Teasimed

TOWARDS AN EFFICIENT, ADEQUATE, SUSTAINABLE AND INTERCONNECTED MEDITERRANEAN POWER SYSTEM

Towards a common playground for the Mediterranean integration

Final Report

Monitoring and Implementation of the Guidelines for the Mediterranean Grid Codes

Med-TSO
MEDITERRANEAN TRANSMISSION SYSTEM OPERATORS

Co-funded by the European Union

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TASK 2 *Consolidation of common technical regulatory framework*

Activity 2 *Monitoring and Implementation of the Guidelines for the Mediterranean Grid Codes*

Deliverables

Del. 2.1 A Survey of applicability and alignment with current needs

Del. 2.1 B Proposal of a Grid Code Guidelines aligned with the survey

Del. 2.1 C Monitoring of the adoption and implementation process in the Med-TSO members countries and stakeholders' engagement to improve them

Table of content

1. Purpose of the report

The report is associated to Task 2 "Consolidation of common technical regulatory frameworks", Activity 2 "Monitoring and Implementation of the Guidelines for the Mediterranean Grid Codes" of the TEASIMED project. A call for tender ME/P2021/0081 has been issued and the work has been assigned to ENGIE Impact.

The objective of this report is to propose Grid Code Guidelines for the key areas of convergence among the involved stakeholders of the Med-TSO Members' power systems. Such Guidelines should be focused on these key areas, which will be identified through a dedicated survey, and will include a proposed structure for a potential future grid code. Figure 1-1 shows an overall overview of the project.

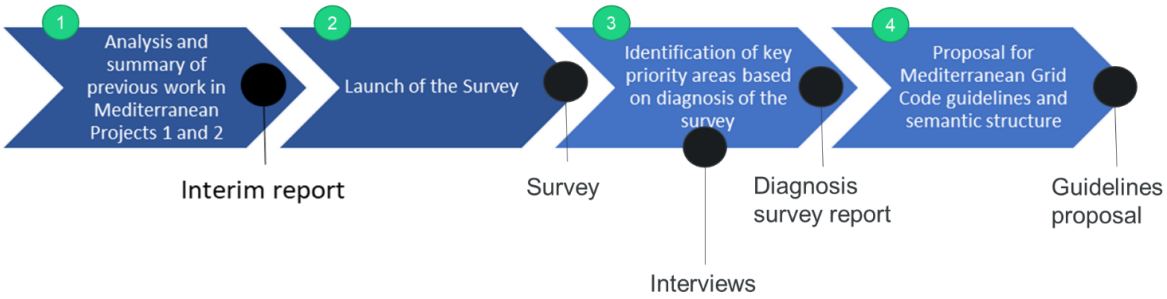


Figure 1 - Overview of the project

This document is organized is two main parts. The first part summarizes the main outcomes of both the survey and list of interviews. The second part, starting at chapter **Errore. L'origine riferimento non è stata trovata.**, details the development of a tool for defining the necessary grid code guidelines.

The document contains the following chapters:

- Chapter 2 – Identified barriers and lessons learnt: Although this is not strictly speaking part of the original scope of work, throughout the analysis and interviews some interesting messages on the regional development of the Mediterranean electricity sector came forward. These are summarized in this chapter.
- PART 1: SURVEY
  - Chapter 3 – Preparation of the survey
  - Chapter 4 - Results of the survey
  - Chapter 5 – Results of the interview

2. Identified barriers and lessons learnt

Throughout this study and in discussion with stakeholders, several interesting lessons were learnt and barriers that are hindering the regional integration became evident.

It is clear that not every member TSO of Med-TSO has the same objective when discussing regional integration. Not every country intends to adopt the European system, with a completely integrated regional market, but rather prefers to be able to trade energy or assure mutual emergency support. This is however not a negative point. Collaboration can very well exist between various regulatory frameworks. It is nonetheless necessary to understand the fact that various objectives exist in the light of this report on developing Grid Code Guidelines.

It is important to note that the development of Grid Code Guidelines in itself is not the objective. They are rather one of the building blocks that are needed for further integration in the Mediterranean region. The current lack of a common regulatory framework is in the opinion of most interviewed stakeholders not identified as a real bottleneck of the further development of the region.
The main driver for further regional integration of the electricity sectors is institutional buy-in. Support from political or institutional level is found to be a key for realizing projects. Some form of agreement is needed between the stakeholders, justifying the investments. However, the format is not the most important. A regulatory framework can have many formats (e.g., a bilateral agreement, a memorandum of understanding, some kind of regional framework…), and will be decided case by case.

The further development and integration of the electricity sector in the Mediterranean region, will foster further geopolitical stability, as a reliable electricity supply is an important economic driver. At the same time, a stable investment climate is needed for guaranteeing investment in regional projects.

PART 1:
SURVEY DIAGNOSIS AND INTERVIEWS

3. Preparation of the survey

3.1. Survey content and practicalities

The Mediterranean Projects 1 and 2 laid out the basis for the development of a common framework for the harmonization of rules in the area. The key differentiator of this survey with respect to the previous work performed by Med-TSO is the targeting of the survey to various types of stakeholders involved in the electricity sector (TSOs, DSOs, developers, governments/institutions, regulators, …).

The survey was consequently built in line with the previous work of Med-TSO – which relies mainly on contributions from TSOs – in order to confirm that the conclusions are indeed representative of all stakeholders involved in the power system. In that frame, the survey considered the same 4 broad categories (Legal & Regulatory, Connection, Operation and System Services Market) and the 34 aspects identified in the Common Target Regulatory Framework which are presented for ease of reference in figure 2.

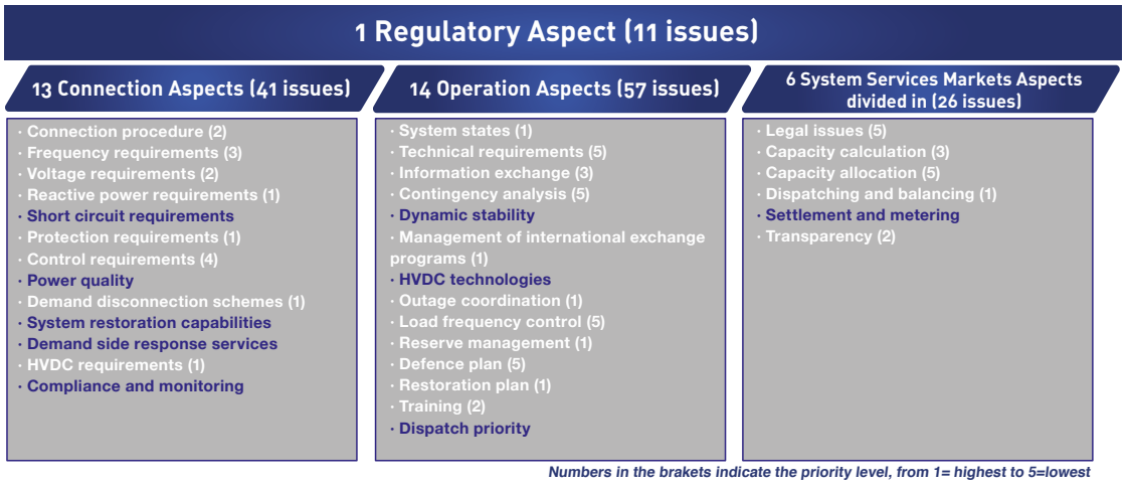


Figure 2-1 Priority aspects for harmonization as per the CTRF

The core of the survey took the form of a number of statements covering each aspect above over which the participant had to agree or disagree on a scale from 1 to 9 (0 meaning that the statement is irrelevant for the stakeholder). It was finally enriched with a number of open questions covering topics such as

- Stakeholder type represented (TSO/DSO, Government/Institution, Developer, Regulator);
- Expected improvements from increased interconnection/energy exchanges;

- Level of geographical harmonization (none, bilateral agreement, regional harmonization, whole Mediterranean region);
- To what extent non-harmonization can be a barrier for investment/operations/cross-border trade.

3.2. Stakeholders contacted and answers description

The survey was sent under the format of an excel spreadsheet (for ease of use and collaboration) to a list of contacts set up in close collaboration with Med-TSO. A total of 110 contacts (not necessarily based inside the Med-TSO area but with activities in the area) were reached covering a wide panel of stakeholder types as well as various geographical areas as shown in Figure 3-

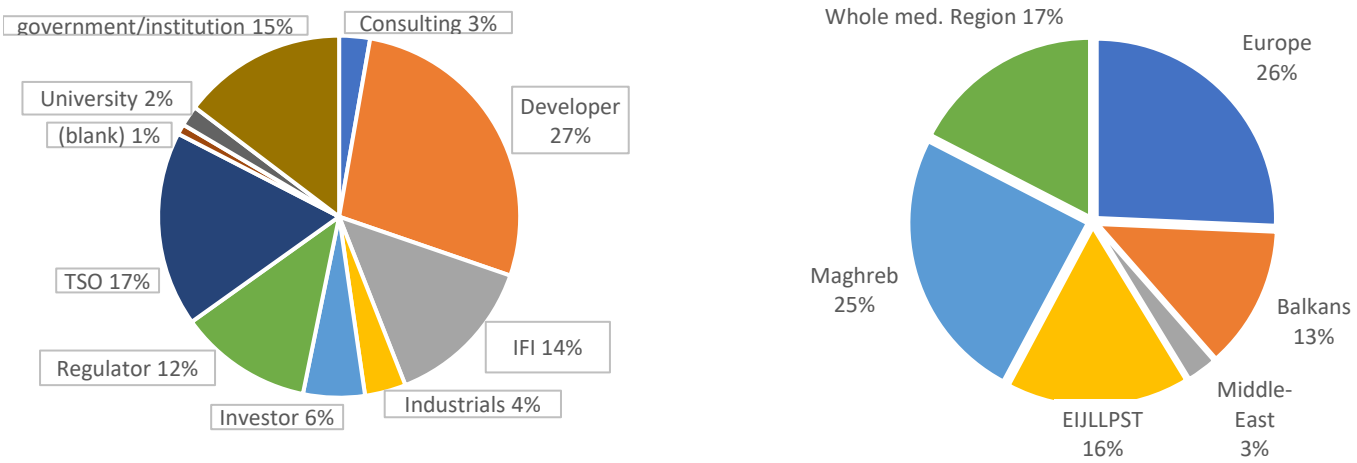
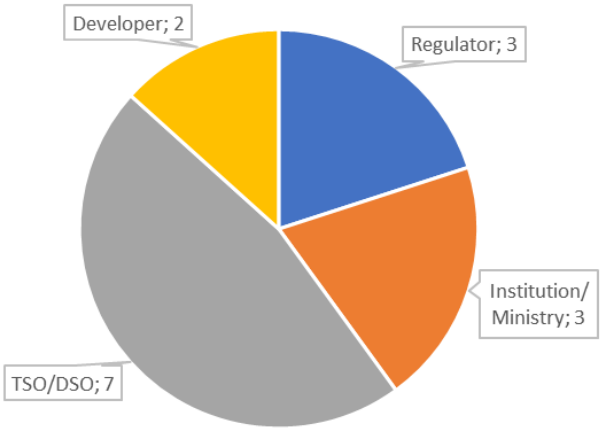


Figure 3- Contact list details

Out of the 110 surveys sent, we received a total of 15 answers from a wide variety of types of stakeholders well dispatched around the Mediterranean area as shown in

Figure 4.



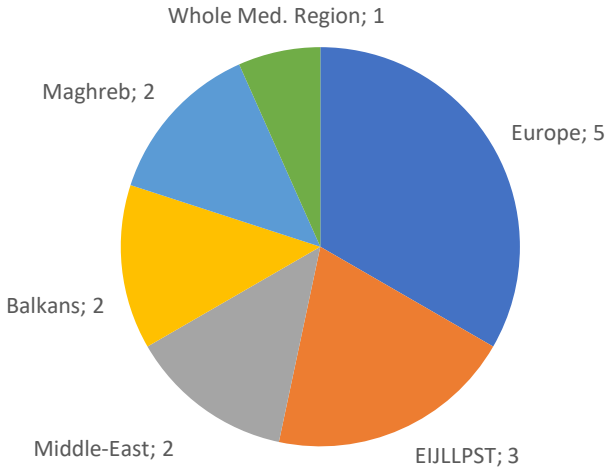


Figure 4- Details of answers received

4. Results of the survey

The results of the survey are summarized in this section. Whenever relevant, they are compared with the results of the previous Med-TSO work (Common Tentative Regulatory Framework - CTRF) whose results are reminded in Figure (1. Operation, 2. Connection, 3. System services Markets, 4. Legal).

As a reminder, these results were obtained based on contributions from TSOs only.

Figure 5 - Issues considered for Harmonization

4.1. Overall results

It can be seen in Figure 6 that the Operation category is the first priority with an average score of 7.4. The three other subjects are close to one another – between 6.8 and 6.9 average score. With respect to the CTRF,

1. The Operation category is indeed confirmed as the main concern for harmonization;
2. The Legal aspect which was lagging behind in the CTRF is given a greater importance in this survey;
3. The Connection and Market categories are equally as important and in line with the conclusions of the CTRF.

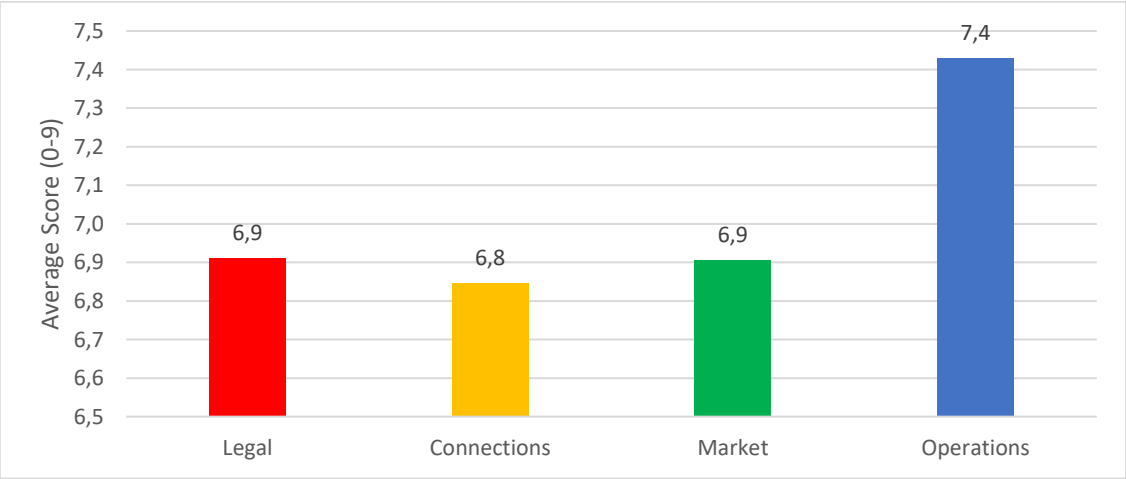


Figure 6 - Survey results per theme

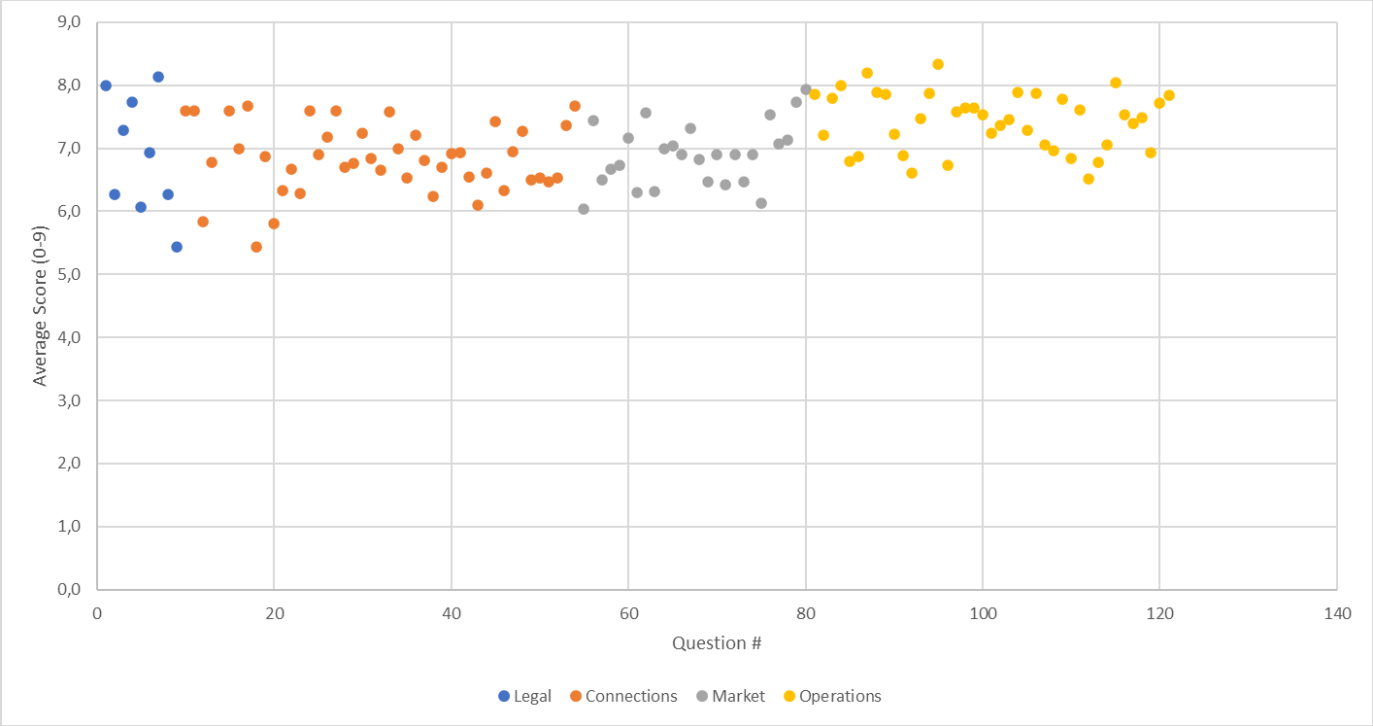


Figure 7 Scatter plot all results

Figure 7 shows individual responses to all questions. There are no large variations between the various answers. Therefore, it is difficult to classify issues according to priority based on this survey.

The following sections will explain more in detail converging and diverging aspects between this survey and the CTRF.

4.1.1. Trends per stakeholder type

Figure 8 shows that opening the survey to various stakeholder categories allowed to capture a wide range of opinions on each of the four categories.

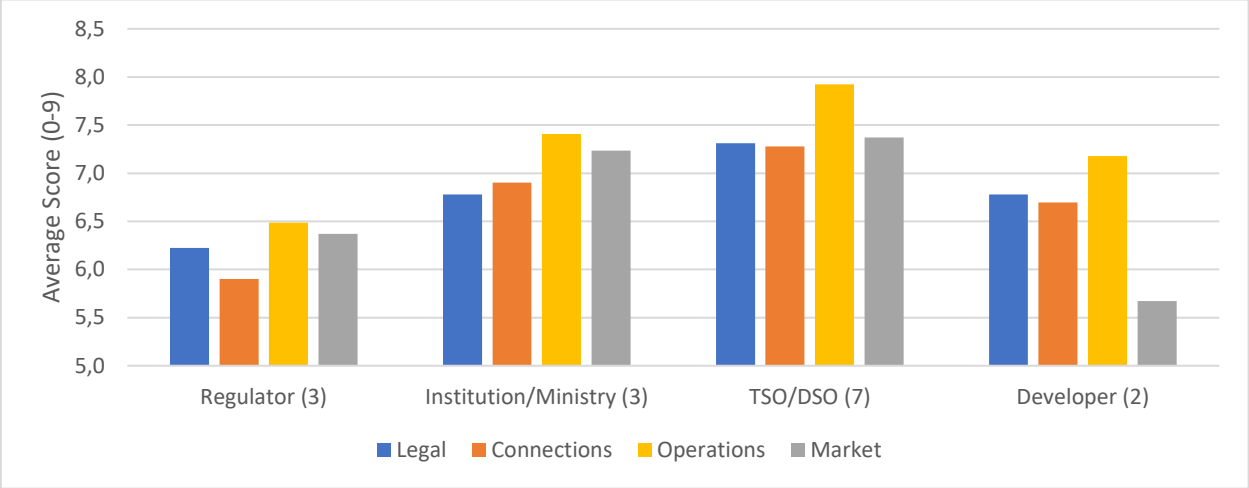


Figure 8 - Survey results per category and per category of stakeholder

The key takeaways of these results are given hereunder. A statement from answers to open questions is given whenever relevant.

- The "operations" category comes in first no matter the stakeholder group;

  "The operations must be as simple as possible and easy controllable, ensuring flexibility and readiness on both sides. This is more easily achieved, for examples, with harmonized systems and well-defined and harmonized operational/technical requirements"

- The regulators give credit to the "market" and "legal" categories in which they have a major part of their activities;

  "Perhaps the most important legal aspect to be implemented for facilitating energy exchange is setting up a regulatory framework allowing for transparent and cost-reflective third-party access to interconnections"

- TSOs and DSOs vision is centred around the "operations" category and more broadly on technical considerations to ensure the stability of their system;

  "[…] Coordination between both TSOs is essential. The lack of rules, measures, and procedures to put in place in the operation of networks could limit the effective and efficient functioning of interconnected systems. "

- Developers really seek a stable legal framework to facilitate investments.

"Legal harmonization should take the form of a standardized grid code template across the region, with a similar layout no matter the country. Even if the actual content would change, it would ease data collection regarding each country technical requirement."

4.1.2. Trends per geographical area

Some general trends may also be extracted from the split per geographical area as shown in Figure 10. In this figure, the areas were sorted per level of maturity of the interconnected system and market. To date,

The Maghreb countries exchange today limited levels of energy on a bilateral basis which can explain why their focus is more on the legal category which is a mandatory prerequisite before structurally increasing the cross-border exchanges.

- The Europe countries on the other hand are part of a fully interconnected system inside an integrated market where cross border exchanges are significant. As a direct consequence, the legal aspects have been harmonized through the ENTSO-E grid code and the focus is more on technical and market considerations, to fully grasp the economic benefit of the integrated market.
- The level of interconnection of the three other areas lies somehow in between the two previous extremes, which is why the opinions are more divergent. Nevertheless, operation-related topics still come in first no matter the area.

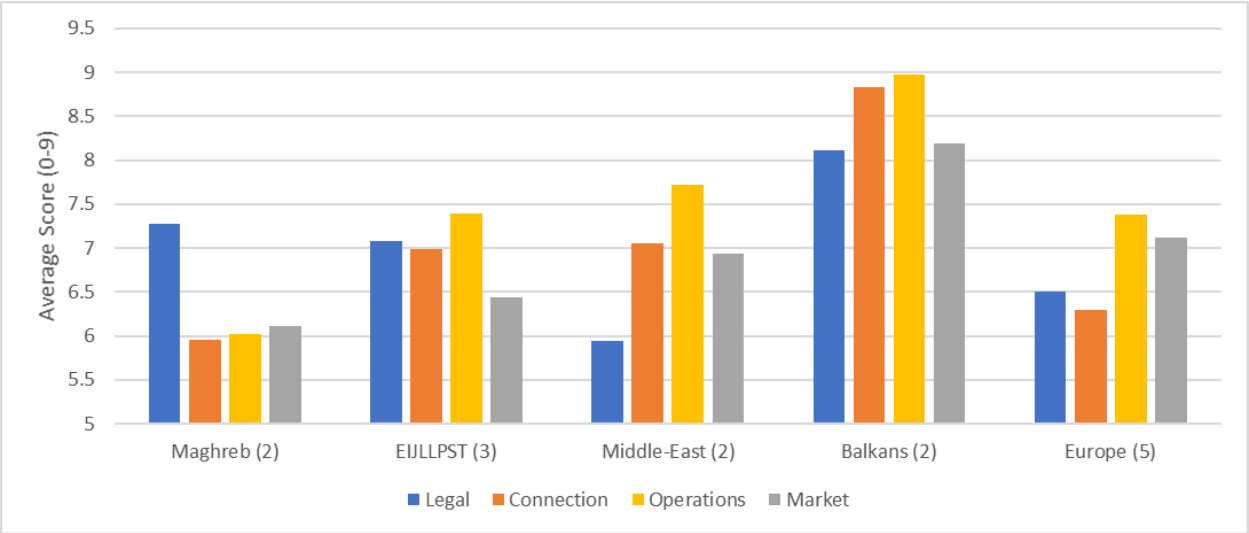


Figure 9 - Survey results per category and per geographical region

4.2. Focus on operation aspects

The detailed results of the Operation category, split per aspects identified in the CTRM, are shown in Figure 10. The results show a good alignment between the two studies: the stakeholders give a lot of credit to restoration processes, outage coordination, and management of international exchanges for harmonization.

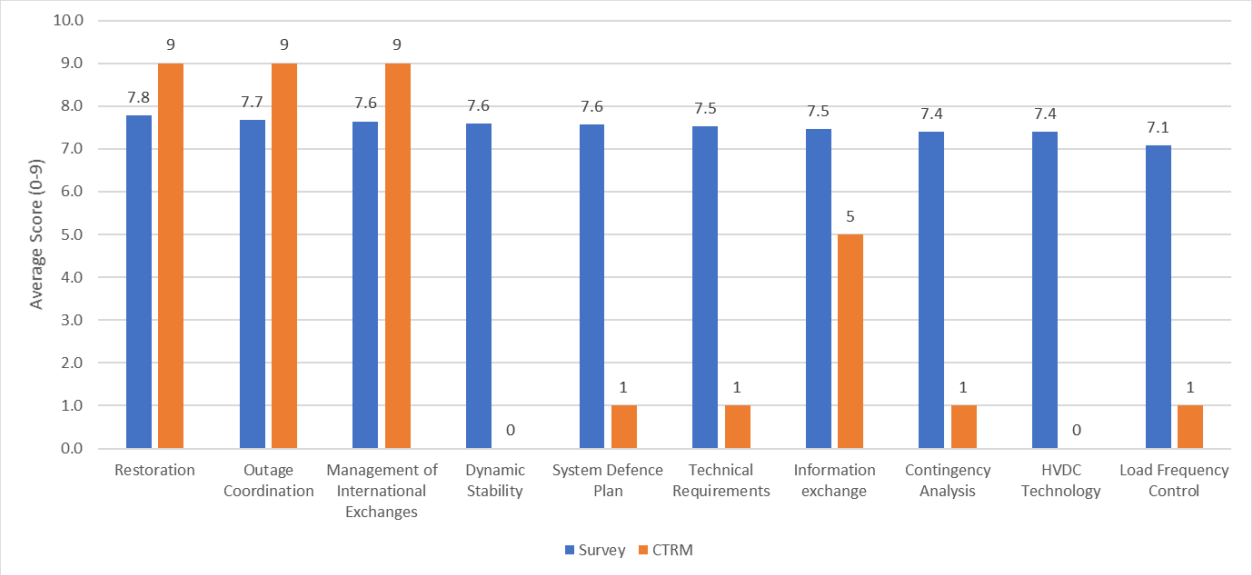


Figure 10 - Operation aspects: comparison between this survey and the CTRM (Common Target Road Map)[1]

Operations is the only category whose overall importance was confirmed by this survey which also explains why the alignment of the various aspects is satisfying.

4.3. Focus on legal/regulatory aspects

Larger discrepancies can be observed when looking into the questions related to regulatory and legal aspects, as can be seen in Figure 10.

1 Survey results are averages of all received replies. Scores of the CTRM are ranked per priority (9 the highest – 1 the lowest). Results cannot be compared one-on-one, but importance can be deduced.

Figure 10 Legal and regulatory aspects

4.4. Focus on connection aspects

The alignment between this survey and the CTRM is less good than for operations as shown in Figure . Nevertheless, the following aspects are confirmed as key between the two studies: HVDC technology requirements, frequency, and voltage requirements.

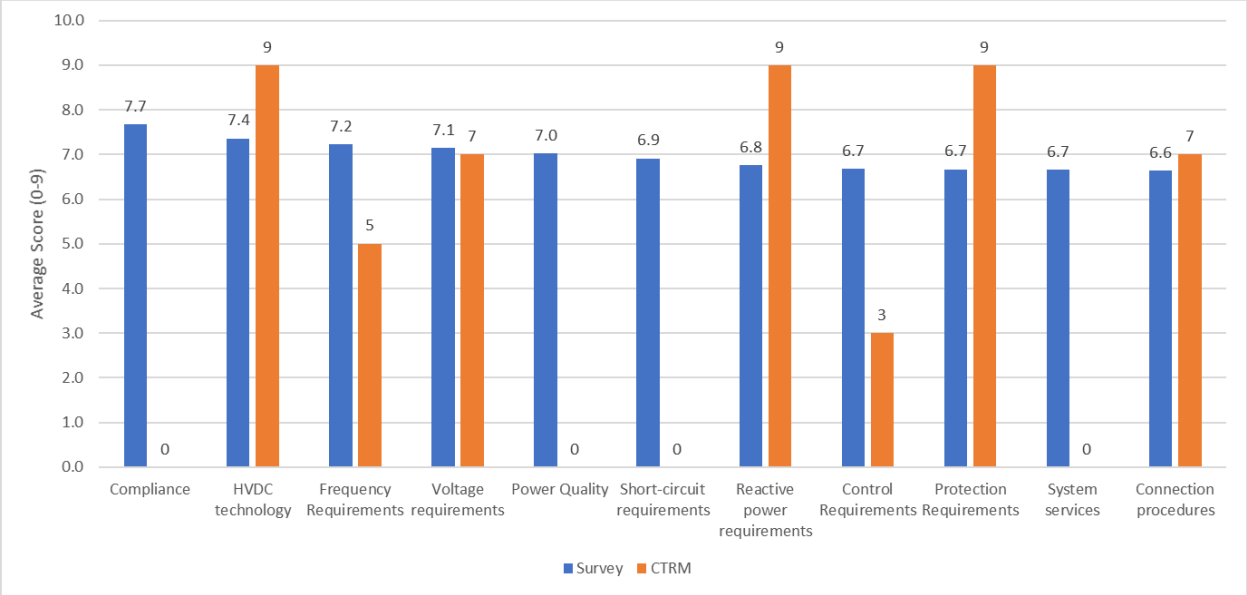


Figure 11 - Connection aspects: comparison between this survey and the CTRM

4.5. Focus on market aspects

The alignment between this survey and the CTRM is less good than for operations as shown in Figure . Nevertheless, transparency of data is confirmed as a key aspect from both studies.

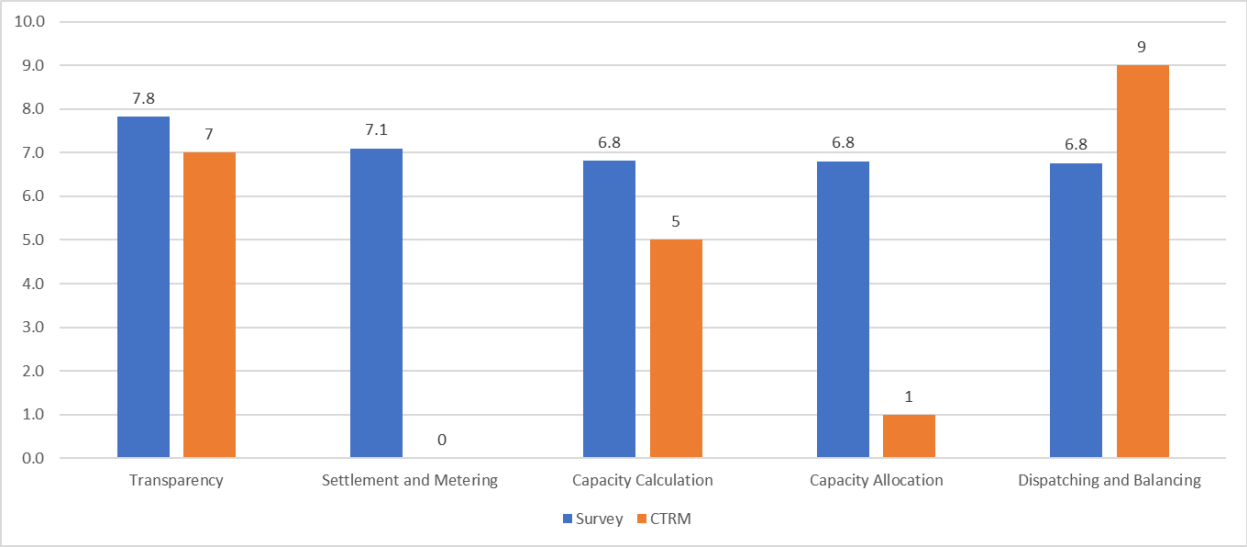


Figure 12 - Market aspects: comparison between this survey and the CTRM

4.6. Main outcomes from the open questions

The answers to the open questions gave meaningful insights on each participant vision. Some general trends are summarized hereunder and confirmed by explicit statements whenever relevant

- Key takeaway 1: Most participants give on the short-term a lot of credit to legal harmonization which they see as a quick win to encourage investments and to improve reliability.
  - *"Perhaps the most important legal aspect to be implemented for facilitating energy exchange is setting up a regulatory framework allowing for transparent and cost-reflective third-party access to interconnections"*
  - *"Technical harmonization most of the time can be resolved. However, regulatory framework is seen as a key […] to build business cases."*
  - *"[…] Therefore, there is a strong need to ensure compatibility of legal, regulatory, market and commercial rules on both sides of neighbouring countries"*
  - *"[…] Regional regulatory institutions are essential for the formation of a variety of agreements and harmonization of market design and regulatory policies, regardless of the degree of power system integration."*

- Key takeaway 2: Most participants confirm that they see poor attractiveness for investment and higher electricity prices as direct consequences of a lack of harmonization inside a geographical area.
  - *"Non-harmonization is a significant barrier for investment in cross-border projects provided that these projects are conceived for system purposes"*
  - *"Non-harmonization can lead to a significant increase on the investments needed, resulting on higher costs and therefore less attractiveness. […]"*
  - *"Lack of harmonization can lead to increased costs of activities related to energy sector […]"*
  - *"Economic gains from increasing exchanges (for example through a medium-long term reduction in energy prices); […]"*
  - *"Lack of harmonization can lead to increased costs of activities related to the energy sector. Further it can reduce the efficiency and effectivity of activities since that without certainty of transmission access, stable cash flows, and regulatory predictability, private investors would be unlikely to invest. […]"*

- Key takeaway 3: Most participants recommend capitalizing on successful harmonization initiative (such as ENTSO-E) and to adapt and extend these rules to other Mediterranean countries.
    - *"Harmonized regulatory framework and technical rules are already existing at EU Level, and should be extended to other MED countries "*
    - *"Some expertise and know-how could be learned from successful examples in EU, as the definition of Iberian Electricity Market (MIBEL), Baltic Electricity Market (BEMIP)"*
    - *"TSOs that are members of ENTSO-E are already obliged to implement and respect the agreed rules. Documents such as The Synchronous Area Framework Agreement (SAFA) consider all the aspects mentioned in questions below."*

5. Results of the interviews

This chapter highlights the main takeaways from the three interviews which have been conducted to date as a follow-up of the survey. The full interview notes can be found in appendix of this report.

5.1. Egypt ERA

EgyptERA is the regulatory body for Egypt. As expected for a regulator, EgyptERA confirmed that the key areas to be harmonized for them concern legal/regulatory, and market aspects. The operations considerations are less of an issue for Egypt since they are already well in place in the country.

Regarding the will to be integrated in an electricity market, the short-term vision of the regulator will be to continue with bilateral long-term contracts for their projects (with Greece and Saudi in HVDC), in order to limit the risks. As a result, EgyptERA encourages for legal/regulatory harmonization at a regional level rather than at the Mediterranean level. Nevertheless, on a long-term basis, Egypt hopes to be integrated in an electricity market with EAPP. Their objective in doing so would be to integrate more renewables in their system. They foresee to keep on exporting electricity in the future.

5.2. Energy Community

Energy Community confirmed that their main focus area lies in the market aspects. They state that there is no need for developing a unique grid code for the Mediterranean Region, as the ENTSO-E Network codes are existing and can be used.

Regarding energy exchanges, Energy Community also identified a barrier related to energy exchanges between member and non-member countries of ENTSO-E which is key in their geographical area dealing with the Western Balkans and the Black Sea region.

5.3. European Commission – DG Energy

One of the key takeaways from the interview is that the European Commission can play a key role in the integration of the Mediterranean region, by financing projects through their Project of Common Interest (PCI) list. In order to be added to this list, projects should be proposed by member states of the EU. The DG also makes a clear distinction

between synchronization between countries, more related to technical barriers, and significant energy exchanges through the interconnector, related to legal, regulatory, and political willingness.

PART 2:
GRID CODE GUIDELINGES
&
DEGREE OF INTEGRATION

6. Degree of integration

Through analysis of previous work and during interviews with stakeholders, it is clear that different regions aim for different levels of regional integration. This can be because certain regions have a different pace of regional development (e.g., Europe, where through ENTSO-E, regional integration is high on the agenda for several years, decades). But some countries do not have the same ultimate objective.

This makes is difficult, if not impossible, to develop a same set of grid code guidelines. Certain regulatory aspects and technical requirements are specifically linked to a certain "degree of integration". We therefore propose to introduce a new concept. The degree of integration defines to what level national power systems are regionally interconnected and integrated with each other. This degree of integration can be defined in two dimensions:

- **Cross-border grid development:** This indicator indicates the level of physical interconnection between countries.
- **Power market development:** This indicator indicates how trade and/or energy exchange is organized between countries.

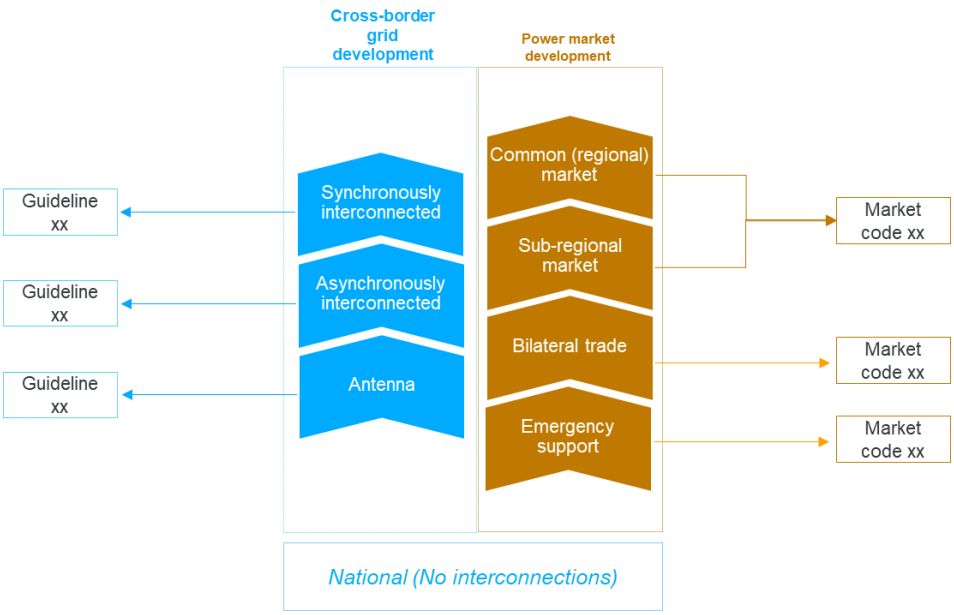


Figure 13: Degree of integration

The concept is illustrated in Figure 13. It is important to note that countries do not necessarily need to evolve in both dimensions to the same level. It is perfectly possible to have two meshed synchronous interconnections that are only trading through bilateral agreements, without the intention to develop a common market. On the other hand, these dimensions are not completely independent from each other. Interconnection is needed if energy is exchanged. With a further degree of market interconnection, a more developed level of cross-border interconnection is expected, as summarized in the scheme in Figure 14.

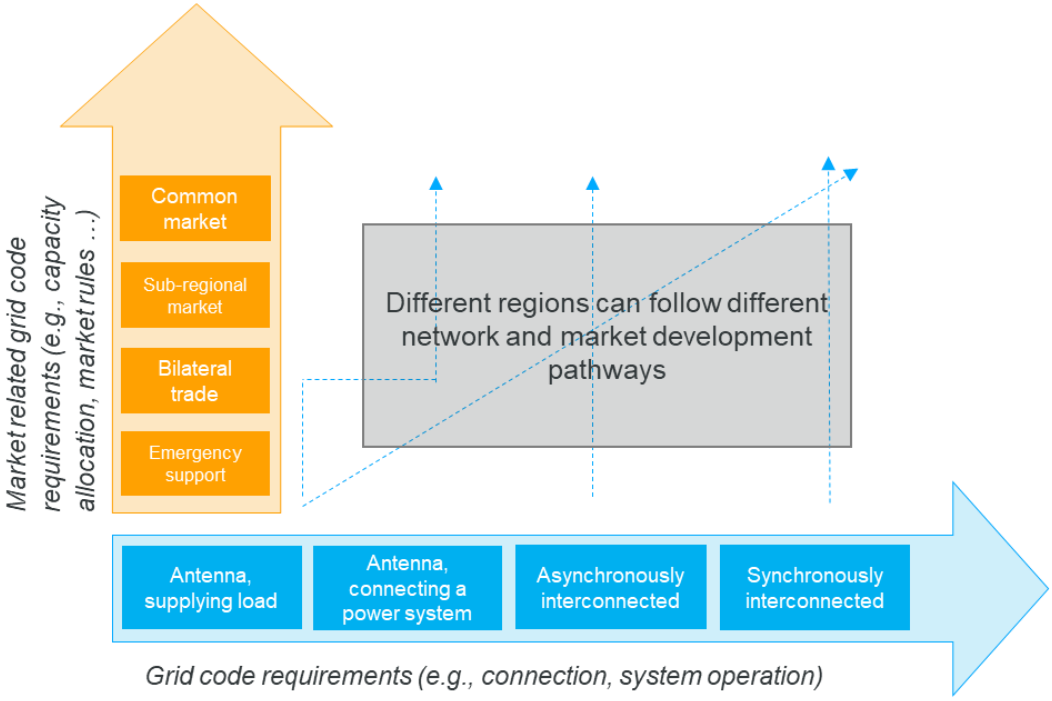


Figure 14: Link between the two dimensions of degree of integration

The following degrees in both dimensions can be defined:

Cross border grid development:

- No interconnection: Two countries are currently not interconnected
- Antenna: Two territories are only interconnected as in antenna. I.e., there is no meshed system present (also not via a third territory/Power System), and loop flows are not possible between the two concerned Power Systems. This also means that metered exchange on the interconnection equals the traded energy.

  Two distinctive cases are possible:

  - Antenna supplying load only: There is no generation present in the second Power System;

- Antenna connecting a Power System: There is generation present in both Power Systems.

- Asynchronously interconnected: Two Power Systems are only connected through HVDC lines and are operated asynchronously.
- Synchronously interconnected: Two Power Systems are connected through multiple AC lines and can be considered as a meshed system.

Power market Development:

- No interconnection: Two Power Systems are currently not interconnected
- Emergency support: Two or more Power Systems are interconnected; however, the purpose of the interconnectors is limited to providing mutual back-up assistance during emergency operating conditions. Some administrative settlement mechanisms are agreed upon between the system operators on both ends of the interconnector.
- Bilateral trade: In this case, the interconnectors are utilized not only for emergency support, but power could be exchanged between interconnected systems from a country with cheaper generation cost to the expensive one. However, this trade is limited to bilateral agreements between two neighbouring Power Systems. In this case, a short-term organized electricity market can be established to facilitate the trade depending on the maturity of the national electricity markets. Otherwise, only a long-term power purchase agreement can be signed between the neighbouring systems or together with short-term market.
- Sub-regional market: Like the bilateral trade, also in this case the interconnectors are utilized beyond emergency needs. However, more than two interconnected Power Systems participate in the power trading agreement. This would naturally require organized markets to facilitate the short-term exchanges of power besides the long-term agreements.
- Common (regional) market: In this case, the geographical scope the power market grows beyond bilateral and sub-regional levels, to regional market. That is, the interconnectors are open to any market player and prices are determined by the dynamics of supply and demand in the concerned systems. The success or market efficiency of such regional market highly depends on the maturity of the national systems and the openness of the generation system to market competition.

Next to this report, a table has been prepared where for each degree of integration, it is indicated what clauses and grid code articles are relevant for said degree of integration. The individual clauses and grid code articles that are identified are based on the work done in Mediterranean Project 1 and 2. In that work a Proposal of a Common Target Regulatory Framework was proposed, indicating priority issues for the development of Mediterranean Grid Code Guidelines.

They are organized in four categories:

- Legal and regulatory issues
- Connection to the grid
- Operation of the interconnected systems
- System Service Markets

This concept of degree of integration can be used in several ways.

- Firstly, it can be used to identify whether there are any gaps in the current regulatory framework that guides the integration between two or more Power Systems. By defining the current degree of integration, the tables developed in this work will summarize what clauses and grid code articles are needed for governing such collaboration. If any seems missing, this can be considered as a gap in the current framework.
- The table can also be used for defining what Grid code guidelines should be further developed, if the integration between two Power Systems will be further developed.

7. Mapping of priorities for Mediterranean Grid code Guidelines

This chapter is complementary to the excel tool that is developed in the frame of this assignment. The excel tool indicates what elements in future Grid Code Guidelines are relevant for each degree of integration, as introduced in the previous chapter.

The various topics under these four following categories, are the topics that are identified in previous work:

- Legal and regulatory issues
- Connection to the grid
- Operation of the interconnected systems
- System Service Markets

The below sections, provide additional information for the various sections on how the excel tool was filled in.

7.1. Legal and Regulatory issues

The topics raised in this category were defined with the purpose of having a clearer picture of the suitable level of harmonization needed in the different areas identified as relevant, based on the previous analysis made and the opinion of Med-TSO members. Both the dimension on cross-border development and the dimension on power market development are considered and presented in the excel tool. However not every topic is relevant for both dimensions. Not every topic raised in this category are a *conditio sine qua non* for further development and is as such not highlighted in the table.

A first analysis led us to the observation that a stronger regulatory framework is needed when moving towards a common market. As long as exchange is limited to bilateral trade, much less of a solid framework must be in place. It is also the Consultant's opinion that a single responsible authority for settlement of disputes in the entire Med-TSO's region is never a prerequisite.

	Cross-border development				Power market development			
Issue	Antenna, supplying load	Antenna, connecting power systems	Asynchronously interconnected	Synchronously interconnected	emergency support	bilateral trade	sub-regional market	common (regional) market
Harmonisation of responsible bodies for the development and/or approval of technical rules across MedTSO countries							✓	✓
The same dispute settlement authority in all MedTSO countries								
Possibility to appeal NRA's decisions at higher instance						✓	✓	✓
Invovement of stakeholders in the elaboration of technical rules/regulations	✓	✓	✓	✓				
Regulation to allow new entrants					✓	✓	✓	✓
Unbundling regulated and non-regulated activities							✓	✓
Coordinated regulation to make feasible and viable an international interconnection							✓	✓
Determination of entities involved in international interconnections								
Harmonized requirements for participation on the Electricity Market							✓	✓
Clarity on whether various activites of the power system including Production, transmission, distribution, trading on injection, trading on consumption, metering are regulated or not							✓	✓
Clarity on whether various activites of the power system including Production, transmission, distribution, trading on injection, trading on consumption, metering are different competent authorities (Ministries, TSOs, independent bodies)							✓	✓

Figure 15: Mapping of legal and regulatory issues

7.2. Connection to the grid

In this category, again both dimensions in the degree of integration (i.e., cross-border development and power market development) are relevant. However, all connection related requirements will be applicable at all market development phases.

Topics related to access and capacity calculations are typically linked with both cross-border development and power market development. Technical requirements on the other hand, are only related to the cross-border development dimension.

	Cross-border development			
Connection Procedure	Antenna, supplying load	Antenna, connecting power systems	Asynchronously interconnected	Synchronously interconnected
Studies performed for access and connection				✓
Horizons used for access capacity calculation				✓
Criteria used for access capacity calculation				✓
Remuneration mechanism for connection studies performed by TSOs	✓	✓	✓	✓
Responsibility of payment for the transmission assets needed for the connection of generation	✓	✓	✓	✓
Responsibility of payment for the transmission assets needed for the connection of distribution	✓	✓	✓	✓
Responsibility of payment for the transmission assets needed for the connection of consumption units	✓	✓	✓	✓
Limiting magnitudes for connection to the transmission grid	✓	✓		✓
Design criteria used for new transmission facilities needed for connection				✓
Obligation of users to provide simulation models to network operators	✓	✓	✓	✓
Capacity Connection Priority				✓
Binding relationship between planning and connection authorisation				
Frequency Requirements				
Frequency/damage range limits for users to withstand without damage	✓	✓		✓
Rate of Change of Frequency withstand capability	✓	✓		✓
Limited Frequency Ssensitive Mode-Overfrequency and Underfrequency schemes	✓	✓		✓
Voltage Requirements				
Voltage/Time range limits for users to withstand without damage	✓	✓		✓
Requirements for Compliance with fault ride through capability (per technology)	✓	✓		✓
Reactive Power Requirements				
Limits of reactive power contribution	✓	✓		✓
Short Circuit Requirements				
Short circuit current limits for switch equipment				✓
Short Circuit Ratio limits for thermal, CCGT, HPP				✓
Protection Requirements				
Type of protection criteria for non-transmission facilities connected at the transmission grid				✓
Aspects included in the protection schemes for non transmission facilities connected to the transmission grid.			✓	✓
Isolation levels in the transmission grid				✓
Redundancy required for telecommunication and protection schemes			✓	✓
Main functions required inside the multifunctional relays installed in the transmission grid			✓	✓
Control Requirements				
Global architecture & schemes required for controllability and observability of non-transmission facilities connected to the transmission grid				✓
Observability of non transmission facilites by TSO control systems (real time monitoring)	✓	✓		✓
Magnitudes provided in real time from non transmission facilties to TSO control center				✓
Controllability of non transmission facilities by TSO control systems				
Characteristics required for the communication system	✓	✓	✓	✓
Power Quality				
Reference normative standards for power quality regulation in the transmission grid	✓	✓		✓
Limit total number of voltage dips per node in the system	✓	✓		✓
Total Harmonic Distortion factor in the system	✓	✓		✓
Flicker limit values in the systems	✓	✓		✓
Refererence levels for voltage unbalances in the system	✓	✓		✓
Reference levels for transient overvoltage in the system	✓	✓		✓
Demand Disconnection Schemes				
Existence of Demand Disconnection Schemes	✓	✓		✓
System Restoration Capabilities				
Existence of Black Start Capability per Technology	✓	✓		✓
Existence of Island Operation Capability Per Technology	✓	✓		✓
Demand Side Response Services				
Existence and type of demand side response services in the system				✓
HVDC Requirements				
Existence of specific HVDC requirements or criteria in the system			✓	
Compliance & Monitoring				
Compliance scheme used in the system	✓	✓	✓	✓

Figure 16: Mapping of grid connection issues

7.3. Operation of the interconnected system

This category of Grid Code Guideline topics is only linked to the physical structure of the system (i.e., the cross-border development dimension).

As expected, the most differentiating factor between the degrees of integration, is the fact whether a system is synchronously interconnected or not.

	Cross-border development			
System States	Antenna, supplying load	Antenna, connecting power systems	Asynchronously interconnected	Synchronously interconnected
Classification of system states in your system	✓	✓	✓	✓
Technical Requirements				
System state in each frequency range	✓	✓		✓
Voltage ranges in normal conditions in your system	✓	✓		✓
Voltage ranges in extraodinary conditions in your system	✓	✓		✓
Specific voltage ranges in international interconnections	✓	✓		✓
Specify measures apply in your system for reactive power management	✓	✓		✓
Specific reactive power management for international interconnections	✓	✓		✓
System protection coordination criteria in interconnection lines	✓	✓		✓
Information exchange				
Real time data exchange with other TSOs				✓
Scheduled time data exchange with other TSOs	✓	✓	✓	✓
Structural data exchange with other TSOs	✓	✓	✓	✓
Contingency Analysis				
Specifying contingencies considered in each power system				✓
Contingency List (both internal & external)				✓
Specifying operational security limits in each power system	✓	✓	✓	✓
Determining the operational security limits in the interconnection lines	✓	✓	✓	✓
Joint remedial actions agreed between TSOs after a contingency in the different time horizons			✓	✓
The period implemented for state estimation calculation				✓
Dynamic Stability				
Performance of Dynamic Stability Studies	✓	✓	✓	✓
Management of InternationalExchanges				
Management of International Exchange programs between TSOs			✓	✓
HVDC Technology				
Need for operational security limits for HVDC facilities			✓	
HVDC technology			✓	
Based on the experience in operation of HVDC interconnection lines, should HVDC operation practices be revised?			✓	
Should operational practices be harmonised if HVDC interconnection lines are operated synchronously?			✓	
Outage Coordination				
The criteria & procedure for outage coordination (corrective/predictive maintenance) that affects the NTC			✓	✓
Load Frequency Control				
Frequency Containment Reserve (FCR) mandatory to provide and Who?				✓
Are users paid for providing FCR?				✓
Criteria used to establish FCR				✓
Compliance scheme for FCR				✓
Is it mandatory to provide Frequency Restoration Reserve (FRR)? Who?				✓
Compliance scheme for FRR?				✓
Replacement Reserve (RR)				✓
Compliance scheme for RR				✓
Reserves Management				
Reserves Management & share between TSOs.				✓
System Defence Plan				
Frequency deviation management procedure			✓	✓
Setting of demand disconnection schemes	✓	✓		✓
Voltage deviation management procedure	✓	✓		✓
Power flow management procedure	✓	✓	✓	✓
Manual demand disconnection procedure				
Inter-TSO assistance and coordination in emergency state				
Restoration Plan				
Rules & Types of restoration plans	✓	✓	✓	✓

Figure 17: Mapping of operational requirements

7.4. System Market Services

The market development builds on the development of the grid infrastructure. That is, without sufficient grid infrastructure, it would be challenging to develop efficient regional markets. Therefore, in this category, both dimensions in the degree of integration (i.e., cross-border development and power market development) are relevant. The relevance of the requirements/issues grows with the evolution of the power market. For instance, it can be observed that, when the interconnector is used only for emergency purposes, the requirements are limited to a few cross-border capacity management, general agreements, settlement and metering mechanisms and transparency issues. In contrast, all requirements need to be fulfilled to ensure efficient common regional market.

	Cross-border development				Power market development			
Legal Issues	Antenna, supplying load	Antenna, connecting power systems	Asynchronously interconnected	Synchronously interconnected	emergency support	bilateral trade	sub-regional market	common (regional) market
Requirements for participation on the cross-border electricity trade in each individual system							✓	✓
Rules for export/import of cross border electricity in each individual system				✓			✓	✓
Categories of operators enabled for import/export activities.				✓			✓	✓
Presence of a market Operator							✓	✓
Requirements for stipulating and executing contracts with market players relevant for the cross border trade with other relevant market players in each country						✓	✓	✓
Presence of any international agreements on either bilateral or multilateral basis that each country has concluded with other countries concerning further development and liberalisation of energy markets						✓	✓	✓
Possibility in each country to buy transmission rights already bought under the Transfer Capacity Allocation							✓	✓
Trading activities of electricity in each country							✓	✓
Requirements to satisfy for using the interconnections	✓	✓	✓	✓	✓	✓	✓	✓
Capacity Calculation								
Security criteria is used for calculating the Net Transfer Capacity (NTC)	✓	✓		✓	✓	✓	✓	✓
Process of finalisation of Net Transfer Capacity	✓	✓		✓	✓	✓	✓	✓
Definition of time horizons used for capacity calculation						✓	✓	✓
Process for calculating capacity in the different time horizons	✓	✓		✓		✓	✓	✓
Capacity Allocation								
Transmisssion capacity allocation methodology				✓		✓	✓	✓
Rules on the use (obligation) of allocated capacity							✓	✓
Definition of capacity products							✓	✓
Preocedure for Physical transmision reight (PTR) allocation							✓	✓
Management of congestions during PTR allocation							✓	✓
Rules for management of physical & commercial use of PTR							✓	✓
Clearly defined system liabilities, guarrantees and penalties for each subject involved and risk managmenet tool (e.g. bank guarantee)	✓	✓		✓	✓	✓	✓	✓
Determining the role for management procedure	✓	✓	✓	✓	✓	✓	✓	✓
Dispatching & Balancing								
Actions foreseen in order to guarantee the exchange programs				✓		✓	✓	✓
Management of unintentional deviations on international interconnections	✓	✓		✓		✓	✓	✓
Description of users which can provide balancing services in the international interconnections				✓		✓	✓	✓
International agreements on emergency situations and/or support exchanges with other countries	✓	✓	✓	✓	✓	✓	✓	✓
Settlement & Metering								
Subject responsible for settlement concerning international interconnections	✓	✓	✓	✓	✓	✓	✓	✓
Subject responsible for metering in the international interconnections	✓	✓	✓	✓	✓	✓	✓	✓
Transparency								
Modalities of publications on the Electricity Markets data in each country.					✓	✓	✓	✓
Modalities of publications on the International Interconnections' data in each country.					✓	✓	✓	✓

Figure 18: Mapping of market related topics

8. Conclusion

The objective of this report is to advance towards harmonization of the development of a common set of basic rules in the Med-TSO region. A proposal regarding common set of basic rules for the entire region, with focus on TSOs responsibilities and functions, is the deliverable target of this task. Such efforts pave the way for a future common Mediterranean electricity market. A common market will enable sharing resources through cross border exchanges and therefore increasing the reliability of energy supply across the region. To that extent, additional stakeholders were surveyed and interviewed for capturing the input of more types of stakeholders.

Limited feedback was received. From more than 100 surveys that were sent out, 15 replies were received, and three interviews were conducted. Moreover, most of the results were homogeneous. These results do not allow to identify clear priorities or key messages from the targeted audience. Results that are received do not deviate from conclusions that were made during previous stages (i.e., Mediterranean Project 1 and 2). It is reassuring to observe that priorities of contacted stakeholders do not deviate a lot from previously identified priorities, which were mainly TSO driven.

It remains an open question, whether the limited interest in this exercise to map the priorities in further harmonization is linked to the fact that this is not the highest priority of the stakeholders, or whether Mediterranean Projects 1 and 2 laid out sufficiently the way forward.

The main outcome from the interviews is that, before all, a common interest is needed to make regional cross-border projects a success. The lack of common grid code guidelines is not necessarily the biggest barrier. It is true that harmonization is needed up to a certain extent. It is also clear that various players have different views on regional integration, and not all parties around the Mediterranean have the same objectives.

It is important that required investments for realizing regional projects can be secured. At the same time, some kind of agreement is needed between stakeholders of various initiatives. This can be under the form of a bilateral agreement, a memorandum of understanding, a regional framework, etc Both aspects can be mitigated by a certain degree of harmonization, nonetheless. It is however necessary to keep in mind that harmonization is not the objective itself, but rather one of the bricks towards more regional integration.

Another very important message that was received during the interviews is that institutional buy-in is essential for pushing the regional integration.

In this study a new indicator is introduced, called degree of integration. The degree of integration defines to what level national power systems are regionally interconnected and integrated with each other. This degree of integration can be defined in two dimensions, cross-border grid development and power market development. The former is linked to the physical assets where the latter is more linked to how energy exchange is organized.

9. Annexes

9.1. Full survey printout

General questions — Progress: 0.0%

Which stakeholder group do you represent?

Additional comments:

In which region do you have most of your activities?

Additional comments:

What Improvements do you expect from increased interconnection? (Multiple answers possible)

- Increase of socio-economic wellfare
- Higher RES penetration
- Higher reliability
- Higher business opportunities for developers
- Reduced electricity costs
- Others

If you chose 'Others', please specify

Additional comments:

What are the main barriers for increased energy exchanges between MedTSO countries? (Multiple answers)

- Lack of harmonized regulatory framework
- Lack of harmonized technical rules
- Lack of financing
- Lack of power market platform
- Uncoordinated power system planning
- Others

If you choose 'Others', please specify

Additional comments:

What is the regional level where harmonization is required?

Additional comments:

Open question: From your point of view, to what extent non-harmonization can be a barrier for investment in cross-border projects?

Open question: From your point of view, to what extent non-harmonization can be a barrier for operations of an interconnected system?

Open question: From your point of view, to what extent non-harmonization can be a barrier for cross-border commercial trade?

Legal, regulatory and institutional aspects

Progress: 0.0%

Open question: is there an important legal aspect for facilitating energy exchange, not mentioned in following questions?

Open question: are you aware whether the country where you have activities is involved/committed to a regional framework?

Open question: what should the elegibility criteria for the establishment of Projects of Common interest in the Mediterranean Area?

In order to increase energy exchanges between Mediterranean coutnries, ...	Please answer from 0 to 9
Should regulated and non regulated activities be unbundled?	
Should the responsible authority for the settlement of disputes among stakeholders be the same in all MedTSO countries?	
Should the responsible body for the development and/or approval of technical rules be harmonised?	
Should stakeholders be involved in the elaboration of technical rules/regulations?	**9=highest priority, 1=lowest priority, 0=not relevant**
Should Stakeholders have the possibility to appeal NRA's decisions at higher instance?	
Should a regional coordinator be created to faciliate interconnected operations of neighbouring systems?	
Should the requirements for participation on the Electricity Markets in MedTSO countries be harmonised?	
To what extent is having regional institutions a pre-requesite for regional energy market integration?	
Should a regional funding mechanism be established to support interconnection Projects?	
Additional comments:	

Connections aspects

Progress: 0.0%

Open question: is there an important aspect on connections, not mentioned in following questions?

Open question: from your experience, what is the main barrier regarding harmonization of connection requirements?

What would harmonization of connection requirements bring to you as a stakeholder? (please answer from 0 to 9)

Clarity	
Reduce risk	
More facility for finding fundings	
Incentive to connect in a country with higher RES potential	
Others (Please specify below)	
If you selected 'Others', please specify:	
Additional comments:	

9=highest priority, 1=lowest priority, 0=not relevant

What are the main aspects to be harmonized between countries, regarding the connection procedures? (please answer from 0 to 9)

Studies performed (e.g. load flow, dynamic, short-circuit, etc.) for access and connection	
Horizons used for access capacity calculation	
Criteria used for access capacity calculation (e.g. N-1)	
Remuneration mechanism for connection studies performed by TSOs	
Responsibility of payment for the transmission assets needed for the connection of generation	
Responsibility of payment for the transmission assets needed for the connection of distribution	
Responsibility of payment for the transmission assets needed for the connection of consumption units	
Obligation of users to provide simulation models (including voltage and frequency control) to network operators	
Capacity Connection Priority (e.g. for renewable, for the first application, etc.)	
Additional comments:	

9=highest priority, 1=lowest priority, 0=not relevant

What are the main aspects to be harmonized between countries, regarding the following technical requirements? (please answer from 0 to 9)

A. Frequency Requirements	
Frequency/damage range limits for users to withstand without damage	
Rate of Change of Frequency withstand capability	
Limited Frequency Sensitive Mode - Overfrequency and Underfrequency schemes	
B. Voltage Requirements	
Voltage/Time range limits for users to withstand without damage	
Requirements for Compliance with fault ride through capability (per technology)	
C. Reactive Power Requirements	
Limits of reactive power (or power factor) contribution	
D. Short Circuit Requirements	
Short circuit current limits for switch equipment	
Short Circuit Ratio limits for thermal, CCGT, HPP	
Minimum short-circuit ratio limit for inverter-based assets	
E. Power Quality	
Reference normative standards for power quality regulation in the transmission grid	
Total Harmonic Distortion factor in the system	
Flicker limit values in the systems	
Refererence levels for voltage unbalances in the system	
Reference levels for transient overvoltage in the system	
Additional comments:	

9=highest priority, 1=lowest priority, 0=not relevant

What are the main aspects to be harmonized between countries, regarding Protection and Control requirements? (please answer from 0 to 9)	
A. Protection Requirements	
Type of protection criteria for non-transmission facilities connected at the transmission grid	
Aspects included in the protection schemes for non transmission facilities connected to the transmission grid.	
Isolation levels in the transmission grid	
Redundancy required for telecommunication and protection schemes	
Main functions required inside the multifunctional relays installed in the transmission grid	**9=highest priority, 1=lowest priority, 0=not relevant**
B. Control Requirements	
Global architecture & schemes required for controllability and observability of non-transmission facilities connected to the transmission grid	
Observability of non transmission facilites by TSO control systems (real time monitoring)	
Variables to be provided in real time from non transmission facilties to TSO control center (e.g. P, Q, V)	
Controllability of selected non transmission facilities by TSO control systems	
Characteristics required for the communication system	
What are the main aspects to be harmonized between countries, regarding system services? (please answer from 0 to 9)	
A. Frequency reserve	
Criteria for providing frequency reserve	
B. Demand Disconnection Schemes	
Criteria for Demand Disconnection Schemes	
C. System Restoration Capabilities	
Criteria to provide Black Start Capability per Technology	**9=highest priority, 1=lowest priority, 0=not relevant**
Criteria for Island Operation Capability Per Technology	
D. Demand Side Response Services	
Criteria for providing demand side response services in the system	
What are the main aspects to be harmonized between countries, regarding HVDC technology? (please answer from 0 to 9)	
A. HVDC Requirements	
Existence of specific HVDC requirements or criteria in the system	
What are the main aspects to be harmonized between countries, regarding compliance? (please answer from 0 to 9)	
Compliance scheme used in the system	
Additional comments:	

Market aspects

Progress: 0.0%

Open question: is there an important aspect missing from the questions here below?

Open question: from your experience, what is the main barrier for participating to the market (or being able to sell/buy energy) from a neighbouring country?

What are the main aspects to be harmonized regarding Legal aspects? (please answer from 0 to 9)

Requirements for participation on the cross-border electricity trade in each individual system.

Rules for export/import of cross border electricity in each individual system.

Categories of operators enabled for import/export activities.

Presence of a market Operator

Requirements for stipulating and executing contracts with market players relevant for the cross border trade with other relevant market players in each country (i.e. contracts between TSO and Grid Operators, Contracts between TSO and Market operators and Contracts between market operators and Grid Operators)

9=highest priority, 1=lowest priority, 0=not relevant

International agreements on either bilateral or multilateral basis that each country has concluded with other countries concerning further development and liberalisation of energy markets

Possibility in each country to buy transmission rights already bought under the Transfer Capacity Allocation

Requirements to satisfy for using the interconnections (e.g. demand/offer equilibrium, congestion management at national, and if possible, at international level, balancing of the exchange program in real time, coordinated dispatching)

What are the main aspects to be harmonized regarding Capacity Calculation? (please answer from 0 to 9)

Security criteria is used for calculating the Net Transfer Capacity (NTC).

Market model - Transparency for the stakeholders.

Process of finalisation of Net Transfer Capacity.

9=highest priority, 1=lowest priority, 0=not relevant

Time horizons used for capacity calculation -
Process for calculating capacity in the different time horizons.

What are the main aspects to be harmonized regarding Capacity Allocation? (please answer from 0 to 9)?

Method for interconnection capacity allocation

Obligation to use allocated capacity

Auctions mechanism

Capacity products allocated

Type of preocedures used for PTR allocation. Management of congestions during PTR allocation.
Rules for management of physical & commercial use of PTR.

9=highest priority, 1=lowest priority, 0=not relevant

System liabilities, guarrantees and penalties applied for each subject involved. Risk management: Auction rules shall contain provisions concerning risk management.

What are the main aspects to be harmonized regarding Dispatching & Balancing? (please answer from 0 to 9)

Actions foreseen in order to guarantee the exchange programs

Management of unintentional deviations on international interconnections

Description of users which can provide balancing services in the international interconnections

9=highest priority, 1=lowest priority, 0=not relevant

International agreements on emergency situations and/or support exchanges with other countries.

What are the main aspects to be harmonized regarding Settlement & Metering? (please answer from 0 to 9)								
Responsabilities for settlement concerning international interconnections.				9-highest priority, 1-lowest priority, 0-not relevant				
Responsabilities for metering in the international interconnections								
What are the main aspects to be harmonized regarding Transparency? (please answer from 0 to 9)								
Presence & modalities of publications on the Electricity Markets data in each country.				9-highest priority, 1-lowest priority, 0-not relevant				
Presence & modalities of publications on the international interconnections' data in each country.								
Additional comments:								

Operations aspects

Progress: 0.0%

Open question: Is there an important aspect missing from the questions here below?

Open question: From your experience, what is the main barrier for ensuring reliable operations of an interconnected system?

Technical Requirements: which aspects need to be harmonized (please answer from 0 to 9)
Frequency range in each system state
Voltage ranges in normal conditions
Voltage ranges in extraordinary conditions
Voltage ranges on the interconnection
Reactive power requirements
Reactive power requirements along the interconnection
Protection coordination on the interconnection

Information exchange: which aspects need to be harmonized (please answer from 0 to 9)
Real time data exchange
Scheduled time data exchange with other TSOs?
Structural data exchange with other TSOs?
Technical characteristics and control with TSOs and neighbouring TSOs?

Contingency Analysis: which aspects need to be harmonized (please answer from 0 to 9)
Contingency List (both internal & external)
Operational security limits in power systems
Operational security limits in the interconnection lines.
Joint remedial actions agreed between TSOs after a contingency in the different time horizons.
Period implemented for state estimation calculation.

Dynamic Stability: which aspects need to be harmonized (please answer from 0 to 9)
Performance of Dynamic Stability Studies

Management of International Exchanges: which aspects need to be harmonized (please answer from 0 to 9)
Management of International Exchange programs between TSOs
Unintentinal deviations management

HVDC Technology: which aspects need to be harmonized (please answer from 0 to 9)
Operational security limits for HVDC facilities
HVDC operation practices
Operational practices if HVDC interconnection lines are operated synchronously.
Simulations and models

Outage Coordination: which aspects need to be harmonized (please answer from 0 to 9)
Criteria & procedure for outage coordination (corrective/predictive maintenance) that affects the NTC
Outage coordination between TSOs
Outage coordination between TSOs and users

Load Frequency Control and reserve management: which aspects need to be harmonized (please answer from 0 to 9)								
Criteria to select Frequency Containment Reserve (FCR) providers								
FCR remuneration								
Compliance requirement scheme for FCR								
Criteria to select Frequency Restoration Reserve (FRR) providers								
Compliance requirement scheme for FRR								
Replacement Reserve (RR)								
Compliance requirement scheme for RR								
Reserves Management & share between TSOs.								
System Defence Plan and Restoration: which aspects need to be harmonized (please answer from 0 to 9)								
Frequency deviation management procedure								
Setting of demand disconnection schemes								
Voltage deviation management procedure								
Power flow management procedure								
Manual demand disconnection procedure								
Inter-TSO assistance and coordination in emergency state								
Rules & Types of restoration plans								
Additional comments:								

9.2. List of stakeholders contacted

Country	Company	Country	Company
Albania	EBRD - Albania	Morocco	OCP
Albania	Energy Regulator Authority (ERE)	Morocco	Onee
Albania	ERE ENTI RREGULLATOR I ENERGJISE	Morocco	Sahara Wind
Albania	MINISTRY OF ENERGY AND INDUSTRY	Palestine	PETL
Albania	MINISTRY OF EUROPEAN INTEGRATION	Portugal	DGEG
Albania	Novo Belgium Holding Albanie	San Marino	Parliamentary Assembly of the Mediterranean
Albania	OST	Serbia	EIB
Albania	URI	Slovenia	EBRD
Algeria	CREG	Spain	Ocean Wind
Algeria	Energy Consultant	Spain	REE
Algeria	Ministry of Energy and Mines	Tunisia	STEG
Algeria	OS	Tunisia	TuNur
Algeria	SONATRACH	Turkey	CENGIZ HOLDING CO
Algeria	SONELGAZ	Turkey	EBRD
Algeria	Tiaret University	Turkey	EMRA
Algeria	UTMB	Turkey	Energy Market Regulatory Authority
Bosnia Herzegovina	Delegation of the European Union to Bosnia and Herzegovina	Engie RES	International
Croatia	HOPS	World Bank	International
Cyprus	Euroasia - Interconnector	AFD	International
Kosovo	European Union Office in Kosovo	Azura	International
Lebanon	Dietsmann	BWSC	International
Lebanon	MP Energy	DG ENERGY	International
Macedonia	EBRD - Western Balkans	EBRD	International
Macedonia	TIMELPROJECT ENGINEERING	Energy Community	International
Montenegro	CGES	Frontier	International
Morocco	ANRE	Globeleq	International
Morocco	CME	IMM	International
Morocco	EBRD-Morocco	Lekela	International
Morocco	MASEN	RES4AFRICA	International
Morocco	Ministry of Energy Transition and Sustainable Development	Skypower	International
Morocco	Ministry of Energy, Mines and Sustainable Development	Schneider Electric	International
France	RES development	Veolia	International

9.3. Interview minutes

9.3.1. Egypt ERA

Interview details

- Date: 28/04/2022
- Present
  - Med-TSO: Luca Ruffino, JuanManuel Rodriguez Garcia
  - Interviewee: May Yousry,
  - Engie Impact: Olivier Antoine, Basile Rosen
- Held via MS Teams for one hour

Identification of the interviewee

- Company: EgyptERA (Egypt national regulatory body)

Name	Position
Ms. May Youssry	Acting General Director of Planning Department
Mr. Ahmed R. Elshami	Med-TSO
Ms. Taghrid Amer	EETC

Interview Notes

- **Are you in line with the survey results?**

First clarification required from the survey results: a score of 1 means for ERA that the topic in question is not a prerequisite for electricity exchanges. In that sense, the average score given to regulatory considerations is biased. It is also noted that the number of questions in each category can affect the average.

The two most important topics for ERA are Legal and Market. Operations aspects are already well defined in Egypt. With respect to connections, they consider the requirements at the point of common coupling as being the most important aspect for harmonization.

- **To what extent should the planned interconnection with Egypt (Saudi HVDC and Greece) require further harmonization between the areas?**

It is clear from answers to other questions that Egypt currently goes for bilateral long-term contracts for both these projects. One of the reasons is that long-term contracts reduce the risk for investors. Another reason is that bilateral agreements require limited harmonization However, the vision is to put in place an electricity market in the future.

- **What are the main barriers for increased energy exchanges between Med-TSO countries? (From Legal, Connection, Market or Operation point of views)**

EgyptERA clearly identifies Regulatory and market considerations as being the main barriers.

- **Do you expect differences per region? Why?**

It was clearly stated by EgyptERA that the main regional priority for harmonization is EAPP.

- **Do you expect differences per type stakeholder? Why?**

ERA expects Operations considerations to be mainly relevant for TSOs, which is in line with the survey results.

- **To what extent non-harmonization can be a barrier for investment in cross-border projects?**

The last thing EgyptERA wants is to see investors leaving due to lack of harmonization which is why Regulatory and Market aspects need to be harmonized. About the level of harmonization, they would like to have first the same/similar topics to be applied at the regional level (not necessarily the exact same requirements and parameters).
For the future interconnection projects in Egypt, typically an agreement is achieved between the two parties (MoU), then funding is typically reached through IFIs.

- **What is the regional level where harmonization is required? (None, bilateral, regional, whole Mediterranean region)**

Currently, Egypt has connections with Jordan, Libya, Sudan. They foresee new ones towards Greece and Saudi Arabia. EgyptERA sees bilateral agreements to remain the norm in the near future. Currently, the long-term bilateral agreements give them the stability they need, and market integrations would lead to risks (for investors?) which should be managed by the governments. They agree that long-term contracts are not optimal for electricity prices.

They see a fully integrated market as being a more long-term consideration, and should it happen, they see an integrated market with EAPP as a must. The biggest added value of such market would be to integrate more RES in the generation mix, not really as an opportunity to import more energy.
Egypt should be seen as an energy exporter and exporting is therefore the main driver for cross-border interconnections.

- **To what extent do you stand by these statements from other stakeholders:**

  - *"For cross-border energy projects, regional political institutions should play a critical role in coordinating interests of member countries and keeping political conflicts to a minimum."*

  They fully agree to this. They always look at pure economic interest and try to take decisions without any political considerations. Nevertheless, not everything is within their hands, in the end, the politics take the decisions.

  - *"Harmonized regulatory framework and technical rules are already existing at EU Level and should be extended to other MED countries "*

    Before harmonizing their rules with neighboring countries, they would like indeed to hear from

successful market integration stories and take advantage from the return of experience from such regions.

- **Other comments**
  - Unbundling of the electricity sector is not under discussion in Egypt
  - ERA expects Med-TSO grid code to provide guidelines for grid code compliance assessment and continuous monitoring.
  - They see a gap in their grid code in terms of compliance verification and monitoring, Med-TSO could play a role to propose common regional guidelines for this.
  - Egypt is part of EAPP and expects to first to develop its trade further within the power pool
  - They are not developing interconnections to have the ability to import, but the main goal is to have access to more renewable energy.

9.3.2. Energy Community

Interview details

- Date: 23/05/2022
- Present
  - Med-TSO: Luca Ruffino, Juan Manuel Rodriguez Garcia, Simone Biondi
  - Interviewee: Jasmina Trhulj, Davor Bajs
  - Engie Impact: Olivier Antoine, David Bekaert, Sarah Ouziaux
- Held via MS Teams for one hour

Identification of the interviewee

- Company: Energy Community

Name	Position
Ms. Jasmina Trhulj	Head of electricity
Mr. Davor Bajs	Electricity infrastructure expert

Interview Notes

- **Are you in line with the survey results?**

The most important topics for Energy Community are topics related to the Market. They state that there is no need for developing a unique grid code for the Mediterranean Region, as the ENTSO-E Network codes are existing and can be used. It is up to non-European countries to adopt the necessary technical requirements Energy Community also states that, the non-European countries should not be convinced to follow European regulation, but regulation should be adopted through a legally binding treaty.

- **What are the main barriers for increased energy exchanges between Med-TSO countries? (From Legal, Connection, Market or Operation point of views)**

The main barriers are linked to a lack of infrastructure. When discussing infrastructure, it is important to keep both the 'hardware' and 'software' related aspects.

- **Does this mean we need a minimum set of rules for investment? To what extent non-harmonization can be a barrier for investment in cross-border projects?**

For an investment to succeed, the fact that there must be a common interest is more important than harmonization.
Energy Community also identified a barrier related to energy exchanges between member and non-member countries of ENTSO-E. The current legal framework does not allow such exchanges. The non-member country can set up an agreement for energy exchange on a voluntary basis which has its limits. There is an issue with the reciprocity – i.e. Energy Community countries are obliged to apply EU rules at the border but the EU countries not.

- **Do you expect differences per region? Why?**

Energy is a very geopolitical issue.

As example the synchronization of Ukraine was given. Due to the war, all of a sudden synchronization was possible within weeks. Otherwise, the process would have taken years.

Energy Community is dealing with two regions, the Western Balkan, and the Black Sea Region. As the Western Balkan started the process to integrate the European union, they observe another pace in development of the energy sector. Members of the EU are faced with initiatives as the 3rd energy package, the clean energy package, RePower EU. that impose stricter requirements, targets, but also access to subsidies.
On the other hand, it is observed that every new package is more demanding than the previous one, which leads to an additional delay in catching up with these development by non-EU countries.

9.3.3. EC – DG Energy

Interview details

- Date: 13/06/2022
- Present
  - Med-TSO: Luca Ruffino, Juan Manuel Rodriguez Garcia
  - Interviewee: Nicolas Kuen
  - Engie Impact: Sarah Ouziaux, David Bekaert, Basile Rosen
- Held via Google Meet for one hour

Identification of the interviewee

- Company: European Commission – DG ENER

Name	Position
Nicolas Kuen	Team leader - Eastern and Southern Neighbourhood, Energy Community/Charter, UKTF

Interview Notes

The meeting started with an introduction of Med-TSO and of the TEASIMED initiative.

- Mr. Kuen is very active in the Balkans and East Mediterranean area.
- The DG notices that there are indeed some areas of the Mediterranean where some interconnector projects are well advanced, but also some less interconnected zones without any foreseen projects. They need incentives for building more interconnectors cause some of them are not even at planning stage. DG also mentions that the EC can finance projects from the Project of Common Interest (PCI) list. They need to be proposed by a member state.
- Med-TSO: having interconnectors is not sufficient to trade energy (taking the example of the Tunisia-Libya interconnector which was tested in 2005 & 2010 unsuccessfully). Today, these tests are not possible due to political context.
- DG agrees that synchronization is great, but it is most important to increase exchange volumes.
- DG: There is an ongoing initiative to encourage Eastern Med to export more Gas. In that frame, what is the position of Algeria within Med-TSO?

- Med-TSO: President of Med-TSO is president of Sonelgaz → they are interested and pushing for more interconnection and energy exchange. They are suffering from the lack of access to the European market.

- Q1: Are you in line with the survey results?

    - DG sees a legal harmonization as a prerequisite to any interconnection (be it as a bilateral agreement, MOU, or wider frame agreement)
    - Med-TSO sees the ongoing initiative between EC and Energy Community as an opportunity to learn from the example.
    - DG mentions that indeed, having a dedicated treaty with Med area would help. To do so, Med-TSO needs to put this on a formal note for discussion with EC.

- Q2: To what extent non-harmonization can be a barrier for investment in cross-border projects?

    - DG: It is more about the security of the investment. The political stability of the region is not always a given → if the risk is too high, so will be the price gap. In that sense, having a project on the PCI list secures funding and helps building on stability. In certain cases, other political points of discussion play a role whether progress on cross-border projects is made or not.
    - To be noted: PCI only finances the European part (member state) → there are other ways to finance the other part.

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