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REGULATORY ASPECTS OF GREEN ELECTRICITY TRADING IN THE MEDITERRANEAN REGION



Environment, Renewable
Energy Sources and
Energy Efficiency
Working Group
(RES WG)

*Empowering Mediterranean regulators
for a common energy future*

ABOUT MEDREG

MEDREG is the Association of Mediterranean Energy Regulators, uniting 29 regulators from 23 countries across the European Union, the Balkans, and the MENA region.

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

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

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

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EXECUTIVE SUMMARY

The Mediterranean region is at a critical stage in its energy transition, actively harnessing its vast Renewable Energy Sources (RES) potential to accelerate regional decarbonisation and strengthen energy security. This report benchmarks the regulatory frameworks for green electricity trading across the Mediterranean region, including the European Union (EU) member states, Balkan countries, and the Southern and Eastern Mediterranean shores.

The analysis reveals a divergence in regulatory maturity, creating a significant barrier to a truly integrated green energy market. EU member states (e.g. Spain, Italy, France, Portugal, Greece) operate fully implemented Guarantees of Origin (GO) schemes compliant with EU directives and the European Energy Certificate System (EECS). Though Türkiye too operates a fully implemented GO scheme, its market participation is currently below the expected level. Conversely, Southern and Eastern Mediterranean countries (e.g. Algeria, Egypt, Morocco, Jordan, Lebanon, North Macedonia) are navigating the early stages of certification, often adopting the International Renewable Energy Certificate (I-REC) standard or launching new national GO decrees. Bridging this certification gap through mutual recognition and harmonisation constitutes the highest technical and regulatory priority.

Cross-border electricity trade is essential; however, it is constrained. While North-North links are robust and key North-South interconnectors exist (e.g. Spain-Morocco, Egypt-Jordan), capacity expansion is essential to facilitate considerable two-way RES flows. Many Southern Shore countries also face internal grid limitations, bureaucratic hurdles, and the need for greater institutional capacity (e.g. establishing a functional National Regulatory Authority, as seen in Lebanon and Tunisia).

Corporate Power Purchase Agreements (CPPAs) are identified as a central tool for financing green projects. The market is highly developed in leading nations like Spain, but in the early stages or limited in scope in the South and East, where access is often restricted to the transmission grid (large consumers) or public entities. Algeria, for instance, has enabled CPPAs for eligible customers but faces hurdles in off-site contract adaptation and financing knowledge.

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1. Introduction

1.1 Report Context and Objective

The Mediterranean region is undergoing significant changes. Rapid urbanisation, sustained economic growth, and abundant solar and wind resources create both opportunities and challenges. Countries across the region must simultaneously pursue national decarbonisation targets while safeguarding energy security and affordability.

Our benchmark analysis reveals substantial disparities in renewable energy penetration, reflecting differences in resource potential, regulatory frameworks, and market structures. A clear North-South and West-East divide emerges in the maturity of Renewable Energy Sources (RES) in national electricity mixes, with notable exceptions. This uneven distribution presents a unique opportunity for green electricity trading: channelling surplus, low-cost renewable generation from high-potential countries such as Spain, Portugal, and Albania towards markets with lower penetration or differing demand profiles.

Cross-border infrastructure is the basis of these exchanges. Today, the Mediterranean grid comprises strong regional interconnections, particularly within Continental Europe's synchronous system, alongside a growing number of links bridging Europe with North Africa and the Middle East.

Despite these links, National Regulatory Authorities (NRAs) agree that current capacity is inadequate to support large-scale renewable energy flows. The development of high-capacity, bi-directional interconnectors, supported by harmonised Grid Codes, is therefore essential to create a truly integrated Mediterranean market.

Building such a market, however, also requires overcoming significant regulatory and institutional barriers. The analysis of 13 countries identifies three key areas of focus:

Guarantee of Origin (GO) Harmonisation: The lack of a mutually recognised certification framework hinders cross-border renewable trading. Divergent systems, such as the EU's GO scheme, Algeria's static CGO model, and emerging I-REC or national mechanisms (e.g. Morocco's Decree N° 2.24.761), complicate consumer disclosure and compliance with tools like the EU Carbon Border Adjustment Mechanism (CBAM).

Institutional Development: The absence of fully empowered NRAs in some countries, such as Lebanon and Tunisia, slows market reforms, tariff setting, and compliance monitoring.

Managing Intermittency and Grid Capacity: High RES penetration demands greater system flexibility. Regulations promoting storage, smart grids, and demand response will be essential to address intermittency and balance cross-border flows.

This report examines these challenges in depth and proposes a roadmap for transforming regulatory diversity into coordinated regional strength, laying the foundations for a unified Mediterranean green electricity trading market.

1.2 Methodology and Definitions

The report is based on a benchmarking exercise sent to MEDREG RES WG members. The benchmark aims to understand the current status regarding the use and implementation of certification of guarantees of origin and green electricity trading.



Figure 1. MEDREG members participating in the benchmark

1.3 Need for Green Electricity Trading

Green electricity trading is not a supplementary activity; it is a critical regulatory and technical necessity for the Mediterranean region to achieve its energy transition goals. The cross-border exchange of renewable energy attributes and physical flows acts as a facilitator, enabling countries to leverage their diverse geographical advantages and energy conditions, thereby enhancing sustainability, reducing carbon footprints, and promoting systemic regional stability.

i. Driving decarbonisation and international compliance

Green electricity trading is fundamental to meeting both national renewable energy targets and the EU's Green Deal and Renewable Energy Directive.

The Mediterranean region is characterised by clear imbalances in renewable energy generation potential and penetration rates, which trading is well-positioned to balance. Countries like Portugal (70% RES in the mix) and Spain (56.5% RES in the mix) demonstrate significant generation surpluses, particularly from intermittent solar and wind. Albania, with its 100% RES

mix predominantly based on hydropower, also represents a major source of dispatchable green energy.

Conversely, countries like Algeria (1%), Egypt (11.7%), and Lebanon (21.6%) are actively seeking to rapidly integrate more clean energy but face grid constraints and slower capacity increase relative to demand. Cross-border trading enables these importing nations to instantly reduce their reliance on fossil fuels by purchasing certified green power, effectively accelerating the region's collective decarbonisation timeline.

ii. Alignment with carbon accounting mechanisms

Standardised green electricity trading is essential for the region's alignment with global carbon pricing mechanisms. As articulated by EgyptERA, standardising emissions reporting for electricity exports and aligning with the EU's CBAM is a key strategic step.

The use of legally recognised GO or I-REC certificates ensures the auditable traceability of green energy, which is necessary to substantiate environmental claims, avoid double-counting, and comply with strict international carbon accounting standards. Without harmonised and credible certification frameworks, electricity traded across the Mediterranean region risks being categorised as "grey" energy for CBAM purposes, undermining both the environmental and economic value of trade.

iii. Enhancing energy security and system flexibility

The integration of intermittent renewable sources places significant burdens on national grids. Cross-border green electricity trade transforms the challenge of managing excess intermittent power on a national level into a regional solution by sharing power across diverse consumption and generation profiles.

a. Optimising grid integration

The ability to export surplus green power reduces congestion and curtailment risks in high-generation areas (like the Iberian Peninsula) and provides load-following capacity to importing nations. This is critical for system stability.

As indicated by the Jordanian and Albanian regulators (EMRC and ERE), enhanced trading must be supported by significant technical steps, such as:

- **Storage technologies:** Promoting large-scale storage technologies (like pumped hydro and batteries) is necessary to convert intermittent RES into a stable and tradable green capacity.

- **Smart grids and flexibility mechanisms:** Implementing demand response programmes and modern grid codes is essential for NRAs to improve RES integration, as highlighted by Portugal's ERSE, which commented on the need for network adjustments to better integrate growing imports and manage capacity allocation.

b. Regional risk mitigation and cooperation

Cross-border interconnections are a critical infrastructure that improves regional energy security by providing alternative supply routes during local disruptions. The expansion of interconnections, as universally recommended by the NRAs in their future roadmap suggestions, is the physical prerequisite for robust trading.

Morocco and Spain are actively expanding their interconnection capacity, recognising that stronger North-South links are vital to realising a true Mediterranean green market. Further, the cooperation fostered through shared grid planning, data exchange between TSOs and regulators (a key step identified by EgyptERA and Albania's ERE), and the development of a common Mediterranean Grid Code (as noted by Portugal's ERSE) builds mutual trust and system resilience.

iv. The economic value proposition

Green electricity trading provides compelling economic benefits for producers, corporate consumers, and national economies by promoting long-term investment stability.

a. De-Risking investment through long-term contracts

The shift from regulated support schemes (like Feed-in Tariffs) towards market-based mechanisms (Auctions and CPPAs) requires financial certainty. Long-term contracts, such as CPPAs, are facilitated by an effective green trading framework:

- **Corporate Power Purchase Agreements (CPPAs):** As Chapter 6 will explore in depth, CPPAs are the most effective financing tool. Their widespread adoption in Spain (reaching 11.6 GW capacity in 2024) demonstrates that a robust trading and certification system attracts corporate buyers, offering stability and hedging against wholesale price volatility.

- **GO/I-REC Market Value:** The existence of a traceable green certificate market adds a separate revenue stream for RES generators, improving project bankability. While prices are defined by a free market (as in Spain), this tradable attribute provides vital collateral for financing projects in emerging markets like Jordan (which uses I-RECs) and Morocco (which is establishing its national GO system).

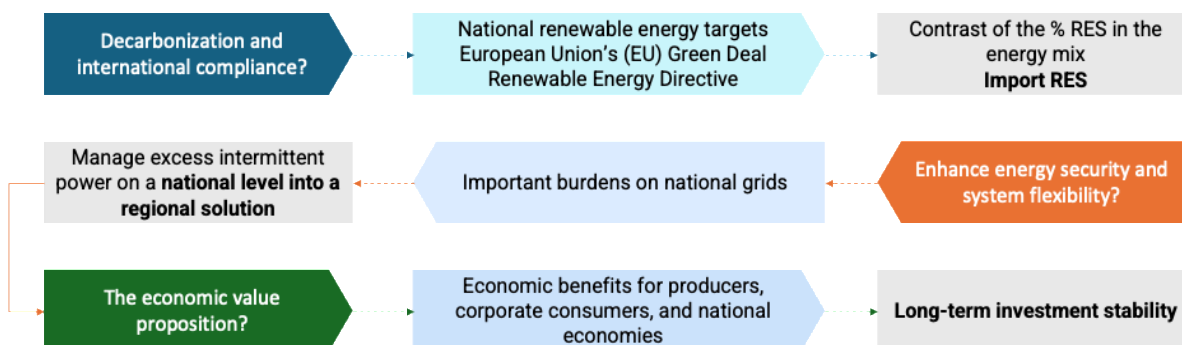
b. Promoting competitive pricing

Competition between regional green generators drives down the cost of electricity. By expanding the potential market size beyond national borders, producers can achieve economies of scale and optimise resource allocation (e.g. placing solar farms in the sunniest regions and wind farms in the windiest, regardless of the consumption point). This increased competition ultimately benefits Mediterranean consumers through lower, more stable energy prices.

Executive Summary: The Critical Need for Green Electricity Trading

Green electricity trading is a non-negotiable necessity for the Mediterranean's energy future, driven by three core imperatives, as illustrated below.

- Decarbonisation & Compliance:** Trading addresses the fundamental North-South imbalance in RES generation. Highly saturated markets (like Spain and Portugal) can export surplus, low-cost power to accelerate decarbonisation timelines in import-reliant nations (like Algeria and Egypt). This flow of certified clean energy is also essential for aligning the entire region with international carbon accounting and the EU's CBAM, ensuring imports are valued as "green" rather than "grey."
- Energy Security & System Flexibility:** Cross-border exchange turns the challenge of intermittency into a regional solution. By sharing intermittent power, the system reduces local curtailment risks in high-production areas and enhances system stability for all. This requires significant investment in interconnection expansion and storage technologies, which also serves to enhance regional energy security by diversifying supply.
- Economic Value Proposition:** Trading promotes long-term investment stability. It facilitates CPPAs, the key financing tool for new RES projects, and adds value through the GO/I-REC market. By expanding the market size, the resulting competition drives down costs, optimising resource allocation and benefiting Mediterranean consumers with lower, more stable energy prices.



2. Evolution of RES Integration Mechanisms

RES integration is divided into two main challenges: the technical challenge of ensuring a stable and secure power grid, and the market challenge of credibly tracking the origin of electricity. This chapter analyses the primary mechanisms used across the Mediterranean region to address both aspects, focusing on grid management flexibility tools and the fundamental role of green certification schemes.

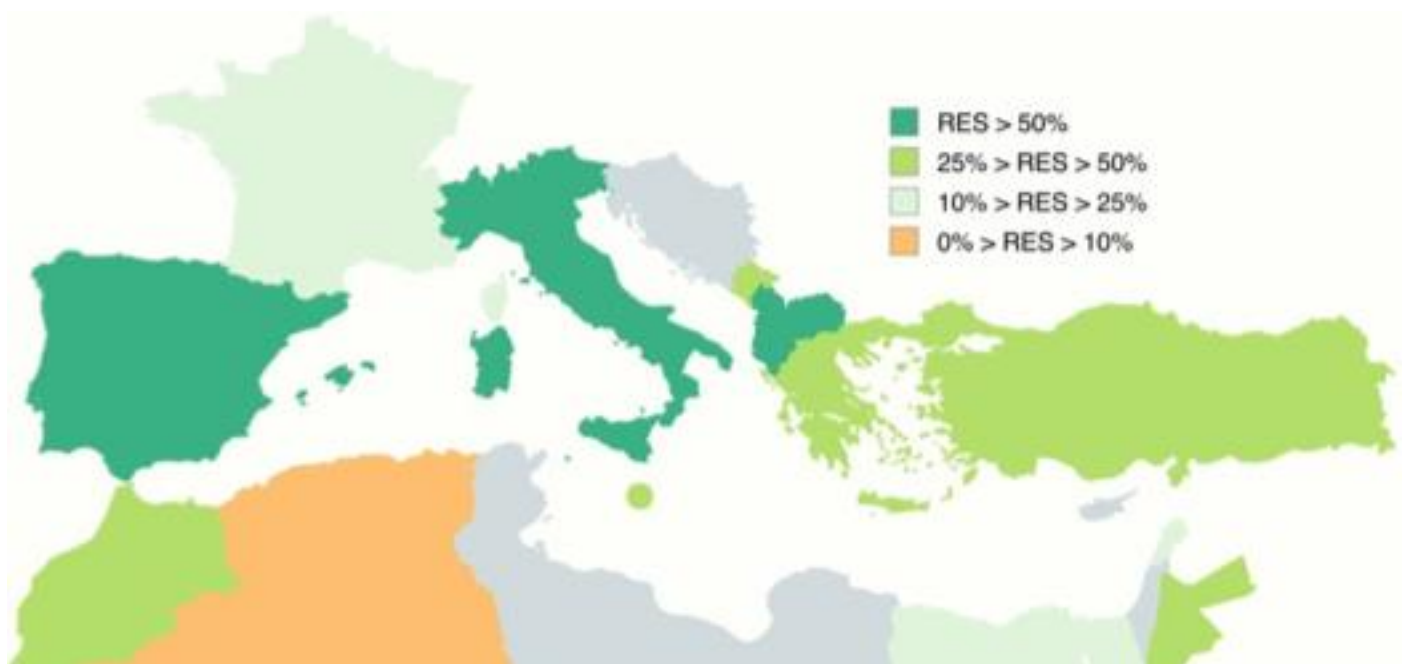


Figure 2. MEDREG member countries - RES % in the energy mix by the end of 2024

To ensure grid stability and maximise the usable output of intermittent RES (solar, wind), countries employ a mix of financial and regulatory mechanisms. The benchmark data reveal a continuum from historical support schemes to modern, market-based flexibility tools.

Many countries in the Mediterranean have successfully transitioned from initial, purely supportive models to more competitive, market-driven approaches to reduce the cost of renewables and promote efficient integration. This evolution reflects a growing maturity in energy policy, moving from guaranteeing revenue to managing price risk.

The trajectory of this evolution can be mapped across four distinct milestones of support schemes (see figure below):

| Pre-2010 | Early 2010s | Mid-2010s | Mid 2010s | 2023 |
|---|---|--|---|---|
| Feed-in Tariffs (FiTs) | Feed-in Premiums (FiPs) | Capacity Auctions/Tenders | Net Metering/Net Billing | Contracts for Difference (CfDs) |
| Italy references laws from 1999 and 2007, marking the earliest form of fixed subsidy. | FiTs are largely replaced by FiPs or auctions for new projects. | Widely adopted (Spain, Portugal, France) and also used in the South Shore, notably in Morocco. | Employed in Jordan (Net Billing—On/Off site), and recently expanded in Lebanon. | Two-way settlement that caps the producer's windfall during high-price periods, which is then used to offset subsidy costs during low-price periods. This provides greater budgetary control for the government and full price certainty for the RES generator. |

Figure 3. Evolution of the financial support mechanisms for RES

- **Milestone 1: Revenue Certainty (Pre-2010)**

The first wave of renewable energy growth relied heavily on Feed-in Tariffs (FiTs). This mechanism guaranteed RES producers a fixed, long-term price for every unit of electricity generated, regardless of the wholesale market price.

Goal: To maximise initial investment and deployment by eliminating market risk, essential when RES technology costs were high.

Drawback: FiTs often led to overcompensation and shielded producers from market signals, reducing their incentive to generate power efficiently (e.g. when the grid needed it most). Italy references this phase with laws dating back to 1999 and 2007.

- **Milestone 2: Introducing Competition (Early 2010s)**

As technology costs dropped, policies shifted towards competitive mechanisms to reduce subsidy rates:

Capacity Auctions/Tenders (Early 2010s): This method replaced fixed tariffs by requiring developers to bid for capacity, winning the right to connect to the grid and receive support based on the lowest price offered. Italy started using descending-bid auctions for large plants around 2012. This approach is now widely used across the region (Spain, Morocco, Portugal, etc.).

Feed-in Premiums (FiPs) (Mid-2010s): FiPs represent a bridge mechanism. The producer sells electricity directly to the wholesale market at the fluctuating market price and receives an additional, fixed premium (or "top-up") from the government. Italy's system explicitly replaced Green Certificates with FiPs as of 2016. Unlike FiTs, this forces the generator to face the market, providing some incentive for efficient operation.

Recent Update

A significant recent development in Italy, effective since February 2025, is the introduction of the new DM FER X support scheme, valid exclusively for the current year. This scheme modernises the support landscape by granting premium tariffs for 20 years to competitive RES-E plants (including wind, hydro, and PV). The support structure is finely tuned to market size: plants up to 200 kW receive a traditional FiT for injected energy, whereas those over 200 kW receive a FiP calculated hourly against the zonal energy price.

While descending-bid auctions determine the tariff for the largest plants (> 1 MW), the role of defining the tariff for smaller power plants (up to 1 MW) is delegated to ARERA, underscoring the National Regulatory Authority's critical role in the technical implementation and definition of support values even in politically mandated incentive schemes. The most critical innovation of DM FER X is its explicit link to system flexibility and risk mitigation: it requires compulsory qualification in the Ancillary Services Market (ASM) for plants over 1 MW. Crucially, the Contract for Difference (CfD) mechanism is extended to cover revenue losses caused by TSO/DSO curtailment and to compensate generators for providing essential upward flexibility (offering capacity to the ASM) when day-ahead market prices are null or negative. This sophisticated linkage demonstrates an advanced step in regulatory design, ensuring generators are compensated for providing essential grid services and promoting efficient system operation.

- **Milestone 3: Decentralisation and Direct Consumption (Mid-2010s)**

This wave focused on customer empowerment and managing smaller-scale, decentralised generation.

Net Metering/Net Billing: These schemes enable residential and commercial consumers to offset their consumption with their own RES generation (e.g. rooftop solar). This system was active in Egypt around 2015 and saw major legislative expansion in Lebanon with Law 318 in 2023, allowing Peer-to-Peer (P2P) trading.

- **Milestone 4: Two-Way Risk Management (2023)**

The most sophisticated model for market integration is the CfD, which addresses both high and low-market price risks. Generally, it is a two-way settlement that caps the producer's windfall during high-price periods, which is then used to offset subsidy costs during low-price periods. This provides greater budgetary control for the government and full price certainty for the RES generator, making it the most advanced support scheme for integrating projects into liberalised electricity markets.

In low-price periods: The government pays the producer the shortfall (the difference between the low market price and the strike price).

In high-price periods: The producer pays back the surplus to the government (the difference between the high market price and the strike price).

- **Grid Flexibility and System Operator Roles**

The shift towards high RES penetration requires Transmission System Operators (TSOs) and Distribution System Operators (DSOs) to actively manage flexibility. This can be achieved through the following multiple mechanisms.

- **Priority Dispatch:** Ensuring priority acceptance of RES generation on the electricity market is a common regulatory tool, explicitly mentioned as part of the NRA's role in countries like Italy (priority acceptance of equal price offers) and Spain (ensuring priority dispatch).
- **Curtailement:** Italy has refined its curtailment compensation rules, effective April 2025, to ensure fair economic treatment for all major intermittent sources. Historically, only wind power plants were compensated for electricity curtailed (shut down by the TSO to manage grid overgeneration). The new regulation extends this compensation—valourised at the zonal electricity price—to all non-programmable RES plants, including large-scale solar PV. This change is crucial as it incentivises all producers to comply with the TSO request.
- **Storage and Demand Response (DR):** These are vital future-facing mechanisms. Jordan's EMRC and Albania's ERE explicitly call out the promotion of storage technologies as a critical future step. Portugal's ERSE highlights investment in smart grids and pumped hydro storage to better integrate intermittent power, and France uses technology-neutral capacity mechanisms open to DR programmes. Lebanon observed that regulations targeting the coupling of RES with other sectors, like electric vehicles, will have a positive cross-sectoral impact, promoting further demand-side flexibility. Italy has a forward procurement mechanism for large-scale storage. The first auction (delivery in 2028) took place on 30th

September 2025, with almost 10 GWh contract at an average premium of less than €13,000/MWh/year (contracts last 15 years).

- **The National Regulatory Authority (NRA)** plays a key role in enabling this flexibility, including:
 - Establishing grid codes and technical requirements: (Explicitly a role for the NRA in France and Spain);
 - Ensuring fair grid access: A universal NRA mandate, essential for non-discriminatory participation; and
 - Monitoring and enforcing market rules: Ensuring RES participation rules are followed.

- **Financial Incentives for RES Development**

Beyond market support, financial incentives encourage the initial capital expenditure for RES projects.

- **Tax Credits/Subsidies:** Spain uses tax incentives and grants under national and EU recovery plans. Jordan provides customs duties and sales tax exemptions (zero rate) on imported RES equipment (solar panels, inverters). Morocco also provides several tax incentives to solar water pumping systems and electric vehicles, inter alia.
- **Public Funding & Guarantees:** France provides public funding for innovative renewable projects, and the public investment bank (BPI) offers a guarantee fund for consumers seeking CPPAs. Egypt has offered customs and VAT exemptions on imported equipment and long-term PPAs guaranteed by the government. Algeria's main policy incentive is the guarantee of sale for electricity produced and injected into the national grid for a specified auction duration, with the purchase price determined by the tender. Lastly, Portugal offers financial support through programmes like the "Vale Eficiência" scheme and public-private partnerships. Morocco has used state guarantees to support long-term PPA projects developed by public entities.

3. Corporate Power Purchase Agreements in Green Trading

CPPAs represent an essential market mechanism for enabling green electricity trading by providing long-term, direct contractual links between RES producers and corporate electricity consumers. This structure is essential for de-risking investments, ensuring the bankability of new RES projects, and helping corporations meet ambitious sustainability targets.

3.1 CPPA Market Maturity and Usage

The CPPA market across the Mediterranean displays significant heterogeneity, ranging from high-volume, liquid markets in the West to emerging or state-controlled markets in the East and South.

- **Leading and Mature Markets (North Shore)**

- **Spain** is the leading European market for CPPAs by volume, with total PPA capacity reaching approximately 11.6 GW by the end of 2024. The Spanish market is characterised by high renewable penetration, with PPAs serving as a crucial instrument for hedging, investment, and sustainability for corporate buyers in the technology and industrial sectors. The market uses both physical and virtual CPPAs (vPPAs).
- **Greece:** CPPAs are a key component of the Greek renewables market, primarily driven by energy-intensive industries. To facilitate these bilateral contracts, the Hellenic Energy Exchange (HEEnEx) launched a PPA Platform in 2024, providing services for submitting offers and recording contracts, although the final deal is concluded outside the platform.
- **Portugal:** The market is actively promoting CPPAs to hedge against price risk and enable project financing. The regulator (ERSE) has formalised the framework for CPPAs by approving Directive No. 8/2025, which establishes the Manual of Procedures for the Registration and Bilateral Contracting of Electricity (MPPA), thereby enhancing transparency and regulatory clarity. A dedicated platform for CPPAs is being established and will be managed by the Iberian (futures and derivatives) market operator (OMIP).

- **Emerging and Structurally Restricted Markets**

- **Algeria:** CPPAs are available as an electricity purchase contract between an eligible customer and a renewable producer. Challenges include a lack of regulatory adaptation for off-site transactions and limited knowledge of this contract type among eligible companies.
- **Italy:** Italy actively facilitates CPPAs through dedicated market platforms. In April 2022, the "Bachecca PPA" was implemented by GME (the Italian Power Exchange) to directly match potential buyers and sellers. Further, the Ministerial Decree of June 2025 formalises the

creation of the MPPA (Market Platform for PPA), a dedicated market to support these transactions. The rules governing the MPPA were subject to a public consultation (Summer 2025) and will be formally approved by the Italian Minister after consulting ARERA. This demonstrates a continuous effort to provide transparent, regulated tools that mitigate market entry barriers and support bilateral contracting.

- **Morocco:** CPPAs are increasingly used following legal reforms (Law 13.09/40.19) that partially liberalised the market, allowing private investors to produce and sell electricity directly to end consumers using the national grid.
- **Jordan:** CPPAs are used, covering models from on-site solar projects to off-site agreements with Independent Power Producers (IPPs), driven by multinational companies seeking to meet sustainability goals.
- **France:** The volume of CPPAs remains limited (around 5 TWh/year). The low-carbon electricity mix and lower wholesale prices, combined with public support mechanisms that are too protective of producers, limit the appeal of CPPAs for both consumers and project developers.
- **Egypt:** The CPPA market is at a nascent stage. While EgyptERA has launched a Peer-to-Peer (P2P) trading scheme to allow direct bilateral contracting, this mechanism is currently restricted to customers connected to the transmission grid.
- **Türkiye:** No finalised CPPA agreements exist for energy sources other than the nuclear power plant currently under construction. The main challenges relate to the large scale and complexity of financing and construction.
- **Albania:** CPPAs are currently restricted to Public Power Purchase Agreements between private investors and public companies, limiting the free-market corporate transaction model.
- **North Macedonia:** CPPAs are not used as a mechanism for RES integration.

3.2 Regulatory and Contractual Challenges for CPPA Implementation

Despite their economic benefits, CPPAs face distinct regulatory and contractual challenges that hinder their widespread adoption, particularly in emerging markets.

- **Grid Integration and Connection Constraints**

A key technical challenge, particularly in the southern shore countries, is the strain that new, large-scale CPPA-backed projects place on the network.

- **Grid Connection Limits:** Jordan specifically cites limited national grid capacity for large-scale private renewable projects as a primary challenge. Türkiye also faces financial and

construction-related challenges due to the large scale of projects (e.g. the nuclear power plant).

- **Limited Access:** Egypt's restriction of CPPA and P2P trading to transmission-connected customers excludes the vast majority of commercial and industrial users connected to the distribution network, severely limiting market growth.
- **Coordination:** Spain highlights the operational complexity of grid access coordination as a recurring challenge.

- **Price Volatility and Risk Allocation**

CPPAs are designed to hedge against price volatility, but risk remains a complex contractual element, especially in long-term deals. Notably, the position of Italy's ARERA, which finds that since CPPAs are based on private contractual agreements and are not subject to direct regulation, there are generally no regulatory challenges for their implementation, focusing regulatory oversight instead on market rules and transparency.

- **Contractual Risk:** In Greece, the main challenges revolve around making PPAs financially attractive and predictable for industrial offtakers due to the contractual risk related to price volatility and shaping costs (the cost of making intermittent power available when the buyer needs it).
- **Regulatory Rigidity:** Jordan noted that long-term contracts (e.g. for 20 years) limit the regulator's flexibility to apply up-to-date regulations according to changes in the market, creating a structural tension between investment stability and market evolution.
- **Cost Risk:** In Jordan, the necessity to fix the power purchase price in certain contracts can also transfer cost risk onto the national grid operator.

- **Regulatory Alignment and Overlap**

In mature European markets, the overlap between energy and financial legislation creates complexity.

- **Financial Market Overlap (MiFID II/EMIR):** Portugal highlights the regulatory challenge of determining whether a CPPA qualifies as a financial derivative under MiFID II. If it does, it triggers additional obligations under EMIR (European Market Infrastructure Regulation), such as trade reporting and central clearing, significantly increasing the complexity of contract drafting and compliance for corporate entities.
- **Energy Market Regulation (REMIT):** Regardless of their financial classification, CPPAs are considered wholesale energy products under REMIT and are subject to data reporting obligations to ACER, adding layers of necessary governance.
- **RED II Alignment:** Spain faces challenges related to the complexity of aligning existing CPPA frameworks with the transposition of the EU's Renewable Energy Directive (RED II).

The CPPA Imperative and Regulatory Mandate

CPPAs are the primary non-subsidised driver of large-scale RES investment, providing long-term revenue certainty that de-risks projects and ensures their bankability. The Mediterranean region, however, reflects a stark contrast between mature markets (Spain, Greece—with over 11 GW of capacity and active exchange platforms like HEnEx) and emerging or restricted markets (Egypt, Albania, Algeria).

To unlock the full investment potential, Regulators (NRAs) must transition from passive oversight to active market facilitation. This requires three key actions:

- **Enabling Access & Liquidity:** NRAs must remove structural barriers, such as the restriction of PPA/P2P trading to the transmission grid (as seen in Egypt), and launch specialised market tools. Italy's implementation of the Bacheca PPA and the forthcoming MPPA demonstrates a model for creating transparent matching platforms.
- **Harmonising Risk:** Regulators must address contractual complexities, especially the overlap between energy regulation (REMIT) and financial derivatives (MiFID II/EMIR), which particularly affects cross-border CPPAs (Portugal, Spain). ARERA's position that private CPPAs pose no regulatory challenge underscores that the focus should be on fair access, not contract control.
- **Capacity Building:** For emerging markets (Algeria), NRAs must adapt regulations for off-site CPPAs and directly address the knowledge gap among local corporations regarding this critical financial tool.

MEDREG's role is essential in driving regional standardisation by developing common contract templates, promoting the mutual recognition of bilateral agreements, and setting clear rules for grid access coordination to mitigate cross-border risk.

4. Green Electricity Trading – Guarantee of Origin (GOs)

4.1 Green Electricity Certification Schemes

The regulatory landscape for green certification across the Mediterranean region can be broadly categorised into three stages of development: Fully Implemented, Partially Implemented (I-REC-based), and Under Development. This tiered structure illustrates the significant differences in market readiness for regional green electricity trading.

- **Fully Implemented**

This category encompasses countries with mature, operational GO systems already aligned with or operating under recognised regional standards, specifically the EU Directive 2018/2001 (RED II) and the European Energy Certificate System (EECS).

EU Member States (Spain, Italy, France, Portugal, Greece): These nations have fully implemented transferable and market-based GO systems. These systems issue a certificate for every MWh of energy produced, ensuring that the attribute is tracked dynamically and can be freely traded, imported, and exported across the Association of Issuing Bodies (AIB) network.

Energy Community States (North Macedonia): North Macedonia is operational (effective 2025) and adheres to the standards set by the Energy Community Secretariat. By following these standards and operating as an observer in the AIB, its system is structurally designed to achieve full EU interoperability once conditions are met.

Algeria (Static Certification Model): Algeria's Electricity and Gas Regulatory Commission (CREG) highlights that its Certificate of Origin Guarantee (CGO) scheme is fully implemented. However, it presents a critical distinction from the EU/AIB model: The CREG primarily certifies the production installation itself (MW) as renewable, verifying compliance with metering and counting rules before commissioning. This results in a static certification of the facility, meaning the certificate confirms the facility's nature, but does not dynamically track and allow the transfer of the specific energy units produced (MWh). This difference is a crucial factor limiting its immediate interoperability for market-based cross-border trading.

Türkiye (Market Operator Model): Türkiye operates a fully implemented GO scheme, though market participation is below the expected level. The scheme covers a wide range of sources, including geothermal, and is administered by the Market Operator (EPIAŞ/EXIST).

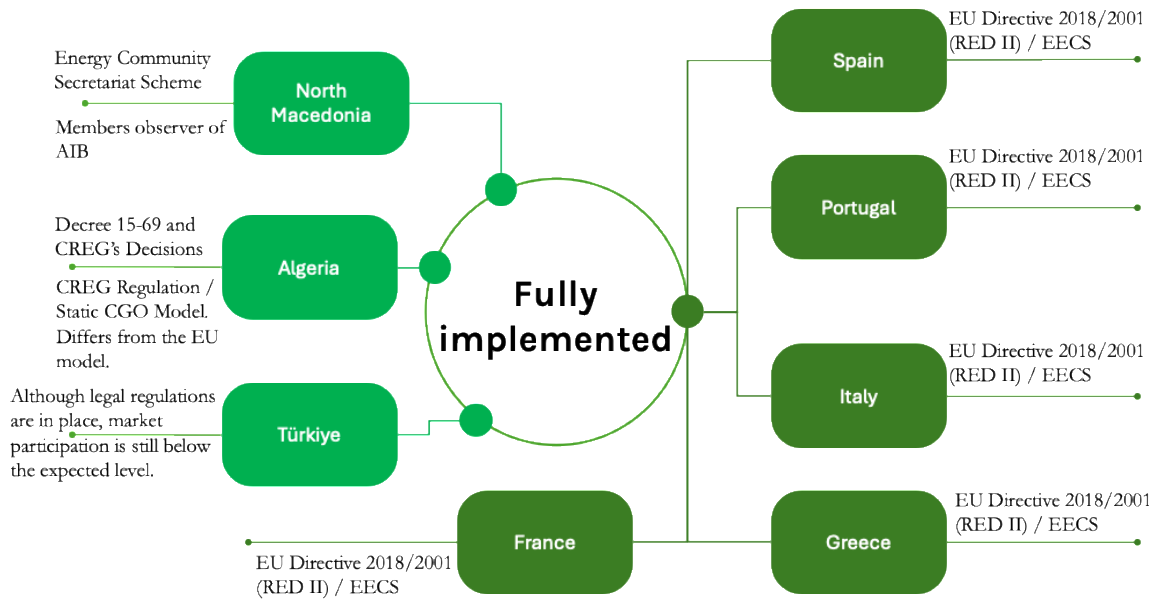


Figure 3. MEDREG member countries with fully implemented GO mechanisms

● **Partially Implemented**

Countries in this stage have an active, operational certification system but rely on an internationally recognised, third-party standard instead of a domestic or EU-aligned GO scheme.

Jordan and Lebanon: Both I-REC standards, with local issuers (the Royal Scientific Society in Jordan and the LCEC in Lebanon), approved by the I-TRACK Foundation. The I-REC is a global standard that tracks 1 MWh units, making the attributes verifiable and tradable for corporate buyers worldwide.

The Regulatory Bridge: The use of I-RECs indicates an early market appetite for certified green power. For these systems to fully integrate into a future Mediterranean market, the next regulatory step involves the mutual recognition of I-RECs against the GO system, a key harmonisation priority.

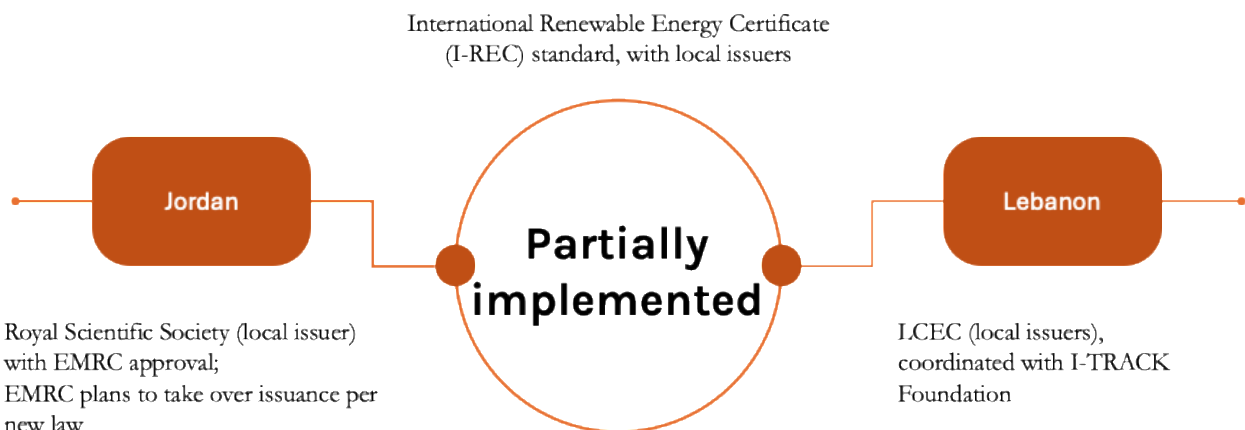


Figure 4. MEDREG member countries with a partially implemented GO mechanism

- **Under Development**

In this last category, members are actively building their national GO schemes, establishing the foundational legal decrees, operational procedures, and issuing bodies.

Morocco: The new Decree N° 2.24.761 (October 2024) establishes the framework for a Certificate of Origin, providing a clear description of the process and its requirements, such as data auditing and verification. The system is currently under development, with work underway to create the digital platform and the national certificate of origin registry. The present issuing body is the Ministry of Energy Transition and Sustainable Development (MTEDD), and the NRA (ANRE) has no direct role in the mechanism.

Albania: While Albania is structurally positioned to follow the Energy Community standard, its GO system is still considered in the development phase. The NRA (ERE) is responsible for issuance and verification, demonstrating the intention for strong regulatory oversight upon full implementation.

Egypt: Egypt is actively collaborating with international consultants to finalise rules for granting and trading GOs/I-RECs, with the regulator, EgyptERA, expected to be the sole issuer. This positioning suggests a rapid move towards a centralised, regulated system.

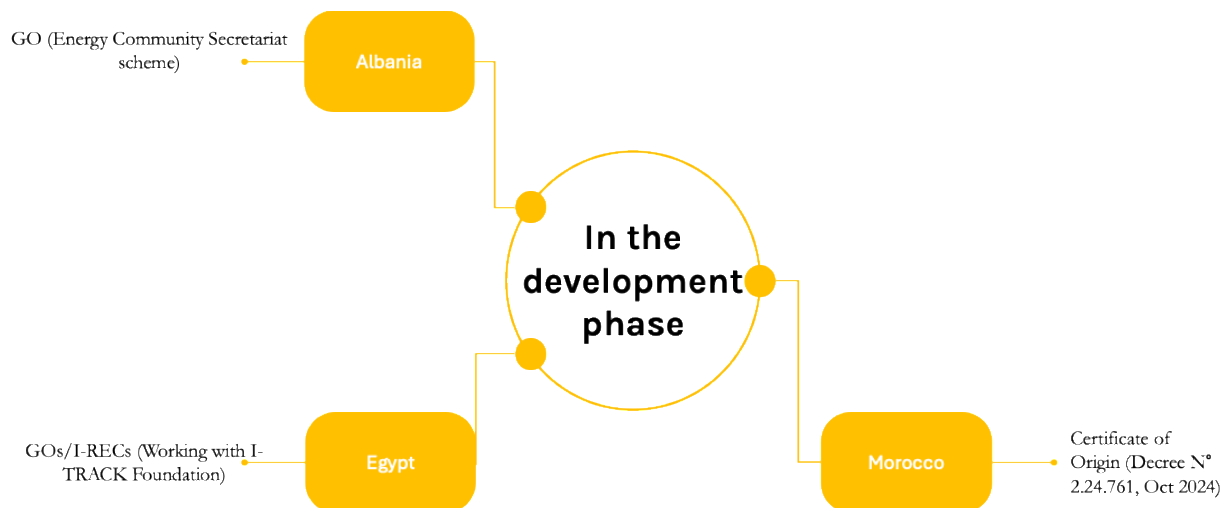


Figure 5. MEDREG member countries developing a GO mechanism

- **The Challenge of Mutual Recognition**

The increase in certification standards presents a significant barrier to cross-border green electricity trading. Spain recommends the "Harmonisation of GO systems and recognition between EU and third countries" as a main roadmap step. Italy specifically calls for "The extension of the GO mechanism and the relative export and import mechanism also to the extra-EU countries."

The core regulatory challenge for the Mediterranean region is to establish a bridge that enables the mutual recognition of EU GOs, the newly developed national schemes (Morocco), and the globally recognised I-RECs (Jordan, Lebanon, Egypt in development). This mutual recognition is a prerequisite for a unified, traceable green electricity market.

4.2. Certification Bodies and Regulatory Framework

The credibility of green electricity trading centres depends entirely on the integrity of the certification process. Certification bodies—known as the Guarantee of Origin Issuing Body (EEGO) or its equivalent—are responsible for validating that a quantity of electricity was generated from renewable sources. This chapter benchmarks the operational models across the Mediterranean, focusing on who issues the certificates, the criteria used for their validation, and the essential regulatory oversight provided by NRAs.

- **The Landscape for Guarantee of Origin Issuing Bodies**

The entity responsible for issuing green certificates varies significantly across the region, reflecting differing levels of market maturity and institutional structures. We observe three main models: the independent regulatory/market model, the TSO/System Operator model, and the government/ministry model.

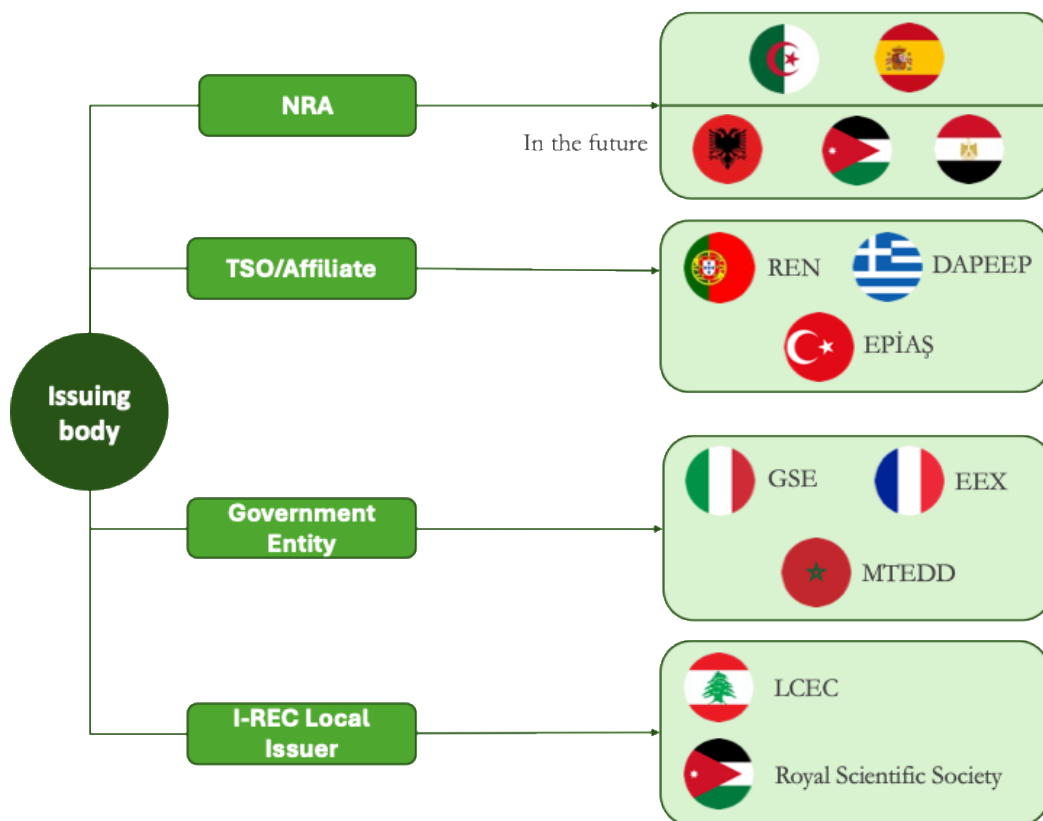


Figure 6. Issuing Bodies in the Mediterranean region

In the EU member states (Portugal, Greece, Spain), the issuing bodies are highly integrated with market operations (TSOs or dedicated market entities). In Morocco, the issuing body is the Ministry of Energy Transition and Sustainable Development (MTEDD), with the NRA (ANRE) currently having no direct role.

In Türkiye, the market operator EPIAŞ (EXIST) is responsible for GO issuance. On the other hand, EMRA is the competent authority responsible for GO regulatory arrangements, setting general rules, and monitoring their implementation.

- **The Evolving Role of the Regulator**

The NRA's involvement shifts from initial market design to continuous supervision and enforcement, acting as a guarantor of system integrity.

- **Direct Issuance/Responsibility:** In Spain and Algeria, the NRA (CNMC/CREG) holds direct responsibility for the issuance and verification of GOs, simplifying the oversight chain. CREG is also responsible for establishing the requirements of the metering code. For countries where GOs are being developed, ERE (Albania) and EgyptERA expect to be the sole issuer of GOs in the future.
- **Supervision and Rule-Setting:** For TSO/Affiliate-based models, the NRA's main role is to approve the rules and monitor compliance. Greece's RAAEY approves core operational rules, resolves disputes, and manages international aspects. Portugal's ERSE approves the EEGO's Manual of Procedures. EMRA (Türkiye) is responsible for determining who can hold certificates and for setting the general rules governing the certificate system operation.
- **Minimal/No Direct Role:** In Italy, ARERA (NRA) currently has no direct role in the GO issuance process, as it is managed by the public entity GSE. Similarly, Morocco's ANRE currently has no particular role.
- **Financial Oversight:** North Macedonia's NRA (ERC) specifically approves the price list for services provided by the Market Operator related to the GO register.
- The trend for future development, as indicated by Jordan's EMRC and EgyptERA, is towards increasing the NRA's authority over GO issuance, recognising that regulatory independence is the most robust foundation for building market trust.

- **Certification Criteria and Standards**

EU Member States adhere to the EU Directive 2018/2001 (RED II) and the EECS (European Energy Certificate System) rules. These standards define the one-MWh-per-GO basis and impose strict anti-double-counting rules.

For non-EU countries, the approach is mixed:

- **I-REC Standard:** Countries such as Jordan and Lebanon use the global I-REC standard, which requires facilities to be registered, generation to be verified against auditable metered data, and the certificate to be unique and issued within 12 months of generation.
- **National Decrees:** Morocco's new Decree N° 2.24.761 (October 2024) specifies all elements related to the issuance of GOs in Morocco, including the requirement for the facilities to be registered in a national register of certificates of origin. It also details the information to be provided about each renewable energy facility, the metering data that must

be verified, and the publication of the list of issued certificates in the national registry of certificates of origin.

- **Developing schemes:** Egypt is actively working with international consultants (e.g. the World Bank and I-REC Standard Foundation) to finalise criteria for its national system, aiming to meet internationally recognised standards.

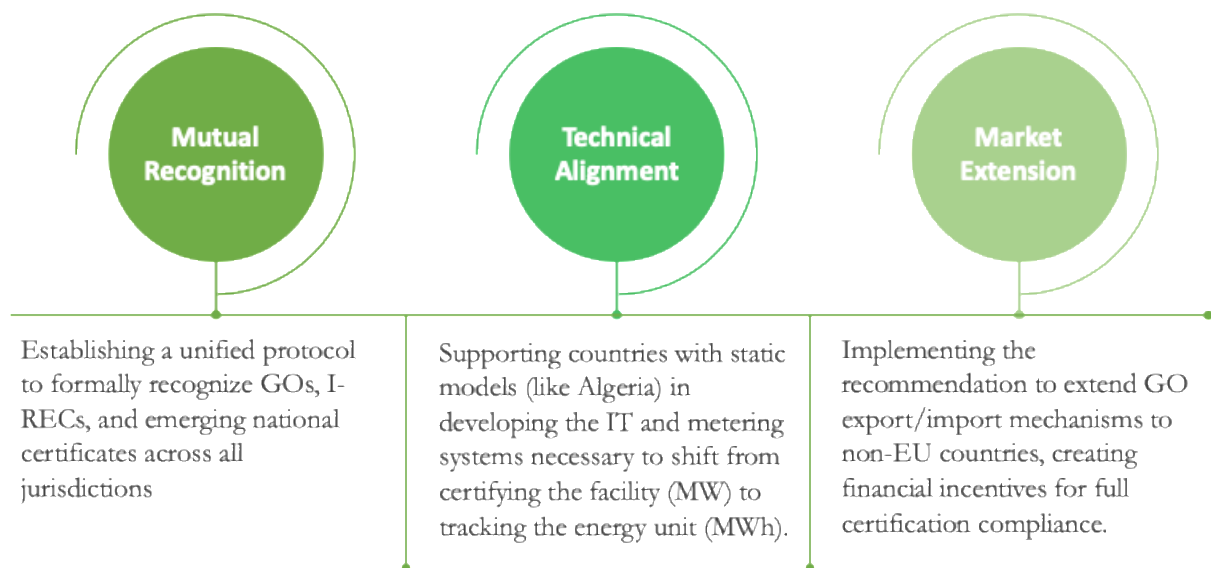
- **Ensuring Independence of Certifiers**

Independence is paramount to avoid conflicts of interest, particularly when the issuing body is government-affiliated or an integrated TSO.

- **Regulatory Oversight:** In most mature markets (e.g. Portugal, Greece, and Türkiye), independence is ensured through the NRA's supervisory role. Portugal's ERSE approves the EEGO's Manual of Procedures and monitors implementation, while Greece's RAAEY functions as the ultimate supervisor, enforcing compliance.

Analysis: Closing the Mediterranean GO Gap

The fundamental challenge to green electricity trading in the Mediterranean is the fragmentation of certification standards. Currently, the region operates across three incompatible tiers: Fully Implemented, Partially Implemented, and Under Development. To close this gap, future action must focus on the following:



- **Public Entity Mandate:** Italy maintains independence by designating the GSE (Gestore dei Servizi Energetici) as a public entity for renewables.
- **I-REC Requirements:** For I-REC-based systems (Jordan, Lebanon), independence is ensured through the I-REC Standard's requirement that certifiers must not have any financial or operational interest in the generating facility or the certificate buyer.

4.3. Technical Access to Metering Data and Verification

The basis for certification is verifiable, accurate, metered data. Efficient and non-discriminatory technical access to this data is a major operational requirement.

| Country | Technical Access Mechanism | Verification Basis |
|-----------------------|--|--|
| Algeria | Producers must establish a database for all metering points and communicate the data to the CREG periodically (every three months). | Verification is ensured through periodic or unplanned checks by authorised certification control bodies. |
| Spain | Access to the SIMEL system, managed by the TSO (Red Eléctrica de España - REE). | GO issuance is directly based on metering data from SIMEL. |
| Portugal | The TSO (REN) holds direct technical access to metering data. | Formal procedures are established in the EEGO's Manual, supervised by DGEG (technical oversight) and audited by ENSE. |
| Italy | DSO and TSO are responsible for the electricity metering service. | Data are shared by DSO and TSO with the EEGO (GSE). |
| Albania | Reports from RES producers are cross matched with data from the TSO or DSO. | Verification confirms that the energy is generated from RES. |
| Jordan/Lebanon | TSO and DSO electrical bills or metering data often requiring a third-party verifier. | Compliance with the I-REC standard, with validated data reviewed by the local issuer (LCEC in Lebanon) and overseen by the NRA (EMRC in Jordan). |
| Morocco | Report prepared by an accredited body following a site visit; the Ministry may consult the relevant System Operator (TSO/DSO) for data verification. | Verification confirms the source, capacity, and accuracy of measuring instruments. |
| Türkiye | Through the market operator systems. | It is monitored through EXIST's systems related to the green certificate. |

The most efficient model involves the TSO/DSO having metering responsibility and providing direct, regulated access to the EEGO (as seen in the EU model). In emerging markets (Jordan, Lebanon, Morocco), reliance on site visits and third-party verification adds an essential layer of assurance but may introduce greater complexity or lead to longer processing times.

5. Market Access Requirements

The development of a Mediterranean green electricity trading market relies on maximising the resource potential of the South Shore countries (Morocco, Egypt, Jordan, Lebanon, and others) and integrating them with the mature North Shore markets. This integration requires meeting specific regulatory, technical, and institutional prerequisites to ensure fair access, mutual trust, and system stability.

5.1 Regulatory and Institutional Prerequisites

Market access begins with establishing robust, transparent, and internationally credible institutions and rules. The NRA benchmark responses highlight varying levels of maturity and critical missing links in this area.

- **NRA's Establishment**

A functional electricity market requires a strong, independent NRA to set tariffs, ensure non-discriminatory access, enforce compliance, and resolve disputes. While countries like Egypt (EgyptERA), Jordan (EMRC), and Morocco (ANRE) have established regulators, Lebanon has recently achieved this institutional prerequisite with the creation of the Electricity Regulatory Authority (ERA) in 2025, marking a critical step forward for market access. The local I-REC issuer (LCEC) confirms that functions such as setting tariffs, ensuring fair grid access, and certifying green electricity fall immediately within the ERA's mandate, underscoring the urgency of the new authority's full operationalisation for complete regional market participation.

- **Liberalised Market Rules and Network Access**

Market rules must enable private transactions and ensure non-discriminatory network use.

- **Algeria** allows CPPAs as an electricity purchase contract between an eligible customer and a renewable electricity producer of their choice, though challenges remain in fully adapting regulations for off-site CPPA transactions and building industry knowledge.
- **Morocco** has established laws (Law 13.09, as amended) that authorise private investors to generate RES and grant them access rights to national transmission and distribution networks for delivery to end-users. Additionally, **Law No. 82-21**, published in 2023, allows electricity generation for self-consumption, including the possibility of using the national transmission and distribution grids to transport electricity from the production site to the consumption site, under specific conditions related to the installed capacity.
- **Egypt** has progressed by launching a Peer-to-Peer (P2P) trading scheme, but this is currently limited to customers connected to the transmission grid, excluding the vast majority of commercial and industrial participants connected to the distribution network. Expanding

P2P trading to the distribution network is a clear regulatory step needed for broader market access.

- **Jordan** noted that long-term CPPAs can limit the regulator's ability to apply up-to-date regulations, indicating a challenge in balancing investment stability with market dynamism.

5.2 Certification Interoperability

The most immediate regulatory challenge is bridging the gap between the established European GO system and the globally popular I-REC system used in many South Shore and Eastern Mediterranean countries (e.g. Jordan, Lebanon, Egypt in development), as well as integrating Algeria's static CGO model.

| Country Status | Certification System | Market Access Requirement |
|--|-----------------------------------|---|
| EU/Balkan | GO System (RED II, EECS) | Requires mutual recognition agreements for I-RECs/National GOs. |
| South/East Med | I-REC / National Decree (Morocco) | Requires formal accreditation and mutual recognition with the EU GO system. |
| <p>Spain's recommendation for the "Harmonisation of GO systems and recognition between EU and third countries" and Italy's call for extending the GO export/import mechanism to non-EU countries are key solutions. Without this, certified green exports from the South Shore cannot be fully credited or marketed in the EU, undermining their investment value.</p> | | |

5.3 Technical and Infrastructure Prerequisites

For the green electricity attribute (the certificate) to follow the physical power flow, the technical infrastructure must be robust and its data verifiable.

- **Cross-border Interconnection Expansion**

Physical trading capability is the foundation of market access. The capacity and reliability of interconnections directly determine the tradeable volume of green electricity.

- **Current Key Links:** Morocco currently links to Spain (1,400 MW). Egypt is linked to Jordan (550 MW), creating a crucial hub in the Levant.
- **Future Needs:** All countries, including Jordan and Egypt, prioritise interconnection expansion. This need includes strengthening existing lines and implementing new

connections (e.g. the planned Jordan-Iraq link and the planned expansion between Morocco and Spain).

- **Internal Grid Capacity and Modernisation**

Trading capacity is often limited not just by border interconnectors but also by internal grid constraints and ageing infrastructure.

- **Jordan** specifically cites grid connection limits as a regulatory challenge for large-scale private renewable projects.
- **Lebanon** faces fundamental technical challenges related to the security of supply and the establishment of a national control centre.

Modernisation steps, such as implementing smart grids, promoting energy storage, and ensuring grid interoperability (as noted by Albania and Morocco), are essential technical prerequisites for handling the intermittent nature of traded RES.

- **Reliable Metering and Verification**

The ability to verify the origin and volume of electricity is non-negotiable for certification. In I-REC markets (Jordan, Lebanon), verification relies on TSO/DSO metering data, which is then often confirmed by a third-party verifier. The Moroccan system requires, among the documents submitted as part of the application, a report from an accredited body following a site visit to the electricity production facility concerned by the request. This report includes, inter alia, the production data and the level of accuracy of the metering equipment. Further, before deciding on the issuance of the certificate of origin, the Ministry in charge of energy may consult the relevant system operator (TSO or DSO) to verify the validity of the data provided.

To streamline trading and move away from potentially complex third-party or site-visit-based verification, South Shore countries must align metering accuracy standards and provide transparent, real-time data access to the EEGO/local issuer, mirroring the sophisticated data access protocols seen in the EU (e.g. Spain's SIMEL system).

5.4 Harmonisation Challenges and Potential Solutions

The greatest hurdle to full market access is the diversity of existing regulatory and technical environments.

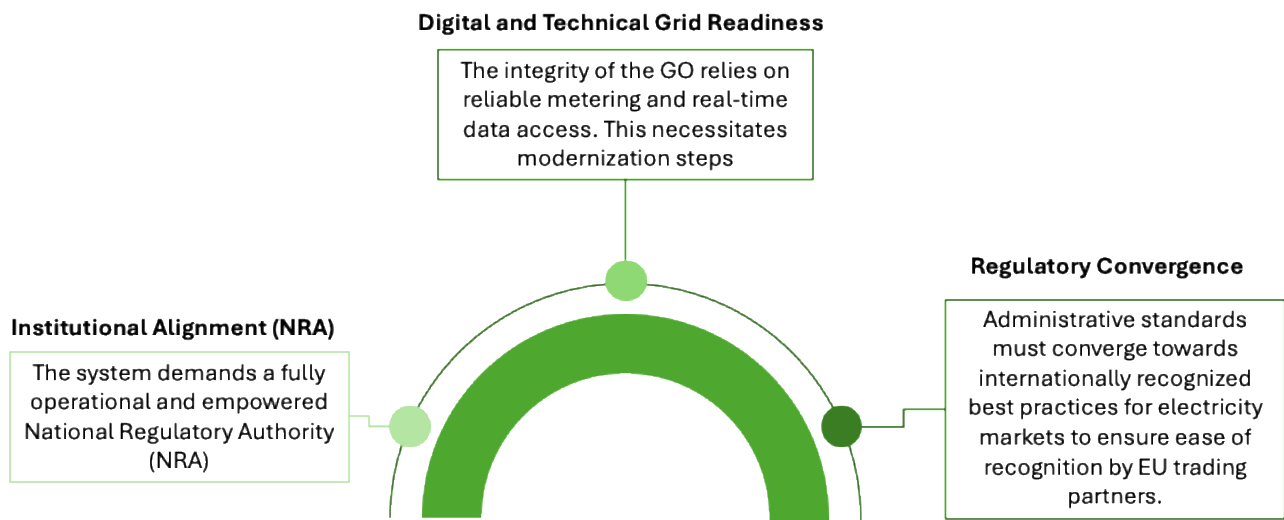
| Challenge Area | Description | Recommended solution |
|------------------------|--|--|
| Market Rules | Regulatory diversity, evolving market structures, and varying levels of institutional capacity across the South Shore. | Harmonisation of Market Rules and Standards (Albania, Morocco), Regional Coordination via platforms like MEDREG (Egypt). |
| Certification | Lack of mutual recognition between EU GOs, I-RECs, and emerging national certificates. | Establish mutual recognition of green certificates across countries (Egypt) and harmonise GO systems (Spain). |
| Grid Operations | Absence of common technical standards, grid codes, and coordinated investment planning. | Development of a fully harmonised Mediterranean Grid Code and common technical standards (Portugal). |
| Investment | Gaps in coordinated investment planning and frameworks needed to support market confidence. | Strengthening investment frameworks, including risk mitigation tools and tariff stability (Portugal). |

Addressing these challenges requires a dedicated, coordinated effort to develop a common regional framework that accepts the diverse starting points of each country while guiding them towards a

unified standard for green electricity trading.

Analysis: Prerequisites for GO Functionality and Market Access

The operability of green certification systems like the GO hinges entirely on meeting fundamental technical and institutional prerequisites, particularly for southern shore markets seeking integration. These requirements transcend basic policy design and include:



6. Role of Key Stakeholders in the Certification Process

Green electricity certification is not a single-actor function but a collaborative ecosystem that relies on mutual accountability, transparent data flows, and robust regulatory oversight. The system's credibility for green electricity trading depends on clearly defined roles for all key stakeholders, from the NRA down to the corporate buyer.

6.1 National Regulatory Authorities (NRA)

The regulator serves as the head market architect and guardian of integrity. Their role is fundamental to establishing the non-discriminatory environment necessary for trading and facilitating RES integration. The table below summarises the role of the NRAs in the Mediterranean region.

| NRA Function | Key Responsibilities | Examples |
|----------------------------------|---|--|
| Oversight and Supervision | Ultimate regulator of the GO/I-REC issuing body (EEGO). Approving procedural manuals and market rules. | <ul style="list-style-type: none"> ○ Greece: RAAEY is the ultimate supervisor, approving operational rules and resolving disputes. ○ Portugal: ERSE approves the EEGO's Manual of Procedures. ○ Jordan: EMRC currently approves the local I-REC issuer's activity. |
| Rule-Setting | Establishing grid codes, setting non-discriminatory technical requirements, and defining market access rules for RES. | <ul style="list-style-type: none"> ○ Spain: CNMC defines tariff methodologies and ensures non-discriminatory access/dispatch. ○ Albania: ERE sets the criteria for certification within the Energy Community scheme. ○ Morocco: ANRE approves the transmission grid code and ensures its compliance, defines tariffs for the use of transmission and medium voltage distribution networks, and ensures non-discriminatory access and dispatch. |
| Direct Issuance | In some emerging or centralised models, the NRA assumes the role of the EEGO to ensure independence and authority. | <ul style="list-style-type: none"> ○ Algeria: CREG and Spain: CNMC are the issuing bodies. ○ Albania: ERE is responsible for issuance and verification. ○ Egypt: EgyptERA is mandated to be the sole issuer under the national electricity law. |

| | | |
|-----------------------------------|---|--|
| Monitoring and Enforcement | Ensuring compliance with sustainability standards, monitoring GO issuance/cancellation, and enforcing market rules for RES participation. | <ul style="list-style-type: none"> ○ Portugal: ERSE monitors and supervises the implementation of the EEGO manual. |
|-----------------------------------|---|--|

The move towards the NRA assuming direct responsibility for issuance in countries like Spain, Albania, and the future plan in Egypt contrasts with the EU model, where specialised operators often handle day-to-day operations. However, it is seen as a way to guarantee a high degree of independence and regulatory authority in developing markets.

6.2 Transmission System Operators (TSO)

The TSO's role is to manage the physical grid and, in many cases, act as the operational arm of the certification system.

- **Grid management and certification enforcement:** Ensuring physical infrastructure capacity, grid access, and technical compliance for RES producers.
- **Operational EEGO function:** In Portugal, the TSO (REN) is also the EEGO, directly managing the electronic platform for registering and transacting GOs.
- **Data provision:** TSOs are crucial as the primary source of verified generation data. They must provide the EEGO with accurate, metered data to serve as the basis for certificate issuance, often facilitated through specialised systems, like Spain's SIMEL.

6.3 Distribution System Operators (DSO)

DSOs are responsible for the integration of decentralised RES and for accurate local metering, which is particularly relevant for net metering schemes and smaller corporate PPAs connected to the distribution network.

- **Local grid integration:** Ensuring grid stability and connection standards for RES facilities below the transmission level.
- **Metering compliance:** DSOs are responsible for the accuracy of local electricity metering data. In Italy, the DSO, along with the TSO, is responsible for providing metering data to the issuing body (GSE) for verification.

6.4 Renewable Energy Producers

The RES producers are the primary source of the product being traded (green electricity and its attribute, the GO/I-REC). Their compliance is the first step in the supply chain's credibility.

- **Compliance with certification standards:** Ensuring the facility meets the technical criteria for the chosen certification scheme (e.g. I-REC, national decree).
- **Data reporting and verification access:** Providing accurate and verifiable production data. In Morocco, producers must commission a technical report from an accredited body, including a site visit, to support the certificate request. Additionally, the issuer of the certificate, the Ministry of Energy, can check the validity of data, especially metering information, through the relevant system operator (TSO or DSOs).
- **Ownership of attributes:** The producer holds the initial ownership of the green electricity attribute (the MWh and the corresponding GO/I-REC), which they can then sell directly or through a supplier.

6.5 Electricity Suppliers and Corporate Buyers

These stakeholders drive market demand and are responsible for issuing the certificate, thereby fulfilling the transparency promise to the final consumer.

- **Ensuring traceability and credibility:** Suppliers use GOs to document their energy mix and market "green energy" supply to consumers. Spain explicitly mandates the use of GOs for the disclosure of electricity by suppliers.
- **Certificate retirement (cancellation):** Once a green claim is made to an end-user, the corresponding GO/I-REC must be permanently cancelled (retired) in the registry to prevent double-counting.
- **Driving market demand:** Corporate buyers (via CPPAs) are the main drivers of the voluntary market, using GOs/I-RECs to meet internal sustainability targets (e.g. RE100, CDP reporting). This corporate demand is crucial for financing new RES projects.

6.6 Comparative Overview of Stakeholder Roles in Certification

The following table summarises the key functions across the supply chain, emphasising the operational role of the EEGO/Local Issuer and the supervisory role of the NRA.

| Stakeholder | Key Role in Green Trading Process | EEGO/Local Issuer | Role of the NRA |
|--------------------------|--|--|---|
| Producers | Generate RES, provide verifiable data, hold initial GO/I-REC. | Reports to GSE (Italy), submits data to REN (Portugal) via metering systems. | Compliance monitored by RAAEY (Greece), ERE (Albania). |
| TSO/DSO | Manage grid, ensure physical flow, provide metered data. | Provides data access to EEGO (CNMC, REN, GSE, EPIAŞ). | NRA sets technical grid codes (France, Spain, Algeria (CREG enforces the metering code), Morocco (ANRE approves the grid code). |
| EEGO/Local Issuer | Register facilities, issue certificates, maintain tracking registry, manage transfers/cancellations. | CNMC (Spain), CREG (Algeria), REN (Portugal), GSE (Italy), LCEC (Lebanon), DAPEEP (Greece), Ministry of Energy MTEDD (Morocco), EPIAŞ/EXIST (Türkiye). | Supervision by NRA (ERSE, RAAEY, EMRA, EMRC) or Ministry (Morocco, France). |
| Suppliers/Buyers | Purchase and retire GO/I-REC to make green claim, drive market demand (CPPAs). | Use the electronic platform (e.g. HEnEx PPA Platform in Greece, CNMC GO platform in Spain). | NRA ensures transparency and enforces disclosure rules. |

7. Conclusions and Recommendations

The Mediterranean region stands at a critical juncture, possessing immense RES potential, particularly solar and wind resources in the South, alongside mature market frameworks and robust demand in the North. Enabling a robust green electricity trading market between these shores is not merely a commercial opportunity but an economic and geopolitical imperative for achieving regional decarbonisation and energy security.

This report's analysis of 13 countries (Albania, Algeria, Egypt, France, Greece, Italy, Jordan, Lebanon, Morocco, North Macedonia, Portugal, Spain, and Türkiye) reveals a dynamic, albeit fragmented, landscape defined by three strategic findings and a clear set of actions required to bridge the existing regulatory and technical divides.

- **The Guarantee of Origin Certification Gap**

A consistent, transparent system for green attribute tracking is the foundation of market credibility; yet the region is severely fractured:

- **Diverse Issuance Models:** GO issuance varies widely—from NRAs (Spain, Algeria) to TSO affiliates (Portugal) and I-REC local issuers (Jordan, Lebanon).
- **The Static Certification Barrier:** The use of a static CGO model in Algeria, which certifies the renewable facility (MW) rather than the energy units produced (MWh), highlights a fundamental difference that prevents direct transferability and market integration with the dynamic GO/I-REC systems.
- **Need for Mutual Recognition:** Bridging the gap between the EU GO, I-REC, and new national systems (like Morocco's Decree) is the highest immediate technical and regulatory priority.

- **The Infrastructure and Flexibility Divide**

Physical trading is constrained by hardware and system readiness:

- **Interconnection Bottlenecks:** While North-North links are strong, capacity across the North-South axis is insufficient, hindering large-scale RES exports from high-potential areas like North Africa.
- **Flexibility and Storage:** Southern Shore countries face challenges in deploying system flexibility mechanisms like large-scale energy storage and Demand Response Programmes (DRPs), which are vital for integrating intermittent and traded RES.

- **CPPA Potential is Limited by Access and Knowledge**

CPPAs are proven drivers of private RES financing, but their potential is restricted by regulation and market maturity:

- **Access restriction:** In countries like Egypt, P2P/CPPA trading is restricted to the transmission grid, excluding the vast majority of commercial users connected to the distribution network.
- **ARERA's view on private risk:** While countries like Portugal focus on the financial risk overlap, Italy's ARERA observes that since CPPAs are defined as private agreements, they present no direct regulatory challenge to the NRA, shifting the focus to ensuring fair market access rather than regulating contract terms.
- **Knowledge gap:** In countries like Algeria, the lack of specific regulatory adaptation for off-site CPPAs, combined with a lack of industry knowledge about such contracts, slows adoption.

Recommendations for Regional Integration

To realise the vision of an integrated Mediterranean green electricity trading market, concurrent action is required across three strategic pillars.

Recommendation 1:

Achieve Certification Interoperability and Mutual Recognition

This action is crucial for building credibility and financial value for certified green exports.

- **Policy action (MEDREG/NRAs):** Establish a unified protocol for the mutual recognition of green certificates (EU GOs, I-RECs, and national equivalents) from all participating countries. This must include an explicit agreement on the criteria for independence and technical access to metering data.
- **Specific certification upgrade:** Support Algeria (CREG) and other countries with static CGO models in developing the necessary IT infrastructure and metering protocols to shift from facility certification (MW) to energy tracking (MWh), thus enabling the dynamic transferability required for market trading.
- **Transparency:** Italy (ARERA) explicitly recommends the extension of the GO export and import mechanism to non-EU countries, recognising this as the critical step to unlock certified regional trade.

Recommendation 2:

Prioritise Cross-border and Internal Infrastructure Investment

Physical trade requires the necessary hardware and system flexibility to handle bi-directional flows.

- **TSO Collaboration:** Launch a coordinated programme for interconnection capacity expansion with clear timelines, particularly between North Africa (Morocco, Algeria, Egypt) and Southern Europe.
- **Grid Modernisation:** NRAs must streamline regulatory frameworks to incentivise energy storage technologies and demand response at all voltage levels, thereby enhancing the internal flexibility of southern shore grids.

Recommendation 3:

De-risk and Decentralise CPPA Frameworks

The private sector is the engine for RES finance; regulations must enable its full participation.

- **Regulatory Reform (Egypt/Algeria):** NRAs must streamline market rules to allow P2P and CPPA agreements for distribution-connected customers, removing the current restriction to transmission-connected users.
- **Market Education:** Launch joint capacity-building programmes across the southern shore (e.g. in Algeria) to improve industry knowledge on CPPA contract structures, particularly for off-site transactions.
- **Standardisation:** Develop and promote a regional template for cross-border CPPAs to standardise contractual terms and mitigate complex financial risks associated with regulatory overlap (MiFID II/EMIR), thereby attracting more corporate buyers and investors.

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