranean region. However, it is worth noting that there are also successful models and lessons learnt that can help investors overcome these challenges.

5
CONCLUSION AND RECOMMENDATIONS

A Call for action for regulatory bodies: Leading the way towards energy efficiency

This report has explored the diverse landscape of energy efficiency mechanisms and energy labeling initiatives employed across the Mediterranean region. Building on the valuable previous work of MEDREG in this field, the analysis delved into supply-side and demand-side regulatory tools, offering insights into specific examples, best practices, and existing challenges.

Key findings highlight the region's progress in implementing various mechanisms, including:

- ✓ **Power market competition:** There are various strategies to promote competition, where a competitive market that functions well encourages market players to be efficient. This leads to the development of better technologies, and at the same time, it allows less efficient operators to be phased out naturally as they struggle to keep up in this dynamic environment.
- ✓ **Network Development Plans:** The formulation of development strategies for energy networks plays a crucial role in shaping the efficiency and expansion of the energy sector across countries. Regulatory bodies hold the responsibility of supervising and overseeing these strategies to guarantee their alignment with national energy goals. Similarities in regional characteristics imply potential opportunities for sharing knowledge and promoting standardization.
- ✓ **Network Access Tariffs**: Although regulations exist, ensuring cost-reflectivity and incentivizing efficient behavior remain challenging. Regulatory bodies must continuously review and update tariff structures to reflect actual costs and explore innovative approaches such as time-of-use tariffs and performance-based incentives.
- ✓ **Incentive Regulation:** Overcoming implementation barriers is crucial for promising approaches like time-of-use tariffs. Regulatory bodies can provide clear guidance to utilities, design effective incentive schemes, and ensure a clear visibility for investors.
- ✓ **Energy Labeling:** The adoption of energy labels for appliances and buildings aim to inform consumer. By displaying clear and standardized information, energy labels empower consumers to choose more energy-efficient options, which can lead to cost savings, reduced environmental impact, and overall energy conservation efforts. Regulatory bodies establish labeling standards, ensure their enforcement, and increase consumer awareness through targeted campaigns and educational initiatives.

In addition, the report identifies areas for improvement, such as:

- **Harmonization:** Improved consistency in regulations and labeling schemes across the region could unlock significant efficiency gains. Regulatory bodies should collaborate to develop regional standards, share best practices, and facilitate mutual recognition of national schemes.
- **Data and monitoring:** Robust data collection and monitoring systems are essential for evaluating the effectiveness of existing mechanisms and informing future policies. Regulatory bodies must establish clear data collection requirements, invest in robust data infrastructure, and promote transparency and communication strategy in data sharing.
- **Investment and financing:** Addressing financial barriers through innovative financing mechanisms is crucial for accelerating the adoption of energy-efficient technologies. Regulatory

bodies can create enabling environments for green finance, facilitate access to funding for energy efficiency projects, and provide guarantees to attract private sector investment.

- **Capacity building:** Continued efforts are needed to boost the capacity of stakeholders, including policymakers, regulators, industry players, and consumers, to implement and benefit from energy efficiency measures. Regulatory bodies play a key role in organizing training programs, workshops, and knowledge-sharing initiatives for diverse stakeholder groups.

In conclusion, The Mediterranean region has a strong foundation to promote energy efficiency. Regulatory bodies play a critical role in this journey by fostering collaboration, harmonizing regulations, sharing best practices, and addressing key challenges.

By taking a proactive and collaborative approach, regulatory bodies can empower stakeholders, unlock the full potential of energy efficiency, and contribute to a more sustainable and secure energy future for the region.

Annexe

Annexe 1: RISE results:

The results depicted in the figure may not provide a comprehensive description of the actual situation. For example, in **Egypt**, numerous aspects have undergone rapid changes. One notable transformation is the transportation sector, which has embraced electric mobility even for public transportation. Additionally, the COP 27 witnessed a significant step forward in carbon monitoring. **In Italy**, it is important to highlight that the recorded scores for both "financing mechanisms – energy efficiency" and "incentives and mandates: utilities programmes" may lack relevant updates, thus failing to represent the current situation. Specifically, it is worth noting that "financing mechanisms" have been extensively utilised, particularly through tax rebates, which have incentivised investments in energy efficiency in the building sector up to 100%. As for "utility programmes," the current market mechanism for "Energy Efficiency Certificates" is based on the energy-saving utilities themselves. These utilities manage investments and operations on their own network. While any entity may be entitled as an "energy saver" in the certificates market, utilities are considered "obliged entities". They are required by law and regulation to achieve specific energy-saving targets outlined in the established programmes.

Nevertheless, they do serve as a valuable tool for evaluating the status of energy efficiency development in their respective countries. These results enable us to identify areas requiring improvements and pinpoint potential synergies for collaboration among MEDREG members. By sharing knowledge and expertise, the Mediterranean region can collectively work towards enhancing energy efficiency and supporting one another in this endeavour[20].

List of indicators:

The following questions were used in the benchmarking process to assess the indicators:

1. **National Energy Efficiency Planning**

- **National energy efficiency legislation/action planning**

Is there a legal framework in place or a national action plan that aims to increase energy efficiency adoption?

Is there an energy efficiency goal or target at the national level?

- **Sub-sectoral targets**

Are there carbon reduction targets in place that include energy efficiency (EE) for the following sectors?

- Residential sector
- Commercial services sector
- Transport sector
- Industrial sector

[20] Attribution: Energy Sector Management Assistance Program (ESMAP). 2022. Regulatory Indicators for Sustainable Energy (RISE). Washington, DC: World Bank.
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- Power sector

- **Scope of targets**

Are targets derived from detailed analysis that is publicly available?

Is there a requirement for periodic progress reports that track data related to the efficiency target(s)?

Is the EE target linked to international commitments (e.g. Nationally Determined Contribution (NDC) or regional commitment)?

2. **Energy Efficiency Entities**

- **Human capital and institutions**

Are there governmental and/or independent bodies that carry out the roles listed below:

- Setting EE strategy
- Setting EE standards
- Regulating the EE activities of energy consumers
- Certifying compliance with equipment EE standards
- Certifying compliance with building EE standards
- Selecting and/or approving third-party auditors tasked with certifying EE standards

Are EE programmes developed based on market analyses with plans open to public consultation and periodic evaluation?

Are there professional certification/accreditation programmes mandated for energy efficiency activities? Select all that apply:

- Energy auditing/energy management
- Monitoring and verification of energy consumption/savings
- Building energy efficiency construction/design
- Other

3. **Incentives & Mandates: Industrial and Commercial End Users**

- **Mandates for large consumers**

Are there any of the following energy-efficiency mandates for large energy users?

- Targets (e.g. kWh savings or lower energy intensity or carbon dioxide reductions, etc.)
- Mandatory audits
- Energy-management system (computer technologies to optimise energy use)
- Energy Manager in the facility

Are there penalties in place for large energy users for non-compliance with EE programmes?

Is there a requirement for periodic reporting of energy consumption in order to enforce and/or track EE progress in large consumers' facilities?

Is there a measurement and verification programme in place?

- **Incentives for commercial and industrial consumers**

Is there a programme to publicly recognise end users who have achieved significant energy savings measures?

Are there any awareness programmes or publicised case study examples of significant measures for energy savings?

Does the programme offer technical assistance (from a government or independent entity) to end users to identify investment opportunities for energy savings?

Is there an EE mandate or incentive programme for SMEs?

4. **Incentives & Mandates: Public Sector**

- **Obligations for public infrastructure**

Are there binding energy savings obligations for public buildings and/or other public facilities (may include water supply, wastewater services, municipal solid waste, street lighting, transportation, and heat supply)?

Is there a financing mechanism in place to support EE retrofitting in the public and/or private sector?

- **Tracking and enforcement of obligations**

Is there a reporting mechanism to track and enforce energy savings in public sector facilities (either in-house or by a third party)?

- **Public procurement of energy efficiency products**

Are there specific policies or mandated guidelines for public procurement of energy-efficient products and services on the following levels?

- National level
- Region/state/province level
- Municipal/city/county level

Are there any guidelines or tools to help identify energy-efficient options for procurement (e.g. EE calculators, technical specifications, product rating catalogues)?

- **Ability to retain energy savings**

Do public budgeting regulations and practices allow public entities to retain energy savings at the following levels?

- National level
- Region/state/province level
- Municipal/city/county level

5. **Incentives and Mandates: Energy Utility Programmes**

- **Utility EE programmes**

Generation:

- Are there "mandated regulations" for utilities to carry out EE activities in this area?
- Are there penalties in place for non-compliance with EE requirements?

Transmission and distribution networks:

- Are there "mandated regulations" for utilities to carry out EE activities in this area?
- Are there penalties in place for non-compliance with EE requirements?

Demand-side management/demand-response:

- Are there "mandated regulations" for utilities to carry out EE activities in this area?
- Are there penalties in place for non-compliance with EE requirements?

Are any of the following mechanisms available for utilities to recover costs associated with or revenue lost from mandated EE activities:

- Public budget financing
- Consumer surcharge
- Decoupling

- **Utility Consumer Pricing and Information**

Are electricity tariffs cost-reflective?

Is there a metering mechanism in place that measures the Time-of-Use (TOU) within the residential, commercial services, and industrial sectors?

- Residential sector
    - Real-time pricing
    - Variable peak pricing
    - Critical peak pricing
    - Seasonal rate
    - Peak-time rebates and/or time-of-day tariffs
- Commercial services sector
    - Real-time pricing
    - Variable peak pricing
    - Critical peak pricing
    - Seasonal rate
    - Peak-time rebates and/or time-of-day tariffs
- Industrial sector
    - Real-time pricing
    - Variable peak pricing
    - Critical peak pricing
    - Seasonal rate
    - Peak-time rebates and/or time-of-day tariffs

Do customers receive a bill or report that compares them to other users in the same region and/or usage class?

- Residential customers
- Commercial customers
- Industrial customers

Do customers receive a bill or report that shows their energy usage compared to previous bills or reports over time?

- Residential customers
- Commercial customers
- Industrial customers

Which of the following charges do electricity customers pay in the commercial services and industrial sectors?

- Commercial services sector
    - Demand (kW)
    - Reactive power (kVAr)
- Industrial sector
    - Demand (kW)
    - Reactive power (kVAr)

6. Financing Mechanisms for Energy Efficiency

- Financing mechanisms available in each sector

Are there "national financial coverage" mechanisms in place for EE activities in each sector?

- Residential sector
    - Discounted "green" mortgages
    - On-bill financing/repayment
    - Credit lines and/or revolving funds with banks for EE activities
    - Energy services agreements (pay-for-performance contracts)
    - Green or energy efficiency bonds
    - Vendor credit and/or leasing for EE activities
    - Partial risk guarantees
    - Other
- Commercial services sector
    - Discounted "green" mortgages
    - On-bill financing/repayment
    - Credit lines and/or revolving funds with banks for EE activities
    - Energy services agreements (pay-for-performance contracts)
    - Green or energy efficiency bonds
    - Vendor credit and/or leasing for EE activities

    - Partial risk guarantees
    - Other
- Industrial sector
    - Discounted "green" mortgages
    - On-bill financing/repayment
    - Credit lines and/or revolving funds with banks for EE activities
    - Energy services agreements (pay-for-performance contracts)
    - Green or energy efficiency bonds
    - Vendor credit and/or leasing for EE activities
    - Partial risk guarantees
    - Other

What is the share of financial and/or non-financial institutions that offer credit lines for EE investments in each sector?

- Residential sector
- Commercial sector
- Industrial sector

7. Minimum Energy Efficiency Performance Standards

- **Have minimum energy performance standards been adopted for the following?**

- Refrigerators
- Heating, ventilation and/or air conditioning (HVAC)
- Lighting equipment
- Industrial electric motors
- Other industrial equipment and/or domestic appliances
- Light vehicles

- **Verification and penalties for non-compliance**

Refrigerators

- Are the standards mandatory?
- Is there a requirement for periodic reporting to verify compliance with standards?
- Is there a place for "testing certification" of EE standards?
- Is the verification of compliance with standards carried out by a "credible verification scheme" (such as an independent third party)?
- Is there a penalty for non-compliance with EE standards?
- Is there a periodic update of standards to reflect technological advances and changes in best practices for EE standards?

Heating, ventilation, and/or air conditioning (HVAC)

- Are the standards mandatory?
- Is there a requirement for periodic reporting to verify compliance with standards?

- Is there a place for "testing certification" of EE standards?
- Is the verification of compliance with standards carried out by a "credible verification scheme" (such as an independent third party)?
- Is there a penalty for non-compliance with EE standards?
- Is there a periodic update of standards to reflect technological advances and changes in best practices for EE standards?

Lighting equipment

- Are the standards mandatory?
- Is there a requirement for periodic reporting to verify compliance with standards?
- Is there a place for "testing certification" of EE standards?
- Is the verification of compliance with standards carried out by a "credible verification scheme" (such as an independent third party)?
- Is there a penalty for non-compliance with EE standards?
- Is there a periodic update of standards to reflect technological advances and changes in best practices for EE standards?

Industrial electric motors

- Are the standards mandatory?
- Is there a requirement for periodic reporting to verify compliance with standards?
- Is there a place for "testing certification" of EE standards?
- Is the verification of compliance with standards carried out by a "credible verification scheme" (such as an independent third party)?
- Is there a penalty for non-compliance with EE standards?
- Is there a periodic update of standards to reflect technological advances and changes in best practices for EE standards?

Other industrial equipment and/or domestic appliances

- Are the standards mandatory?
- Is there a requirement for periodic reporting to verify compliance with standards?
- Is there a place for "testing certification" of EE standards?
- Is the verification of compliance with standards carried out by a "credible verification scheme" (such as an independent third party)?
- Is there a penalty for non-compliance with EE standards?
- Is there a periodic update of standards to reflect technological advances and changes in best practices for EE standards?

Light vehicles

- Are the standards mandatory?
- Is there a requirement for periodic reporting to verify compliance with standards?
- Is there a place for "testing certification" of EE standards?

- Is the verification of compliance with standards carried out by a "credible verification scheme" (such as an independent third party)?
- Is there a penalty for non-compliance with EE standards?
- Is there a periodic update of standards to reflect technological advances and changes in best practices for EE standards?

8. Energy Labelling Systems

- **Have energy efficiency labelling schemes been adopted for the following?**

- Refrigerators
- Heating, ventilation and/or air conditioning (HVAC)
- Lighting equipment
- Industrial electric motors
- Other industrial equipment and/or domestic appliances
- Transport vehicles

- **Mandatory vs voluntary labelling system**

Refrigerators

- Are any of the above labelling schemes mandatory?
- Is there a periodic update of standards to reflect technological advances and changes in best practices for EE labels?

Heating, ventilation, and/or air conditioning (HVAC)

- Are any of the above labelling schemes mandatory?
- Is there a periodic update of standards to reflect technological advances and changes in best practices for EE labels?

Lighting equipment

- Are any of the above labelling schemes mandatory?
- Is there a periodic update of standards to reflect technological advances and changes in best practices for EE labels?

Industrial electric motors

- Are any of the above labelling schemes mandatory?
- Is there a periodic update of standards to reflect technological advances and changes in best practices for EE labels?

Other industrial equipment and/or domestic appliances

- Are any of the above labelling schemes mandatory?
- Is there a periodic update of standards to reflect technological advances and changes in best practices for EE labels?

Transport vehicles

- Are any of the above labelling schemes mandatory?
- Is there a periodic update of standards to reflect technological advances and changes in best practices for EE labels?

9. Building Energy Codes

- New residential and commercial buildings

Is there a national heating or cooling strategy in place?

Is there a national standard or regulation for "near zero energy buildings"?

Are there EE codes for new residential buildings?

Are there EE codes for new commercial buildings?

Are the building EE standards required to be updated on a regular basis to reflect technological advances and changes in best practices for building EE?

- Residential sector
- Commercial sector

- Compliance system

Is commission testing for EE required for final building acceptance documentation?

Is there a requirement for periodic reporting to verify compliance with building EE requirements?

Is verification carried out by a "credible verification scheme" (such as an independent third party)?

- Renovated buildings

Are renovated buildings required to meet a building energy code, in residential and commercial sectors?

- Residential sector
- Commercial sector

Are the building EE standards required to be updated on a regular basis to reflect technological advances and changes in best practices for building EE?

- Residential sector
- Commercial sector

- Building energy information

Is there a mandatory standardised rating or labelling system for the energy performance of existing buildings?

Are commercial and residential buildings required to disclose property energy usage at the point of sale or when leased?

Are large commercial and residential buildings required to disclose property energy usage annually?

- Green buildings

Are there targets or incentives in place for green buildings? If so, what percentage of buildings are certified green?

What percentage of buildings are actually certified "green" or energy efficient according to the incentive scheme?

10. Transport Sector

- **Planning**

Is there a national database or national reporting system to periodically track and report the following transport efficiency metrics:

- Fuel per mile driven
- Average distance travelled per vehicle
- Distance travelled by public transit as a share of total passenger distance travelled
- Vehicle miles travelled per capita
- Other

- **Private transport**

Are there any mandates or incentive programmes that support the reduction of transport demands or shifts to more energy-efficient modes of transport for personal use, such as:

- Regularly scheduled teleworking
- Bicycle and/or other non-motorised schemes
- Car sharing
- Public transit subsidies for consumers
- Congestion charges
- Electric vehicle programmes
- Other

Is there a requirement for periodic reporting to verify compliance or progress of the programme(s)?

- **Commercial and/or industrial transport**

Are there any mandates or incentive programmes that support the reduction of transport demands or shifts to more energy-efficient modes of transport for commercial and/or industrial use, such as:

- Fuel economy standards for heavy-duty vehicles (the data already collected in Indicator 10 can be scored here)
- Mandatory fuel economy standards or efficiency incentives for the freight rail
- EE procurement standards or incentives for municipal rail and bus fleets
- Efficient fuel-switching mandate or incentive programmes for commercial/industrial vehicle fleets
- Other

Is there a requirement for periodic reporting to verify compliance or progress of the programme(s)?

11. Carbon Pricing and Monitoring

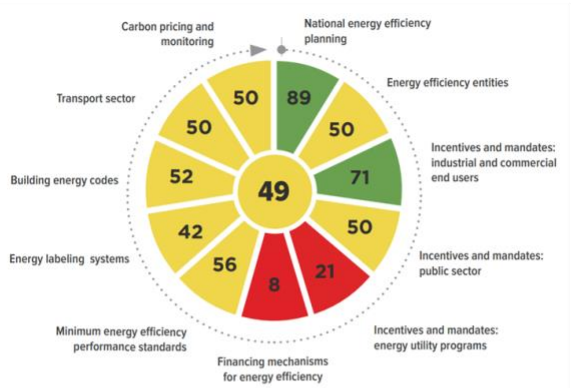
- Greenhouse gases (GHG) emissions regulations

Is there a carbon pricing mechanism that covers GHG emissions within the country?

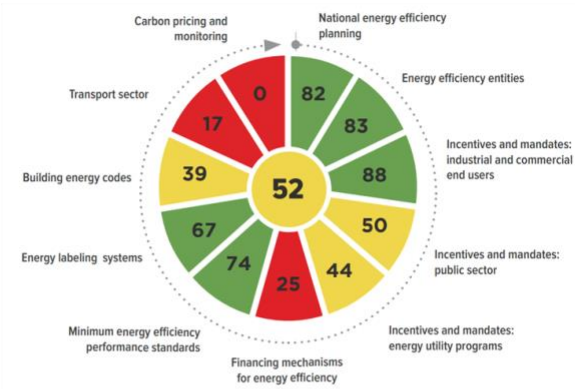
Is there a monitoring, reporting, and verification system for GHG emissions in place?

Results by country in the Mediterranean region

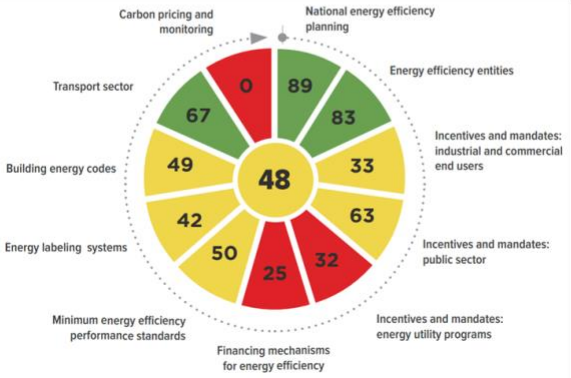
Albania



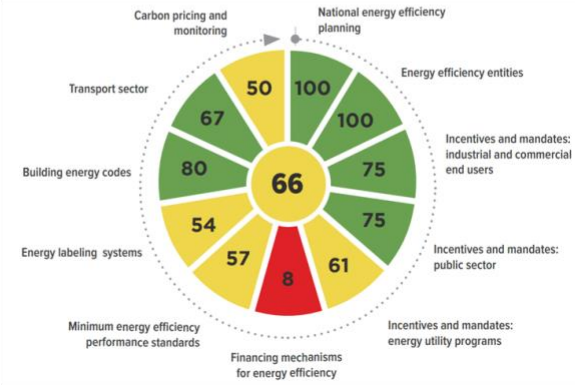
Algeria



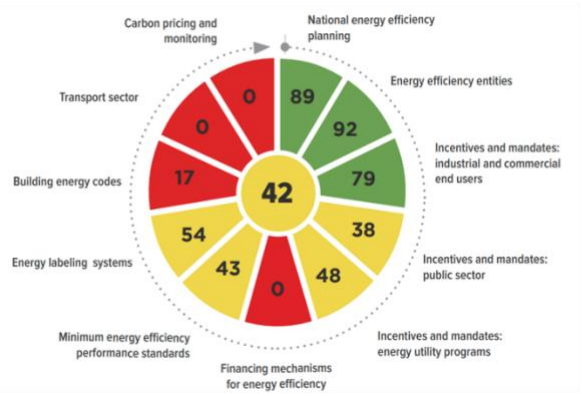
Bosnia & Herzegovina



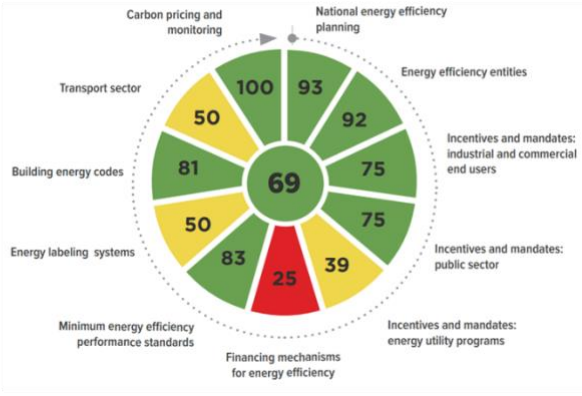
Croatia



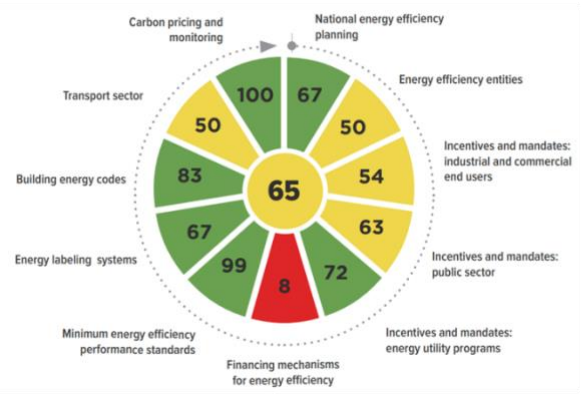
Egypt



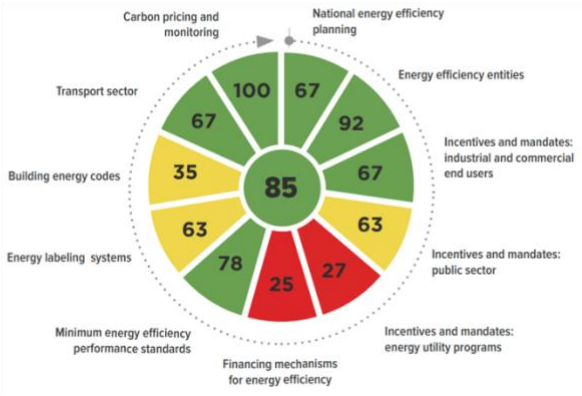
France



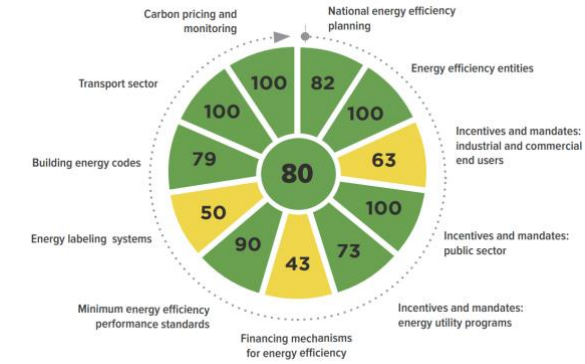
Greece



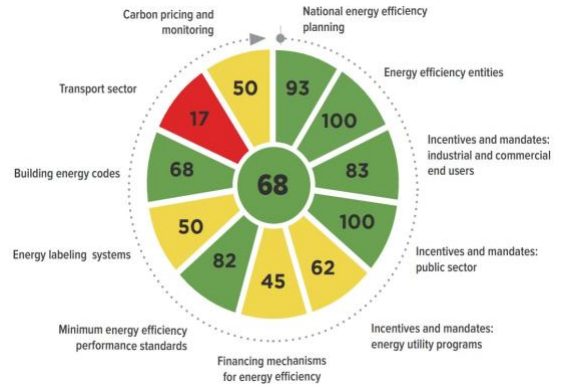
Italy



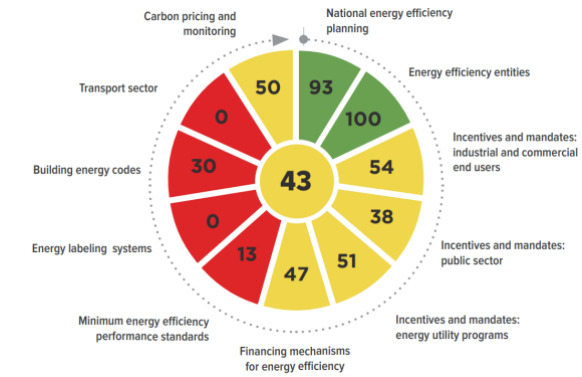
Israel



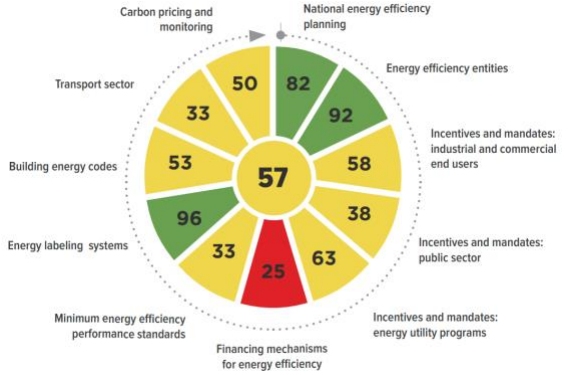
Jordan



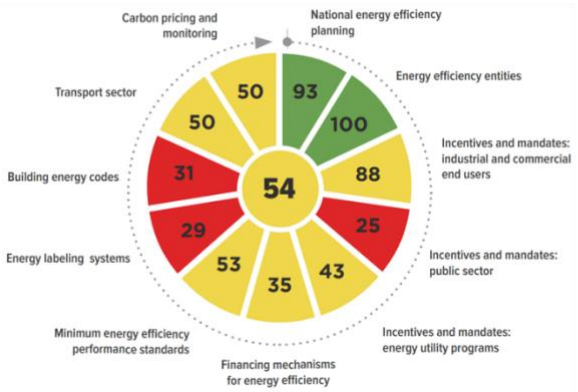
Lebanon



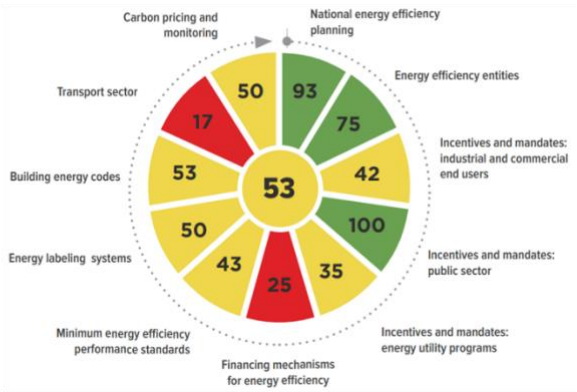
Montenegro



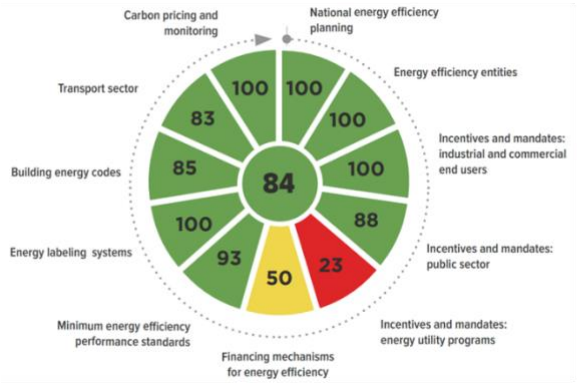
Morocco



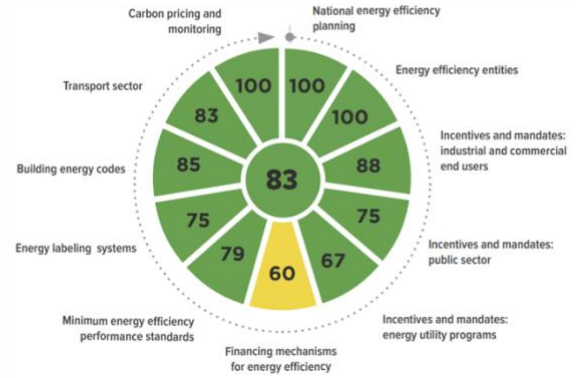
North Macedonia



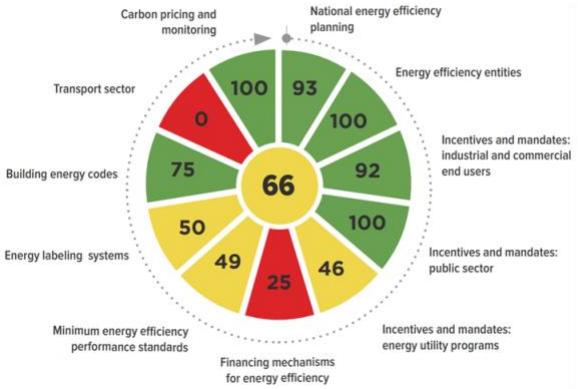
Portugal



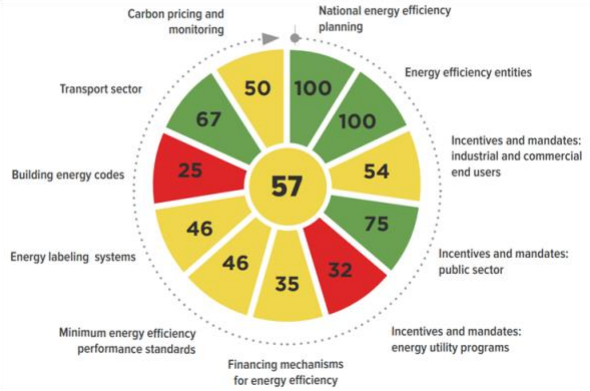
Spain



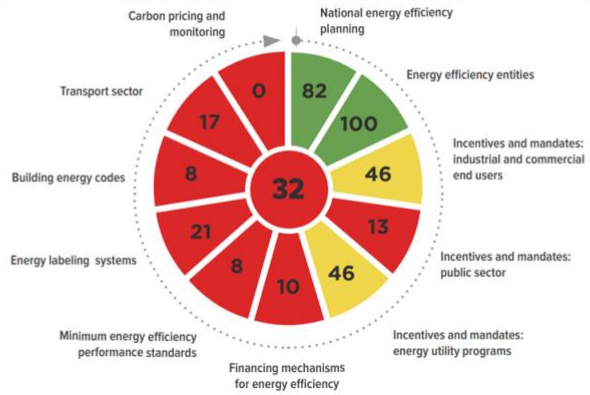
Tunisia



Türkiye



Palestine



Annexe 2:

1- Buildings in MENA[21]

The project provides insights and outputs from the accelerating zero-emission building sector ambitions in the MENA region project, with a focus on the heating and cooling system deployment in new buildings. Furthermore, it has an online tool concerning the building's energy performance and typology database.

In addition, the progress reports and country fact sheets (2021 data) for Egypt, Jordan, and Lebanon are available on the website.

2- Cool Up Programme[22]

The second important aspect regarding the work of RCREEE and MEDENER on EE is the numerous initiatives regarding sustainable cooling – the Cool Up Programme. The case studies from Egypt, Lebanon, Jordan, and Turkey are interesting examples of initiatives for sustainable cooling. Further information related to the regulations and policies and case studies of the mentioned countries are available on the website.

[21] https://www.buildings-mena.com/

[22] https://www.coolupprogramme.org/

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