

TOWARDS AN INTERCONNECTED MEDITERRANEAN GRID

Institutional Framework and
Regulatory Perspectives

KEY POINTS

EDITORIAL

Relier les pays de la Méditerranée entre eux par l'intermédiaire d'autoroutes électriques est une idée déjà ancienne, évoquée dans les années 30 comme une promesse de paix en Méditerranée.

Le travail engagé depuis longtemps sur la boucle électrique méditerranéenne pour tenter de faire des réseaux électriques de la Méditerranée un seul réseau à la même fréquence n'a pas pu être mené à son terme. Les échanges d'électricité entre pays, dont il est prouvé qu'ils permettent à la fois d'améliorer la sécurité d'approvisionnement de chacun et d'optimiser l'utilisation des parcs de production, ne sont pas encore suffisants pour obtenir des gains substantiels.

Aujourd'hui les progrès technologiques mettent ce grand rêve à notre portée : liaisons à courant continu capables de transporter sous la mer et sur terre des quantités d'énergie impressionnantes, stations de conversion permettant de passer du courant alternatif au courant continu et de coupler entre eux des réseaux de tailles et de puissances différentes, sophistication des moyens de commande et de contrôle des grands réseaux ... La technologie n'est plus un obstacle et devrait même continuer de s'améliorer.

De nombreux obstacles existent encore, ils ne sont plus technologiques mais réglementaires ou plutôt « régulateurs » et donc politiques.

C'est pour tenter de lever certains de ces obstacles que MEDGRID et l'OME ont décidé de travailler ensemble en mettant en commun leurs connaissances et en proposant des pistes d'amélioration des modes de « régulation » harmonisés dans les pays concernés.

Alors que l'OME travaille déjà depuis longtemps à la meilleure connaissance de toutes les énergies en Méditerranée, le but de MEDGRID est plus spécifiquement de promouvoir les interconnexions électriques méditerranéennes. La collaboration OME MEDGRID a ainsi permis de replacer l'électricité dans le contexte énergétique méditerranéen, de prendre en considération l'accroissement de la demande, de rappeler l'intérêt des interconnexions, puis de proposer des recommandations pour favoriser les échanges entre pays.

Du côté Nord de la Méditerranée il a fallu plus de vingt ans aux pays Européens dans le cadre de l'Union Européenne pour arriver à définir les règles communes d'échange d'énergie électrique dans le cadre d'un marché intégré de l'électricité, et les travaux se poursuivent encore, sur l'élaboration d'un « code de réseau » européen et d'un plan de développement du réseau à long terme. De plus, il reste encore en Europe des pays insuffisamment interconnectés (c'est le cas notamment de pays comme l'Espagne et l'Italie ...). Néanmoins de grandes quantités d'électricité sont échangées tous les jours, toutes les heures entre les pays européens, dans un cadre connu, transparent et non

discriminatoire. Ces échanges permettent à la fois d'assurer les secours mutuels entre pays, mais aussi de contribuer à l'utilisation la plus efficace des moyens de production en Europe, permettant une baisse des coûts d'approvisionnement en électricité.

Du côté Sud de la Méditerranée, il n'existe pas aujourd'hui de cadre général pour assurer les échanges d'électricité. Des accords existent entre pays qui permettent néanmoins des échanges « techniques » plus particulièrement dédiés aux secours mutuels, mais peu d'échanges « commerciaux » permettant les économies attendues par la mise en commun des parcs de production.

Malgré ces deux systèmes assez différents, il est remarquable de constater que des échanges Nord Sud se pratiquent néanmoins régulièrement et les systèmes précurseurs mis en place pour cela par l'Espagne et le Maroc notamment sont étudiés dans ce document.

Ces deux pays ont réussi à bâtir un système pragmatique et opérationnel, avec un partage des bénéfices apportés par les échanges, certes imparfait mais accepté de part et d'autre... Dans le contexte actuel, l'Espagne peut vendre son excédent de production électrique et le Maroc peut bénéficier d'une électricité parfois moins chère que celle issue de son propre parc de production. Dans le futur et selon les scénarios envisagés par MEDGRID, des transferts d'énergie pourraient avoir lieu dans les deux sens, utilisant la capacité des lignes existantes et nécessitant même la création de nouvelles liaisons d'interconnexion.

A partir de l'étude des échanges d'énergie entre ces deux pays de la Méditerranée placés dans des systèmes de régulation très différents (marché ouvert et concurrentiel en Espagne, acheteur unique et entreprise intégrée au Maroc), MEDGRID et l'OME ont cherché à proposer des règles générales ou du moins des pistes de réflexion pour promouvoir les échanges entre pays du Nord et du Sud et entre pays du Sud.

Les recommandations de MEDGRID et l'OME se veulent pragmatiques et ne cherchent pas à recopier le modèle européen dans les pays du sud de la Méditerranée, elles ouvrent la voie à un travail à effectuer dans chaque pays en respectant le principe de subsidiarité. Chaque pays devrait néanmoins pouvoir bénéficier des institutions internationales et méditerranéennes pour l'aider à développer progressivement son cadre réglementaire dans une approche régionale harmonisée sur les aspects techniques (MED TSO), réglementaires (MEDREG) et politiques (UPM). MEDGRID et l'OME, comme les autres parties prenantes du monde industriel, resteront en appui de ces travaux pour continuer de promouvoir/renforcer les interconnexions entre les pays de la Méditerranée et pour participer à la formation nécessaire aux acteurs de ces changements.

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KEY IDEAS: INTERCONNECTION OF MEDITERRANEAN POWER SYSTEMS AND RELATED INSTITUTIONS AND REGULATORY MEASURES

Electricity is a vital driver in the socio-economic development of modern societies. This is particularly true for the Mediterranean region, with its rapidly growing population and increasing socio-economic needs; it is also an appropriate tool for improving the efficiency of many end-use applications and for reducing greenhouse gas (GHG) emissions.

To best ascertain the crucial role of electricity, and of the associated generation, grid and interconnection infrastructures in the Mediterranean region, it is necessary to bear in mind the challenges and socio-economic parameters of the region:

For the Northern Mediterranean region (the European Union), the challenge is energy transition towards a decarbonized energy sector by 2050 (integrating significant amounts of renewable energy into the power system) and the completion of the Internal Energy Market (IEM); the objective is to provide society with cost-effective energy while mitigating the negative impacts of energy generation and end-use applications on the environment, human health and biodiversity. European Union member states have agreed to comply with the 20/20/20 objectives by 2020, taking 2009 as the reference year: reduction of GHG by 20%, and 20% of total energy consumption to be satisfied by renewable energy sources (RES) (which means 35% of electricity demand met by RES), plus a 20% increase in energy efficiency.

The Southern Mediterranean region (the so-called Southern and Eastern Mediterranean Countries – or SEMC) faces the dual challenge of population and economic growth, which requires a massive amount of new investments in the electricity sector to meet demand: by 2030 the Southern population will have increased by 78 million and there is a need for 200 GW of additional capacity.

The Southern region also faces the challenge of coping with decarbonization of the energy sector, as the region is one of the most vulnerable to climate change. Moreover, freshwater shortage could become critical and desalination plants would be necessary to meet the growing demand for water. Increasing demand for air-conditioning would also accelerate due to climate change effects. Desalination plants and air-conditioning are high energy consumers.

DIVERSIFYING ENERGY SUPPLIES

A common objective for the entire Mediterranean region is to make energy supply **more secure**, with less dependency on fossil fuels, and **more sustainable**, with exploitation of the high energy efficiency potential and development of the vast solar and wind energy resources available, particularly in the South. The Mediterranean region features a large

array of power systems and economies; thus each system will develop its own diversification process according to its current sector structure, organization and regulation, its generation mix, its renewable energy potential, its projected demand and its capability of exporting to other regions. The most challenging supply diversification is the development of renewable energy, as its investment cost is still high in comparison with conventional thermal plants, and the variability of renewable generation will cause new operational challenges and require network development.

As for 2030 energy prospects, OME (Observatoire Méditerranéen de l'Énergie) has developed two scenarios, based on the same projected population and GDP growths:

- A conservative “Business-as-usual” scenario: the North will continue developing its renewable energy sources and energy efficiency programme as planned, while the South would satisfy the projected demand in 2030 mainly with generation from fossil fuels, without any significant development of renewable energy.
- A proactive scenario with significant targets for the development of renewable energy and for demand side management. This scenario is particularly challenging for the Southern region, as it involves undertaking a diversification plan to reach about 15% of demand in 2030 satisfied by wind and solar energy. Furthermore, a demand side management and energy efficiency plan is to be launched to reduce demand growth by 20%.

Chapter 1 describes energy demand and supply from 2010 to 2030 under both scenarios, in order to assess the level of financial and technical needs.

REGIONAL INTEGRATION OF THE POWER SECTOR

Mediterranean operators have long been cooperating together within associations such as AUE (Arab Union for Electricity), IESOE (Electricity Interconnection in South-Western Europe), COMELEC (Comité Maghrébin de l'Électricité), MEDELEC (Euro-Mediterranean Electricity Cooperation), OME and more recently with MEDREG (Mediterranean Energy Regulators) and MedTSO (Mediterranean Transmission System Operators); they are seeking to complete the MedRing, a network which will interconnect onshore all Mediterranean grids. Interconnected countries are currently exchanging energy, under commercial contracts or in emergency cases. This integration however still needs to be developed.

Chapter 2 describes political initiatives, institutions and projects related to regional integration, to show the progress made in building up Mediterranean cooperation in the Power sector.

The integration of Mediterranean power systems raises two crucial questions: which regulations can be used to increase electricity trading, and how to allow for the development of new interconnections.

INCREASING ELECTRICITY TRADING IN THE MEDITERRANEAN REGION

Trading electricity in the Mediterranean region should allow use of the most cost-effective and decarbonized energy sources available for each time period, wherever they are located in the grids (in whatever part of the region). This is particularly true for intermittent sources, such as those from wind and solar energy.

Once the different parts of the Mediterranean region are interconnected, the obstacles to electricity trading are mainly regulatory:

- Grid access should be open, based on transparent and non-discriminatory conditions. Tariffs for access should be cost-reflective, in order to avoid inefficient price signals and under-recovery of network costs. Transparency and non-discrimination could be ensured by a transmission system operator (TSO) independent of the existing integrated utility, under the supervision of a national regulator.
- Electricity trading involves transit countries (in between the source country and the destination country). Adequate regulations should ensure that transit countries receive fair compensation.
- Support for electricity generated from renewable sources should be possible, not only within each Mediterranean country, but also from one country to another.
- More generally, the cooperation of all system operators, and all regulators, is also needed across the entire Mediterranean region.
- In the long term, open markets, would give the possibility for market parties to trade electricity in a more efficient, competitive and transparent way, ensuring symmetrical rights and responsibilities of involved users and operators.

The above conditions are absolutely essential, not only for electricity trading, but also for the development of new interconnectors, so that investors know in advance how their future generation and transmission assets may be used.

DEVELOPING INTERCONNECTIONS IN THE MEDITERRANEAN REGION

New interconnectors are needed in all parts of the Mediterranean region (between Southern countries, between North and South, between Northern countries and within the European grid), to allow for electricity trading on a large scale. Furthermore, new interconnectors can enhance power system security throughout the Mediterranean region in emergency situations.

Obstacles to the development of new interconnectors can be technical (e.g. due to difficulties in laying deep-sea cables), or due to the environment (conflict with other land

or sea uses), or due to financing limitations (within the context of the current economic crisis).

But the main obstacles considered here again involve the absence of a clear regulatory framework for cost allocation of network developments:

- In most countries, legislations concerning interconnectors needs to be improved (in particular, the EU legislation, which is very thorough for interconnectors within the community, is not applicable to interconnectors with third countries). Indeed, in some cases, national regulations exist stipulating that interconnectors must be regulated, but it is not clear if this only refers to ownership by the TSO, or also to open access conditions, and whether exemptions are possible for merchant interconnectors.
- A new interconnector and, if needed, its associated investments within the interconnected power systems, is an asset for the two interconnected countries (and possibly for other interconnected countries, that may be far away). This raises the issue of sharing investment and operation costs according to the respective benefits for all countries concerned. A cost-benefit analysis approach is proposed in the EU regulation on guidelines for trans-European energy infrastructure: this approach, or a similar one, should also be applicable to North-South Mediterranean interconnectors, notably, in the framework of the Mediterranean Solar Plan.

Chapter 4 of this report offers separate views, respectively on the Northern (EU) and the Southern Mediterranean region (SEMC). In each case, it analyzes existing regulations, in particular those applicable to electricity trading and to the development of new interconnectors.

Then Chapter 5 pans out to a large-scale Mediterranean integrated perspective, and examines how the two priorities highlighted – electricity trading and development of new interconnectors – are already taken into account in the existing regulations (in particular those relating to the existing Morocco-Spain interconnector), and how they could be enhanced by further improvements in the regulations.

TWELVE RECOMMENDATIONS

In conclusion, Chapter 6 summarizes the main actions to be undertaken, by presenting twelve recommendations regarding institutional, regulatory and technical issues, also proposing some advice for implementing them efficiently.

These recommendations will be presented in three blocks:

- Introducing a pre-market design in SEMCs,
- Fostering development of new interconnectors,
- Supporting trading of renewables.

TABLE OF CONTENTS

VOLUME I:

THE EURO-MEDITERRANEAN ELECTRICITY SECTOR - PERSPECTIVES, POLICIES, INSTITUTIONS AND REGULATION

CHAPTER 1

The Euro-Mediterranean energy context: economic outlook, electricity demand perspectives and transmission requirements

- 1.1 Economic outlook: strong demographic and GDP growth in the South
- 1.2 OME's "conservative" and "proactive" scenarios: from a business as usual to a more proactive approach
- 1.3 Electricity demand perspectives and future generation mix: natural gas and renewable era
- 1.4 The Euro-Mediterranean transmission infrastructure: still very fragmented. Major benefits expected from more interconnections
 - 1.4.1 Why the Euro-Mediterranean grid has to be more interconnected
 - 1.4.2 The existing Euro-Mediterranean electricity networks
 - 1.4.3 Trans-Mediterranean infrastructures: studies and projects

CHAPTER 2

Towards Euro-Mediterranean cooperation: a political impetus

- 2.1 From the Euro-Mediterranean Partnership (EMP) to the European Neighbourhood Policy (ENP)

- 2.2 The European Neighbourhood Policy (ENP) and the evolutionary integration process: energy infrastructures at the heart of regional cooperation

- 2.3 The European energy policy and the partnership with the Southern Mediterranean: recent developments

CHAPTER 3

Institutions and stakeholders at work

- 3.1 Euro-Mediterranean regional institutions and sectorial organizations
 - 3.1.1 The UfM and the Parliamentary Assemblies: political involvement
 - 3.1.2 Regulators at work: MEDREG
 - 3.1.3 Sectorial organizations for promoting electricity cooperation in the region: OME, AUE, MEDELEC, COMELEC, IESOE
 - 3.1.4 Mediterranean TSOs called to an essential role: Med-TSO and IESOE
- 3.2 Euro-Mediterranean cooperation initiatives
 - 3.2.1 The Mediterranean Solar Plan: a political initiative
 - 3.2.2 The Desertec industrial initiative (Dii): Power from the desert
 - 3.2.3 Medgrid: Developing the Euro-Mediterranean grid
- 3.3 Euro-Mediterranean financing institutions and tools

CHAPTER 4

Regulation of the electricity sector in the European Union and in South and East Mediterranean countries: a contrasted situation

- 4.1 Regulation of the electricity sector in the European Union: a 20-year process

- 4.1.1 Three successive Energy Packages, leading to three unbundling models, ENTSO-E and ACER
- 4.1.2 Promotion of the use of energy from renewable sources within the European Union: Directive 2009/28
- 4.1.3 Development of new interconnectors within the EU
- 4.1.4 Compensation of national grids impacted by international Cross-Border Transits

4.2 Regulation of the electricity sector in the SEMCs: a young process

CHAPTER 5

Towards a more integrated electricity sector around the Mediterranean: new regulations are necessary

5.1 Regulation for international trade of electricity through interconnections across the Mediterranean: towards market integration

- 5.1.1 An interesting case: the existing regulations for trade of electricity between Morocco and Spain
- 5.1.2 Progressive integration of SEMCs into a Mediterranean-wide electricity market
- 5.1.3 Various conditions for market players using a North-South Interconnector
- 5.1.4 Support for production from renewable sources in a Southern Mediterranean country exported to Europe (Articles 9 and 15 of Directive 2009/28)

5.2 Regulation for new north-south interconnectors

- 5.2.1 Regional and national regulations for new North-South interconnectors
- 5.2.2 EU Regulation on Energy Infrastructure: also applicable to North-South Interconnectors

- 5.2.3 Model agreements for cross-border electricity projects, for signatories of the Energy Charter Treaty

- 5.2.4 Possible structures for investment

5.3 Compensation of national grids around the Mediterranean for cross-border transits

- 5.3.1 Special treatment of flows entering or exiting the European Union (from / to third countries) according to Regulation 838/2010
- 5.3.2 Proposals for third countries regarding compensation of cross-border transit flows
- 5.3.3 New infrastructure needed in the grid of a particular Mediterranean country to accommodate an increase of cross-border transit flows

CHAPTER 6

Conclusions and recommendations for a progressively integrated Mediterranean Grid

6.1 The Twelve Recommendations

6.2 From recommendations to implementation

References

TOWARDS AN INTERCONNECTED MEDITERRANEAN GRID

OME and MEDGRID are both widely involved in the Electricity sector of the Mediterranean region and share the idea that promoting electricity exchanges across and around the Mediterranean Sea will help to the economic development of the whole area.

The study, they prepared in close cooperation, describes the institutional framework of the Mediterranean electricity sector, and identifies the regulatory perspectives to promote a more interconnected power grid across the region. More precisely, the objective of this work is to present the Euro-Mediterranean electricity context from a regulatory point of view, illustrating what has been done in terms of reforms and policies, and what should be improved for a more efficient development of cross-border infrastructures investments and power exchanges. This study offers a tool to better understand such a complex and articulated background, and presents twelve proposals to move towards an improvement of the cross border exchanges.