

# Enhancing electricity trade in interconnected electricity exchange zones

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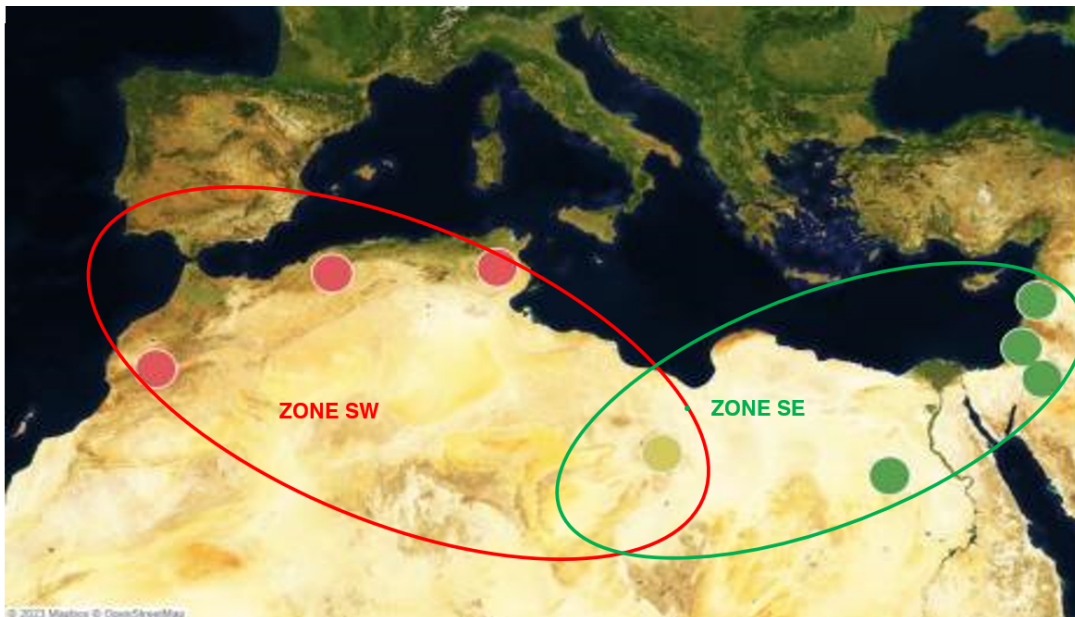
## INTERCONNECTED ELECTRICITY EXCHANGE ZONES

This brochure showcases the work carried out by Med-TSO during the TEASIMED (*Towards an Efficient, Adequate, Sustainable and Interconnected MEDiterranean power system*) project, aimed at proposing a practical approach to improve the electricity exchange in two so-called Interconnected Electricity Exchange Zones (IEEZ) in the south-west (Zone SW) and south-east (Zone SE) Mediterranean subregions. Zone SW includes Algeria, Morocco and Tunisia, while Zone SE comprises Egypt, Lebanon, Jordan and Palestine. These zones have been identified during the implementation of the Mediterranean Project 2, in cooperation with MEDREG, and are based on two dimensions:

- ◆ Geographical: each of the pilot projects covers synchronously interconnected power systems in the south of the Mediterranean where an ample set of issues are selected and developed for a tentative roadmap for practical implementation.
- ◆ Regulatory: considering the current legislative framework in each region.

The proposed model has three main objectives:

1. Use the existing interconnection capacity more efficiently.
2. Build a cross-border market that is compatible with the principles of the Internal European Energy Market, to enable future harmonization between the two shores of the Mediterranean, while respecting regional specificities.
3. Adopt a multi-phase approach to build progressively on current commercial arrangements, avoiding a sudden overhaul of the system. This approach allows TSOs to take the first steps, and further implementation requires the necessary institutional buy-in from governments, national regulatory authorities, and international institutions in the Region.



**Figure 1.** Interconnected Electricity Exchange Zones

## THE STATE OF THE ART OF THE POWER EXCHANGES IN THE IEEZS

**South West Zone:** The interconnection infrastructure among the three Maghreb countries has been reinforced with transmission facilities for several years. The commissioning of a 400 kV backbone has been a significant factor in increasing exchanges among the three countries. Additionally, the region boasts the only connection between North Africa and the European Union, consisting of two submarine AC 400 kV circuits with a total thermal capacity of 1400 MW between Morocco and Spain. Looking ahead, future developments include the Tunisia-Italy link and the reinforcement of interconnections between Morocco and Spain, which are expected to be completed by 2028 and 2030, respectively. Direct connections of Algeria with Spain and Italy are under studies.

Despite the existence of bilateral commercial contracts between Algeria and Morocco since 2007, followed by others between Algeria and Tunisia since 2012, the current capacity remains underutilized, and the exchanges fall below expectations. As a result, the three Maghreb Transmission System Operators (TSOs) have analyzed different priorities and decided to develop a zonal platform for power trading, building on the activities already performed in the region, and using Med-TSO's support to access international experience on this subject. The goal is to enhance the use of the interconnections in the South West Mediterranean, which are presently used primarily for mutual emergency situations.

**South East Zone:** Similarly to the South West Med IEEZ, electricity trade among the South East-Med countries has historically been very low, compared to the capacity of cross-border interconnection and the complementarities that exist, between the different systems. Still, barriers such as a non-economical pricing framework exist constraining trade volumes and leaving stakeholders preferring exchanges “in-kind” and on emergency operations.

Also in this region, the South East Med TSO, identifies among its priorities the need to gradually introduce **commercial mechanisms, producing clear Commercial Agreements that should to move local TSOs from predetermined dispatching rules to a market-driven situation.**

ISSUES	DESCRIPTION	South West TSOs			South East TSOs		
		STEG	SONELGAZ	ONEE	NEPCO	EETC	PETL
REGULATORY / INSTITUTIONAL	Trade Platform	1	1	1	1	1	N
DISPATCHING & BALANCING	Compensation for Voluntary Exchange	5	2	3	2	1	1
REGULATORY	Grid Services Market	2	3	2	N	N	N
CAPACITY ALLOCATION & CALCULATION	Capacity Calculation	N	N	4	N	N	N
PROFITABILITY & EFFICIENCY	CBA Study	N	N	5	N	N	N
N	Issues not disclosed by TSOs						
Number (1,2)	Issues disclosed with desired priority by TSOs						

Figure 2. Priorities identified by the TSOs – IEEZ South West South-East

## THE PROPOSED MODEL: DESIGN AND GOVERNANCE

Based on the priorities identified by the TSOs, Med-TSO proposes a multiphase design in three stages that will be compatible with the general principles of the EU Internal Energy Market and easier to implement from the current commercial cross-border exchanges. Applying a phased approach makes it easier to implement changes progressively and build on cumulative improvements from the previous phase.

In **Phase 1**, the current bilateral agreements are improved with an enhanced process of pre-defined prices, which enables the TSOs to modify prices according to the market and grid conditions. This proposal represents a slight modification of existing commercial agreements that does not affect the current technical operation of the interconnections, as governed by the involved TSOs.

In **Phase 2**, the principle of predefined price is opened more widely so that the TSOs participate in daily auctions. Each TSO builds a daily order book. The optimization of the order books is gained through an auction procedure, considering cross-border constraints, permitting an implicit allocation of cross-border transmission rights and optimizing the exchange possibilities between the countries.

In **Phase 3**, the implicit cross-border auction market is opened to additional participants (in at least one country). An independent market operator steps in to organize the market neutrally with standard procedures. The participation of other market participants is designed to bring more competition and liquidity in regional trade for the benefit of all grid users. This phase requires a range of changes in the regulatory framework of the involved countries. Phase 3 opens the cross-border power market to other participants besides the TSOs and is based on local regulatory changes and the implementation of standard procedures.

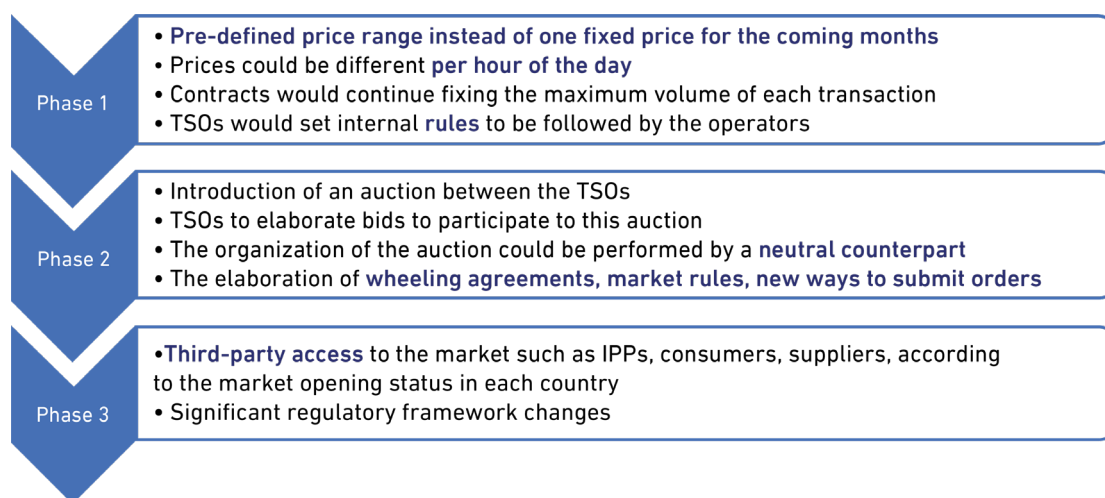


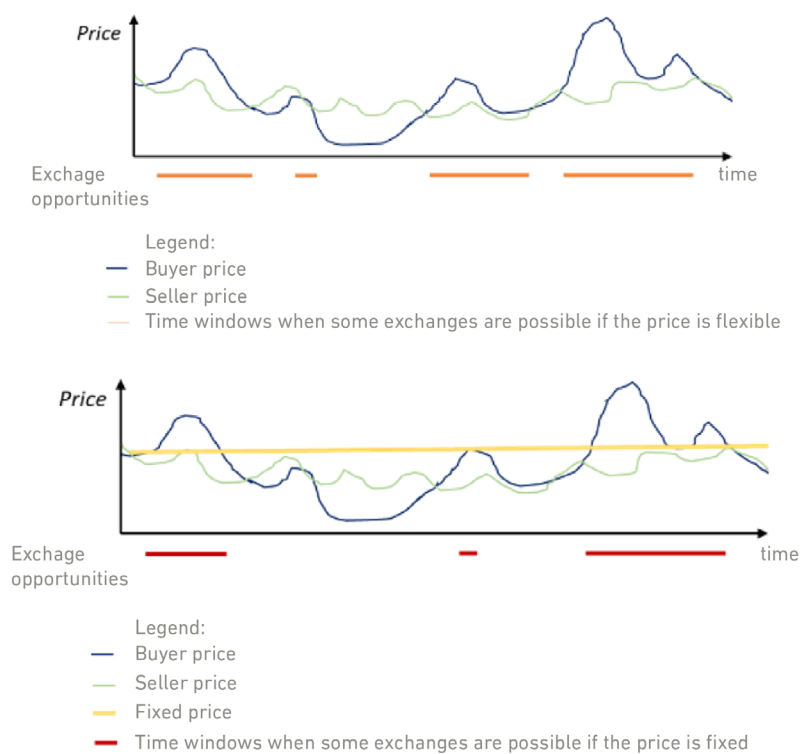
Figure 3. Three-Phase design approach

Finally, a **governance framework** for each phase of the market design is proposed.

◆ **Phase 1:** Bilateral trading arrangements exist between the system operators, with price ranges fixed with a min-max price. In Phase 1, the current trading mechanism is improved, as well as some elements of the existing bilateral agreements.

The proposed model aims to increase exchange opportunities by working on a more flexible pricing pattern. In fact, a fixed price for day-ahead exchanges for three months is the main obstacle to increasing exchanges, as it does not accommodate different economic and operational situations. Overall, the proposed model will allow TSOs to exchange based on their needs and technical constraints.

By moving towards a more flexible pricing pattern, TSOs can better adapt to changing economic and operational situations. This will ultimately increase exchange opportunities between countries. The following figures demonstrate through random price willingness from buyers and sellers that when the price is flexible, there are more exchange opportunities than when the price is fixed for a prolonged period.



**Figure 4.** Exchange opportunities: Flexible vs Fixed pricing

Concretely, in Phase 1, each company would establish internal guidelines to determine the price transaction to be proposed, updating it when necessary. On the buyer side, some rules shall also be determined upfront instead of agreeing on a price for a long duration with the seller. Even if the buyer is a price taker, they will have different interests in buying depending on the time of the week and on its economic and technical constraints.

- ◆ **Phase 2:** Leaving the bilateral trading arrangements towards a global multilateral agreement between the TSOs and maximizing use of the existing transmission infrastructure. It can be characterized as follows: regional trading is not high, and the use of the regional market is part of each country's solution to increase security of supply by granting support to its neighbouring TSOs by using short-term markets (day-ahead and intraday segments). Such a market arrangement can be developed relatively quickly as it does not require high degrees of harmonization. In this trading model, domestic electricity markets are cleared first by using respective domestic generation with any surplus or deficit traded and balanced with the trading partners.

Key elements:

- (1) multilateral agreement between the TSOs,
- (2) pilot trilateral trading with auctions,
- (3) market platform,
- (4) TSO Steering Committee organized within the multilateral agreement.

- ◆ **Phase 3:** Set-up of an independent market organization function for operating a regional trading opened to third market participants. It requires a higher degree of system harmonization and political agreement among participants, although it does not require the same national market structures. Governance will be achieved through:

- (1) an MoU at Governmental level,
- (2) approval of market rules,
- (3) agreements with the market participants,
- (4) development of processes to share data and transparency,
- (5) set-up of an independent market organization function operating under a licence describing its activities.

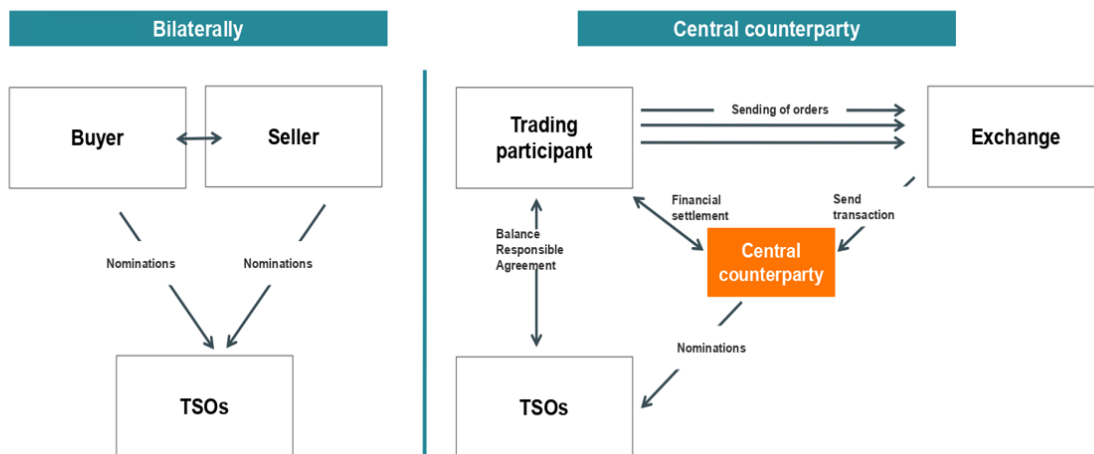


Figure 5. Governance for the different phases



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Med-TSO is the Association of the Mediterranean Transmission System Operators (TSOs) for electricity, operating the High Voltage Transmission Networks of 20 Mediterranean Countries. It was established on 19 April 2012 in Rome as a technical platform that, using multilateral cooperation as a strategy of regional development, could facilitate the integration of the Mediterranean Power Systems and foster Security and Socio – economic Development in the Region.

Med-TSO members share the primary objective of promoting the creation of a Mediterranean energy market, ensuring its optimal functioning through the definition of common methodologies, rules and practices for optimizing the operation of the existing infrastructures and facilitating the development of new ones.

Med-TSO Legal Headquarters  
Viale Egidio Galbani, 70 - 00156 Rome, Italy

Operational Headquarters  
Via della Marcigliana, 911 - 00138 Rome, Italy

Telephone +39 06 8313 9431 - Email: [info@med-tso.com](mailto:info@med-tso.com)



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