MEDREG – ELE WG- WORKSHOP Report

Workshop report: Enabling electricity exchanges and trading in the Mediterranean

Empowering Mediterranean regulators for a common energy future

Organized by

MEDREG

Med-TSO
MEDITERRANEAN TRANSMISSION SYSTEM OPERATORS

Co-funded by the European Union

Electricity Working Group (ELE WG)

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ABTRACT

On the 9th of February 2022 MEDREG and MedTSO jointly organized an online on "Enabling electricity exchanges and trading in the Mediterranean" with an aim to achieve a common technical and regulatory framework to increase electricity exchanges and trading between the two Mediterranean shores.

The Workshop discussed the importance of an integrated energy market, where speakers from different stakeholders, including IFIs, shared their experiences, knowledge and lessons learnt how to mitigate the challenges that they have met towards a smoot exchanges and trading between the borders.

The workshop featured two panels, each featuring 5 speakers from various backgrounds, experiences, and regions (Europe, GCC and Southern Africa). The first panel included discussions and debates on how to achieve a common technical & regulatory framework in the MENA region, including experiences and best practices from neighbouring regions. On the other hand, the discussions during the second panel were focused on electricity trading within the MENA region, including the missing links and requirements to facilitate and ease the development of an integrated market in the Mediterranean region.

The workshop was attended by more than 90 attendees. MEDREG shared in this workshop the work of the Electricity working group.

AKNOWLEDGMENTS

This report is drafted by the MEDREG Secretariat (Mr. Bardhi Hoxha, Mr. Lamine Zitouni and Mr. Omar Rafaat) and approved by the MEDREG ELE WG chairs. The report will provide the main takeaways of the workshop and it's part of the MEDREG ELE Working Group contribution to the UfM Energy platform.

ABOUT MEDREG

MEDREG is the Association of Mediterranean Energy Regulators, bringing together 27 regulators from 22 countries, spanning the European Union, the Balkans and the MENA region.
Mediterranean regulators work together to promote greater harmonization of the regional energy markets and legislations, seeking progressive market integration in the Euro-Mediterranean basin. Through constant cooperation and information exchange among members, MEDREG aims at fostering consumers rights, energy efficiency, infrastructure investment and development, based on secure, safe, cost-effective, and environmentally sustainable energy systems. MEDREG acts as a platform providing information exchange and assistance to its members as well as capacity development activities through webinars, training sessions and workshops.

The MEDREG Secretariat is in Milan, Italy.

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ROLE OF THE REGULATORS AND TSO IN ENABLING INTERCONNECTION WITH NEIGHBOURING REGIONS

The elaboration of a consistent regulatory framework and the development of transmission infrastructure represent the key elements for the creation of a sub-regional and regional electricity market.

From the European experience, having an integrated energy market is an asset for this new era of energy transition. It facilitated the integration of renewable energy sources, supported the quality and security of supply.

Moreover, the European Commission is currently promoting the extension of the electricity market to the Balkan and Eastern European countries by the development market coupling projects which require common structures and rules.

In that perspective, the role of the National Regulatory Authority (NRA) is crucial to develop a regulatory framework with a regional integration vision. At a regional level, NRAs initiate the discussion and debate to develop common rules, starting from the basic rules such as definition of the TSO and its competences, separation of transmission and distribution and unbundling of the market.

It is also important to highlight that developing a common network code and regulatory framework is a long process. At the European level, the common network code took almost 6 years to be finalized from 2009 to 2015, due to the high technical issues and the political challenges. Therefore, it is recommended for the technicians and politicians to collaborate on the technical and regulatory aspects

Besides to the role of the NRAs on developing a coherent regulatory framework, TSOs have a crucial role in developing the local infrastructure with a perspective of achieving future regional integration. Moreover, TSOs support the NRAs in expanding the network grid code and elaborating studies and assessment of the socioeconomics and security benefits of interconnections.

Daily, TSOs have a crucial role on the operation and maintenance of the network, coordinating with the DSOs to ensure an optimal use of the market infrastructure. However, for the Mediterranean region, the TSOs will have to face more challenges not only in terms of complexity of the geographical situation, but also coupling with other sectors such as the integration of hydrogen to the energy system.

Besides the role of the NRAs and TSOs in enabling interconnection with neighbouring countries, trust is another key element to be built with time among the countries of the same sub-regions, by improving the cooperation and developing common activities and projects.

2

EXPERIENCES AND BEST PRACTICES FROM NEIGHBOURING REGIONS

1.1. Southern Africa - Southern African Power Pool (SAPP)

The Southern African Power Pool (SAPP) was established in 1995 through the signing of an Inter-Government Memorandum of Understanding by 12 Southern African Development Community (SADC) with objectives to:

- Coordinate the planning and operation of the electricity business in SADC
- Facilitate cross border electricity trading
- Promote regional cooperation in power projects development (Generation and Transmission Infrastructure)
- Ensure that the region attracts investment for large energy intensive electricity users

SAPP covers a population of over 350 million people, with an installed capacity of more than 70 GW. The cross-border interconnection in the region can be seen in Figure 1 below.

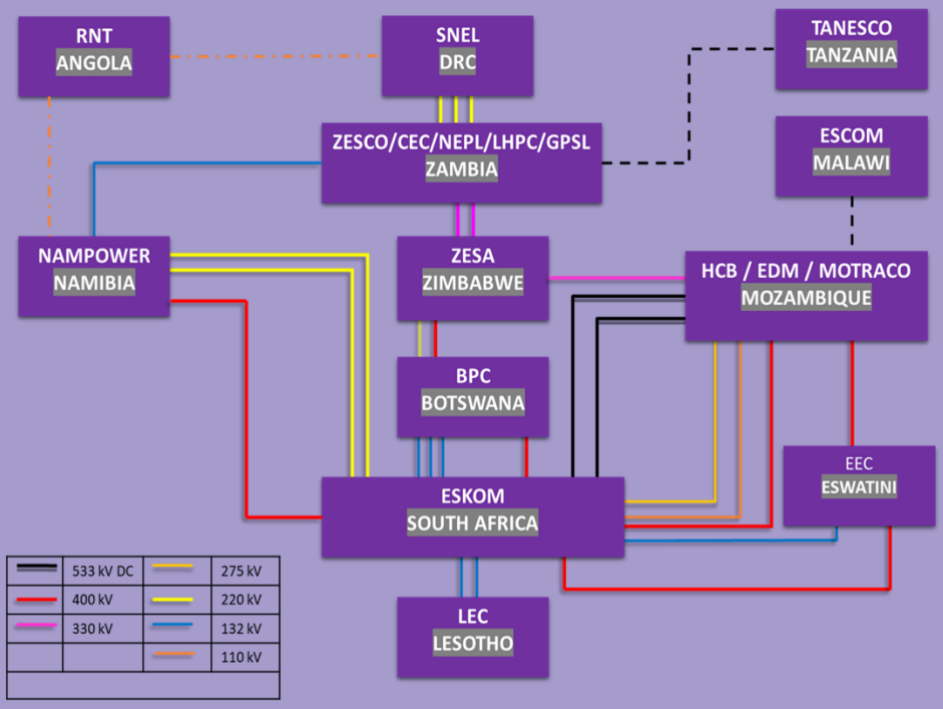

Figure 1. Cross border interconnection in SAPP region

Source: Stephen Dihwa – SAPP – MEDREG -MedTSO workshop: "Enabling electricity exchanges and trading in the Mediterranean"

The Inter-Government Memorandum of Understanding focuses only on enabling electricity trades among the members and does not prescribe national reforms on the different countries. The SAAP experience has shown that enabling electricity exchange and trading requires several steps and understanding of the market. The priority of the SAAP was to initiate trade among the members therefore, the unbundling in the region happened at a different pace, where till date, some vertical integrated local markets are operating. However, the SAAP concentrated their efforts on the wholesale market.

The evolution of traded volumes is given in the figure below.

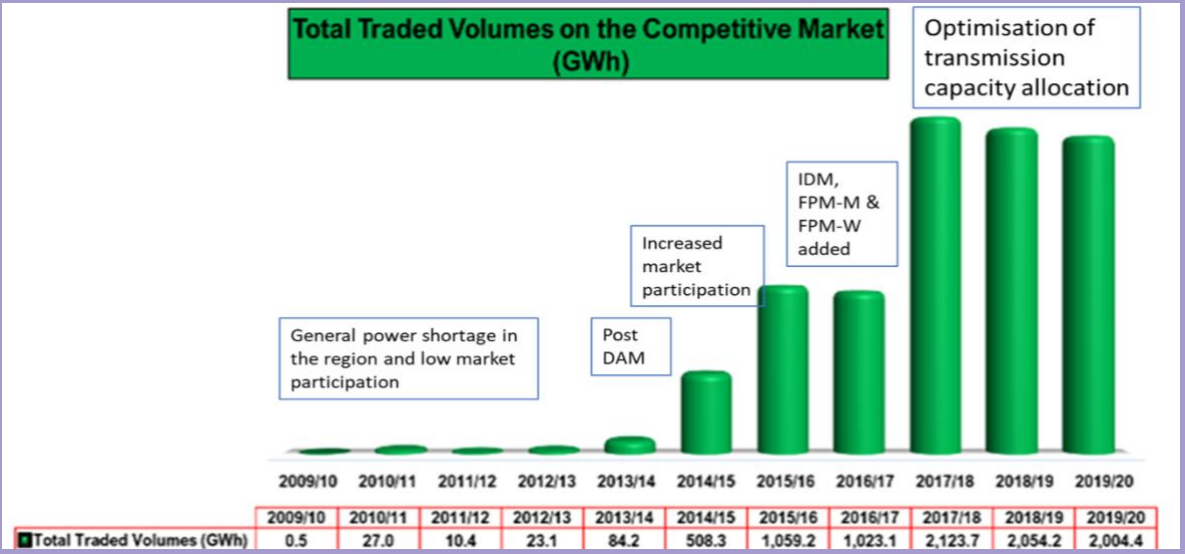

Figure 2. Total traded volumes on the competitive market

Source: Stephen Dihwa – SAPP – MEDREG -MedTSO workshop: "Enabling electricity exchanges and trading in the Mediterranean"

The experience from Southern Africa region, has shown that enabling trading in a subregion is possible even if other aspects of the market are not yet homogenous among the countries of the region, such as unbundling of the market and local market operating. The first step to enable the trading among the countries would be to set basic rules to initiate the trading in a wholesale market, followed by increasing market participation and optimization of transmission capacity allocation.

1.2. Gulf Cooperation Council GCC

A second good example of sub-region market is the Gulf Cooperation Council (GCC) that regroup six Middle Eastern countries (Saudi Arabia, Kuwait, the United Arab Emirates, Qatar, Bahrain, and Oman), mostly with a single buyer model in most of the countries.

The need for enabling electricity trading in the GCC region was mainly to face the increase in demand, improve the security of supply and integrate more RES. The peak demand in the GCC is around 120 GW with an energy mix dominated by fossil fuels, where RES counts for 1% of installed capacity.

In earlier years the countries of the GCC region were focused more on the development of local electricity power generation to satisfy the local demand.

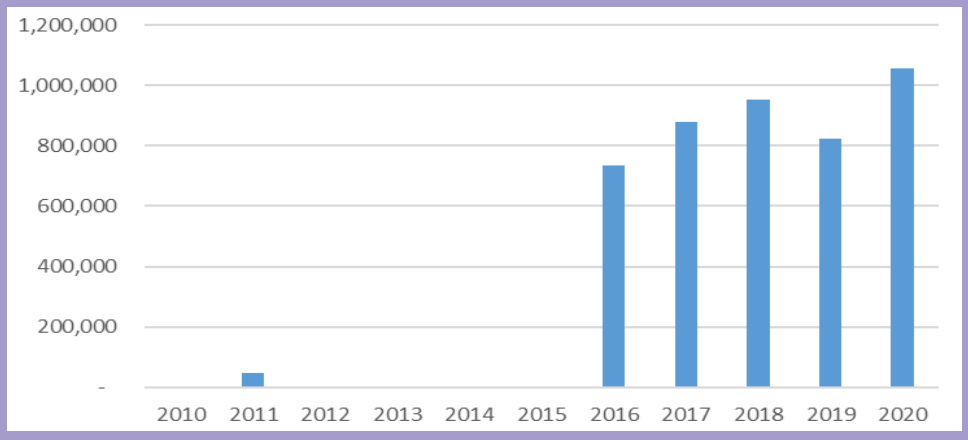

Figure 3. Energy traded in the GCC region in MWh

Source: Moayad Al-Kadhem (GCCIA): MEDREG -MedTSO workshop: "Enabling electricity exchanges and trading in the Mediterranean"

Like the SAPP region, trading in the region also took several years to be enable as shown in figure 3 below and was mainly represented by long term transaction contract; the market does not yet allow day ahead trading.

In the future, the countries in the region are planning to increase the share of the RES to reach 72,3 GW of installed capacity[1], thus the need to improve the electricity exchanging and trading in the region. However, the main obstacle that the countries are facing is the energy subsidies.

The experience from the GCC sub-region, has shown another aspect of the benefits of enabling electricity exchange and trading. With the development of the sub-region market, the countries improved their security of supply and will diversify their energy mix and integrate more RES in the market. Additionally, the GCC have a considerable experience on developing regulation related to the security of supply.

1.3. Europe – ENTSO-e

Electricity exchanges and trading in Europe, has one of most developed market and infrastructure.
ENTSO-E, has been working for many years to create a regional market with common market codes, and is an integral party to draft, consult and implement market related network codes[2]:

- Long-term (as of 2017)
- Short-term (day-ahead & intraday, as of 2015)[3]
- "Real-time" markets (balancing, as of 2018)

Besides the experience of Europe in electricity exchanges and trading as described in chapter 1 above, ENTSO-E is working on further harmonization of market coupling and TSOs/NEMOs processes, "merge" of Single Day-Ahead Market Coupling (SDAC) and Single Intraday Market Coupling (SIDC) under the umbrella of governance of the Market Coupling Steering Committee (MCSC) as shown in the figures below.

[1] *Source: IRENA Renewable Energy Market Analysis: GCC 2019*

[2] *Available on ENTSO-e website*

[3] *Short-term "network" code currently under major revision (entry into force expected by mid-2023)*

Figure 4. Intraday Market Coupling (SIDC) & Single Day Ahead Coupling (SDAC) timeline
Source: ENTSO

1.4. Balkans & Eastern Europe – Energy Community

The European neighboring region, the Balkans & Eastern Europe, have an important experience in developing a sub-regional market. The Energy Community have been working to develop and enhance the electricity exchanges in three main sub-regions as shown in the figure 5 below.

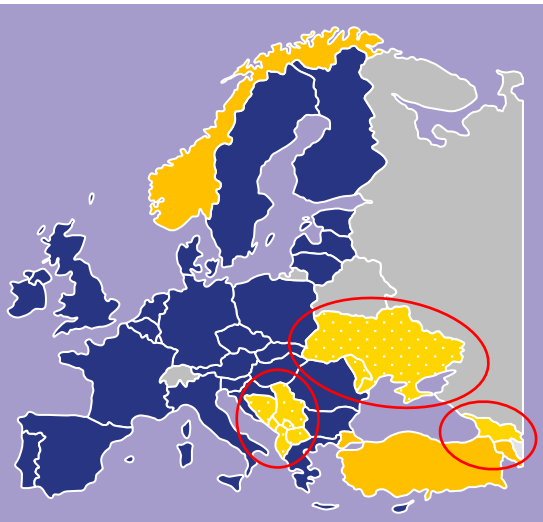

Figure 5. Energy Community Contracting Parties' electricity markets
Source: Energy Community

Besides establishing a stable regulatory and an integrated energy market, over the next years, the Energy Community is focusing on improving the environmental situation in relation to energy supply in the region and fostering the use of renewable energy and energy efficiency, where they would be relying on the cross-border interconnections to achieve that goal.

The experience from the energy community revealed the main challenges to cross-border cooperation, as shown in the figure below.

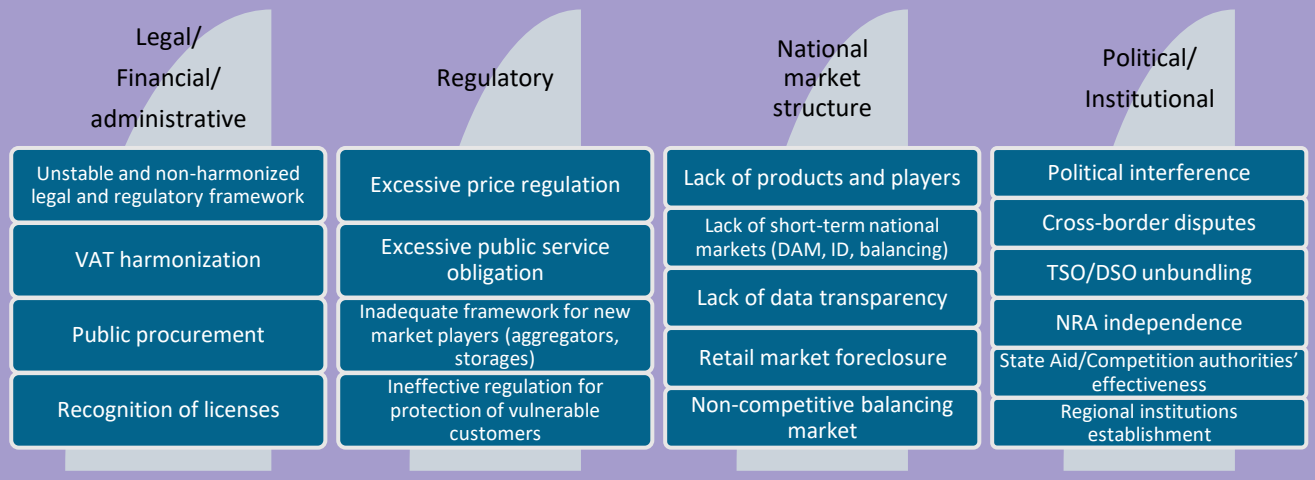

Figure 6. Challenges to the cross-border cooperation
Source: Energy Community

1.5. North Africa – Morocco –

Regarding the North African sub-region, the development of cross-border interconnection infrastructure has shown a better advancement comparing with the other south shore sub-regions. The current existing interconnections present between Morocco and neighboring countries include a 1.5 GW lines to Spain and Algeria. Plans on constructing a line with Mauritania and a third line with Spain are under way. Furthermore, the Moroccan authority and the Portuguese counterpart are studying the feasibility of a 1 GW interconnection. By concluding and operating all those interconnections, The Moroccan power system would have an interconnected capacity exceeding 4 GW.

However, the electricity exchanges and trading remain low mainly due to the lack of harmonization in terms of regulatory legislation and missing of a common network code.

On other hand, the sub-region contains an attractive potential in term of solar and wind energy sources, compared to the north shore countries of the Mediterranean; it may be seen as a motivation to further integrate RES in the energy mix of the Mediterranean region, to eventually meet the climate change objectives. From the south shore point of view, enabling the electricity exchanges will provide a better quality of energy supply, increase the security of supply, and reduce the energy prices.

However, to leverage these potentials, immense efforts and cooperation needs to take place as follows:

- **Common regulatory framework:** developing a common regulatory framework that works with the European trading exchanges.
- **Focus on existing infrastructure:** Enabling electricity exchange in the existing market between the North African countries before focusing on the elaboration of new interconnection with the north shore countries.
- **Market design:** need for unbundling the market and complying with one of the European unbundling models for electricity transmission e.g., ownership unbundling or independent transmission operator model.

- **Ensure fair network access:** Non-discriminatory network access needs to be provided to third parties for any transmission network infrastructure.
- **Allocation of interconnection capacities:** Congestion management methods should be market-based, and maximum capacity of the interconnection should be made available to market participants

The future interconnection between north Africa sub-region and the north shore countries of the Mediterranean may also accelerate the development of a new regulatory framework and the upgrade of infrastructures to meet with the EU regulations.

3

ELECTRICITY TRADING WITHIN THE MENA REGION AND AFRICA AND THE MISSING LINKS AND REQUIREMENTS

The MENA region appears to be challenging to interconnect, geographically due to the large area of the region and for the specific regulations in each country. Those challenges, lead to non-connected lines and hence, few exchanges. However, the region offers a huge potential in terms of its natural resources and geographical placement.

Therefore, many organizations are interested in understanding the potential of the region and are working towards harmonized regulations and technical rules to reduce the gaps and fill the missing links in the MENA region for the creation of a regional electricity market.

In that regard, Med-TSO, World Bank and the European Bank have developed many studies including the Mediterranean Master plan, operation and economic studies based on the knowledge sharing and experiences from EU and other neighboring regions. The main missing links to enable electricity trading are summarized in the next table.

Moreover, according to a survey conducted by RES4Africa, investors from the private sector is more skeptical about the Grid Access, Inflation and Financing availability. In comparison, these issues tend to have a medium to low perception of risk from the point of view of investors from the public sector, compared to aspects like IPP market access and currency exchange rates.

Overall, convincing investors to invest in the infrastructure can often be a major hurdle. However, from experience, it appeared that investors are more interested in investing once they are presented with success stories from areas and regions with similar backgrounds, rather than success stories from developed countries.

Table 1. Electricity trading missing link & requirements

Region	Missing link & requirements	
	Regulatory aspects	Infrastructure and technical aspects
MENA	Coordinated regulation for international interconnection	Harmonized regulation and technical rules
	Regulatory framework that allows and enable electricity trading	Some interconnection infrastructures are inactive.
	Shift from trading model of bilateral contract to multilateral trading model.	Lack of synchronicity among one another
	Energy pricing and subsidies which hence distorts the regional electricity market.	
	Reach at one third of the existing interconnection capacities in the region would bring many benefits to all the parties	
	Lack of liquidity in the region.	
Morocco	Allow non-discriminatory mechanism for capacity allocation on Spain-Morocco interconnection Allow direct imports and exports between private players in Morocco and EU	Reinforcing the network infrastructure near the borders
	EU countries to remove barriers to corporate PPAs between them and Morocco	
	Allow third party access to ONEE HV grid for this purpose	
Egypt	Cost competitiveness of Egyptian power	Interconnection with neighbors
	Consistent with Egypt's climate pledge	Increase generation capacity
	Certification of green energy in line with EU rules	Digitalization of the grid
	Energy market opening	Undersea cable to the EU: technical compatibility
	Long-term PPAs with neighbors	

Angelo Ferrante
Med-TSO

Angelo Ferrante is Secretary General of Med-TSO, the Association of the Mediterranean TSOs for electricity and Head of European Affairs at Terna S.p.A., the Italian Transmission System Operator for electricity.
He is an electrical engineer with more than 35-year professional experience in Power Sector, with special focus on International Co-operation, Project Financing, Regulation and relations with International Organizations.
In his carrier, Angelo Ferrante has been also deeply involved in R&D and Technical Assistance projects in many parts of the world.

Hasan Ozkoc
MEDREG

Hasan Ozkoc has been appointed as the Director of the Mediterranean Energy Regulators (MEDREG) in June 2021 and he was Deputy Secretary General from March 2018 to June 2021. He represents MEDREG globally and is in charge of developing activities, tools, regulatory standards and good practices to promote a functioning, interoperated, compatible and sustainable regulatory framework in the Mediterranean region.
He also coordinates and contributes to the national and regional energy progress reports and activities as well as supports MEDREG institutional relations and guides training programmes on legislative and regulatory developments.

Florian Ermacora
DG Energy

Dr. Florian Ermacora studied law at the Universities of Innsbruck and Paris and received his doctorate degree in Vienna. Since 1996, Dr. Ermacora has been working as an official for the European Commission (Directorate-General for Environment; Directorate-General for Internal Market; Directorate-General for Energy).

From January 2015 to January 2021, Dr. Ermacora was responsible for the Wholesale Electricity and Gas Division, as the Head of B.2 Unit. He is currently the head of Neighbourhood policies and international relations unit A.3.
Dr. Ermacora has published several books and articles in the areas of European environmental and business law.

Hervé Laffaye
ENTSO-E - Med-TSO

Hervé Laffaye is the International Affairs Officer of RTE, and the current ENTSO-E President and Vice-President of Med-TSO.

His career started with R&D in the field of applied mathematics for electrical systems, followed by different operational management positions in distribution of gas and electricity, then as head of the National Control Center during the seven critical years (2000-2007) of the birth of RTE, and finally up to 2016 as COO covering from engineering to maintenance and operation the operational activities of RTE.

Hervé Laffaye has an engineering diploma from Ecole Centrale of Paris and has held several high-level functions in both EDF and RTE.

Simone Biondi
Med-TSO

Simone Biondi has been appointed by Med-TSO in autumn 2021 as TEASIMED Project Manager. TEASIMED project "Towards an efficient, adequate, sustainable and interconnected Mediterranean electricity system" is the third Med-TSO project financed by the European Commission after Project I (2015-2018) and Project II (2018-2020).

Simone Biondi is an Energy Engineer with more than 10-year professional experience in the Power Sector. Before joining Med-TSO, he worked for ENTSO-E and TERNA. In 2019 he co-founded HelioSwitch S.R.L. - Spin-off Politecnico of Milan.

Andre Estermann
ENTSO-E

Dr. André Estermann has a background as an economist and is the Market Integration Working Group Convener at Entso-E. In this regard, he is responsible for all matters of CACM & FCA guideline. He has worked with Market Projects at 50Hertz since 2009, being 50Hertz representative at SDAC/SIDC/MCSC Steering Committees.

Stephen Dihwa
South African Power Pool

Stephen Diwha has over 30 years of experience in the power sector. Started with Zimbabwe Electricity Supply Authority (ZESA) in 1988 and rose through the ranks to Business Development Director of the Transmission subsidiary up to 2007. He worked as System Planning Advisor in EdM (Mozambique) in 2007 and as Senior Manager responsible for Planning and then Renewable Energy & System Integration in NamPower (Namibia) from 2008 to 2012. He worked from 2013 to 2016 as a consultant Power Engineer for African Development Bank in Zimbabwe. He was Principal Director in the Ministry of Energy and Power Development of Zimbabwe from 2016 to 2017. He joined SAPP in December 2017.

Moayad Al-Kadhem
GCCIA

Moayad Al Kadhem is working in System Planning & Studies Section in Gulf Cooperation Council Interconnection Authority (GCCIA) since Dec 2018, leading the technical and economic studies for the interconnector. This includes the planning of the interconnector and the adequacy of the interconnected power system based on GCC utilities' plans. Prior to GCCIA, Moayad worked in Saudi Electricity Company (SEC) for 11 years in transmission planning and R&D with focus on FACTS and HVDC projects. Moayad holds Bachelor of Science in Electrical Engineering from King Fahad University of Petroleum and Minerals and Professional Master's in Sustainable Electrical Energy from Georgia Institute of Technology.

Jasmina Trhulj
Energy Community

Jasmina Trhulj is a Diploma Electrical Engineer for Power Systems employed as Head of Electricity Unit at the Energy Community Secretariat in Vienna. Her 22-year professional career is dedicated to the development of the electricity markets in line with the EU acquis. Currently, her responsibilities include activities on facilitating energy transition and electricity market developments in the Energy Community Contracting Parties and their integration at regional and pan-European level.

She is author of number of paper and articles published and presented in the national and international conferences.

Yahya Mrabti
MEDREG (ANRE)

Yahya Mrabti is Head of Transmission, Distribution and Interconnections Department at the National Electricity Regulatory Authority (ANRE). He's in charge of monitoring the transmission, distribution and interconnections of the national electricity sector. He holds a Master's degree in Power system engineering from Mohammadia School of Engineers.

Yahya managed to build a solid experience in the development, planning and operation of, not only the Moroccan but also the Mediterranean, power system through his membership at the MEDTSO's technical committees more precisely on the Arab scale as member of the Maghreb electricity committee to the Arab Electricity Union.

Benoit Esnault
MEDREG

Benoit Esnault has 20 years of experience in energy regulation, and he holds a PhD in economics. He joined the National Regulatory Authority of France (CRE) in 2008 where he is currently head of the Interconnections and European Affairs Department, which is responsible for gas and electricity interconnections and the development and implementation of European regulations. Benoit Esnault has directly contributed to the development and application of the third legislative package and the TEN-E guidelines, and he has chaired several European task forces. He has been chairing the MEDREG Electricity WG since 2016. Currently, he teaches industrial organization and energy governance in French universities.

Roberto Vigotti
RES4AFRICA

Roberto Vigotti is the Secretary General of RES4Africa Foundation, a European think tank gathering 34 stakeholders from the clean energy value chain to accelerate Africa's RE transition, supporting wider participation of private players in delivering investments.

In 2012, he embarked on the RES4Africa adventure, to support a wider participation of private players in delivering investments in Africa. At RES4Africa, he coordinates a number of activities aimed at transforming Africa's energy sector through public-private dialogue, market- driven analysis, training and capacity building activities, and on-field projects.

J. M. Rodriguez
Med-TSO

Juan Ma. Rodríguez (Spain, 1964), since 1990 has been with Red Eléctrica de España (REE, the Spanish TSO) where he is currently Manager of Verification and Inspection Department.

He has a vast experience in the area of planning and operation of power systems, reactive power and voltage control, stability and the secure integration of renewable sources into the power system. Also, he participated in several international projects and he was the Technical Director of the Institution Building for the National Electric Power Company (NEPCO) in Jordan, a Twinning Project supported by the European Commission (2013-2015). He took part in the team which designed the European Network of TSOs for Electricity, today ENTSO-E. In Med-TSO, JuanMa is the Technical Committee "Regulation" chairperson.

Tarik Hamane
MASEN

Tarik Hamane is today the Executive Director Head of Development of Masen (Moroccan agency for sustainable energy).

He oversees Masen's projects and activities in Morocco and abroad, mainly in Africa, starting from the establishment of the strategy and the sourcing of renewable project opportunities to the launch of construction through all the development process. He has more than 19 years of managerial experience in leading the development of large-scale infrastructure and power generation projects for different technologies. He is one of the main energy experts in the areas of renewables (wind, solar), Green Hydrogen and thermal power generation in Morocco and Africa.

Moëz Cherif
World Bank

Moëz Cherif is a Lead Energy Economist at the World Bank in charge of coordinating sector engagement in the Maghreb countries. With over 20 years of experience in the energy and infrastructure sectors, he is currently focused on promoting green energy investments; improving the performance of energy utilities and integrating cross-border power markets.

Before that he worked as an infrastructure economist at the IFC then moved to the World Bank in 2008, where he first worked in sub-Saharan Africa on the development of hydropower and gas-to-power projects, and on rehabilitation and reform of power utilities.

Gabriel de Lastours
EBRD

Gabriel de Lastours is responsible for developing the EBRD's power and renewables portfolio across the southern and eastern Mediterranean region (SEMED). This includes structuring debt and equity investments as well as leading policy dialogue with governments in the region.

Gabriel has worked in the EBRD's energy team for 16 years, both on oil and gas and mining financing and power and renewable energy projects. Prior to joining the Bank, Gabriel worked with EY Transaction Advisory Services in Paris and Credit Agricole CIB in New York.

He is a graduate from ESSEC Business School in Paris.

Olivier Antoine
ENGIE IMPACT

Olivier Antoine received his M.Sc. in 2007 and Ph.D. in 2013 from the Universite Libre de Bruxelles, Belgium. From 2009 to 2013, he was a researcher at the University of Brussels. His research interests focus on the use of WAMS and PMUs for oscillation source identification using data mining.

Since 2019, he is with Engie Impact, acting now as senior expert and team leader for the power system analysis team. He is involved in a wide variety of projects which include the following: grid code review and compliance assessment, large power plant integration, power system planning and operation, technical assistance, integration of RES, ancillary services review, interconnection study.

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