



INTERCONNECTION INFRASTRUCTURES IN THE MEDITERRANEAN: A CHALLENGING ENVIRONMENT FOR INVESTMENTS

MED15-19GA-4.6B



MEDREG is supported by the European Union

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Introduction

1. Overview of the Mediterranean energy framework

While the Mediterranean region displays a great diversity of population, languages and cultures, it is as well a place of convergence. Starting with the Euro-Med Conference (Barcelona, November 1995) the economic and financial partnership between European Union and Southern Mediterranean countries has been constantly developed.

In this context, energy has been recognized as a pivotal aspect of the Euro-Mediterranean regional cooperation. The Barcelona Declaration specifically referred to increasing cross-border investments in the regional energy markets in order to support the development of Mediterranean national economies, as well as strengthen cooperation and intensify exchange of experiences among Mediterranean countries.

Following the 1995 Declaration, the **Barcelona process** accomplished progress through several meetings: the Conferences of Athens, Rome and Naples (2003), the Conference of Brussels (2006), the Conference of Limassol (2007), and the Algiers Declaration (2010). Moreover, in June 2008 the Union for the Mediterranean (UfM) was launched, with the aim to capitalize into a permanent institution the work done and the synergies emerged throughout the Barcelona process.

The **Mediterranean energy sector has a high degree of interdependence**, both for electricity and gas. Constant contacts and strong cooperation among Mediterranean countries is therefore necessary to ensure countries with proper flows of energy, both for commercial use and to guarantee proper security of supply. Currently, several cross-border interconnections exist in the region. As for electricity, the three Maghreb countries (Algeria, Morocco and Tunisia) are interconnected and further linked with the European Union. As for the Eastern side of the Mediterranean, the interconnected grids of Jordan and Egypt form the South East Pool. The main gas interconnections of the region lay on the South shore - North shore axis. It is foreseeable that diversification of supply will pave the way for more intense transport infrastructures along the East-West corridor.

Current interconnections are not sufficient to guarantee a proper development of the region. Electricity and gas interconnections around the Mediterranean region need to be substantially improved in order to allow an effective and well integrated regional energy market. It should also be considered that **investments** in energy grids and generation facilities require a **medium-to-long term commitment** on the part of companies, regulator and the political power, so to create a stable and well governed environment where payback is guaranteed in due time.

Moreover, **Mediterranean national energy markets are today at very different degrees of maturity**. In the Southern shore utilities are state-owned and operate either based on vertically integrated service providers or using a single buyer model. Most of these utilities are running at high degree of subsidies, which do not provide a right price signal for private investors. Therefore, most of the investments are financed by the state. However, states face increasing difficulties in keeping the current level of subsidies. Reform of the electricity and gas sectors are being discussed in various Southern countries. Egypt, for example, is

currently designing a substantial reform of its electricity sector. The presence of independent regulators is pivotal to guarantee that the **reform balances between the needs of investors and consumers**, and to subsequently provide investors with a clear framework of rules.

Several initiatives are active in the region to increase investments in the energy sector and enlarge their scope: governments, regulators (MEDREG), TSOs (Med-TSO), operators (Observatoire Méditerranéen de l'Energie, - OME, Res4Med, Medgrid, Desertec - Dii and others), as well as international financial institutions (IFIs). Also, the EU implements a program of financial and technical assistance to the region, called the European Neighborhood and Partnership Instrument (ENPI).

In particular, **international financial institutions** (such as the European Bank for Reconstruction and Development - EBRD, the European Investment Bank - EIB, the African Development Bank - AfDB and the World Bank - WB) **are today in a key position to support energy investments**, most notably in infrastructure, provided that appropriate cooperation takes place among the different actors involved. Regulators are among those actors.

Indeed, **regulators should dedicate increasing attention to enhance** the level of efficiency interoperability and the **quality** of planning of **energy infrastructure**. Cross-border infrastructures are crucial to boost the upgrade of internal grids and overcome the actual fragmentation of the Mediterranean energy system. The creation of adequate, integrated and reliable energy networks is a prerequisite to deliver a properly functioning energy market that will enhance security of supply, integration of renewable energy sources, energy efficiency and will enable consumers to benefit from new technologies and a smart use of energy. Currently, Mediterranean countries are mainly concerned with two priority corridors: the North-South electricity corridor and the Southern gas corridor. These projects should also take into account future energy demand, which is expected to substantially rise.

2. Obstacles and challenges for infrastructure development

Cross border interconnection capacity is pivotal for the creation of a well-integrated energy market at regional level. However, the level of investment in cross border infrastructures often appears to be inadequate to meet the demand of energy flows. Two main aspects characterize infrastructure development in the Mediterranean:

Interconnection facilities require long term investments and huge amount of capital. Consequently, investors are exposed to high financial risks. If these risks are not compensated by an interesting rate of return, hedging tools and appropriate regulatory measures, investors may be discouraged.

Interconnections have a long-reaching effect. Cross-border interconnections guarantee an optimal level of capacity, successfully reducing costs. but require constant technical and regulatory cooperation. As sometimes market mechanisms fail to provide the right signal to investors, appropriate regulation measures are needed to correct the market allocation and restore the optimal level of investment.

As a consequence, the lack of a common and harmonized regulatory framework strongly affects the regional integration of the energy markets. Below, we list the most widespread obstacles to the development of integrated national energy markets in the Mediterranean region. Our report will measure these obstacles both for electricity and gas and weight them with respect to new investments flows.

3. The role of regulation

The effective integration of Mediterranean energy markets also depends on factors that are not strictly correlated with the financial and technical environment. **A common regulatory framework is needed. National regulators should create a stable regulatory framework, aimed at reducing risks for new investors.** To attain this objective, it is necessary to establish cooperation mechanisms at national and regional level, in particular with TSOs, to set up common rules to correctly allocate costs and benefits associated to infrastructures of common interest. TSOs have a central role in identifying investment needs and assessing infrastructure projects. MEDREG considers that TSOs have to be data providers to regulators and are responsible for drafting investment plans, which are responsible for drafting investment plans, which are then subject to regulatory scrutiny.

Infrastructure investments are mainly affected by tariff regulation, regimes to access the grid and authorization procedures. In order to mitigate the regulatory risk, tariff regulation should be based on pre-defined methodologies, set for long term regulatory periods and based on cost reflective parameters. Indeed, tariffs determine how (and how fast) investments are paid back. The financial risk identified in each country should be considered when establishing the rates of return. MEDREG believes that duly justified investment costs, properly based on a cost-benefit analysis, should be covered by taxes to ensure a stable return on the invested capital.

The level playing field in the energy markets can be granted only if the access to the grid is based on transparent and competitive mechanisms for all interested parties. However, under particular conditions, the exemption from third party access obligations could be beneficial to infrastructure development. Procedures for granting this exemption should be harmonized as much as possible between the different countries of the Southern shore. As it is currently envisaged in the 2013 European Infrastructure Package, all the needed authorization should be granted by a unique national body to overcome bureaucratic barriers.

Even when national regulators apply best practices and create a stable regulatory framework in their national jurisdiction cross-border infrastructure development could be hampered by lack of coordination among regulators. In particular, sharing the list of national investment priorities helps TSOs not to dissipate efforts and financial resources because of overlapping projects. Cooperation among regulators is the fundamental step to allow plans containing projects of common and regional interest.

The establishment of an appropriate and effective Mediterranean energy framework is a key factor to build an environment that fosters sustainable development. Regulation can support a more efficient infrastructure system with monitored energy flows both for electricity and gas, as well as promote new investments for infrastructures of regional interest to create the

condition for an competitive regional energy market. The national regulatory framework of countries should not be subject to continuous changes, but should be stable and certain. There should be coherence throughout the different regulatory decisions taken. Political stability and the existence of regulations and laws protecting investors' interests in the long term are two relevant conditions to ensure the attractiveness of infrastructure projects.

Regulatory coherence allows international and domestic investors to better understand the regulatory environment and the rules they work with. In particular, information on the determination of the rate of return, the regulatory asset base (RAB) and the depreciation of assets should be clear and accessible. Additionally, the European Union could consider playing a role as a mediator between international financial institutions and those countries that have implemented/are implementing reforms to increase the stability of their investment framework.

While in the Southern Mediterranean is currently not possible to evaluate projects based on market prices, the market reforms currently taking place in several Southern countries (such as Egypt, Jordan and Morocco) can have a positive impact on the creation of clear and transparent price signals, notably for the electricity market.

For countries where an efficient regulatory and legal framework already exists, it is important to maintain and improve it continuously. For other countries, the **implementation of new national policies typically will require various measures beyond the establishment of an appropriate framework**, such as adequate administrative structures and practices, organizational capability, technical expertise, and appropriate human and financial resources. For regulation it is also important to balance industrial initiatives and consumer protection for the benefit of all parties.

To achieve this important targets regulators should be able to:

- **Identify clear rules to effectively integrate energy interconnections in the Euro Mediterranean area;**
- **Provide specific tools for the improvement of existing infrastructures;**
- **Create the conditions for investors to build new infrastructures;**

Promote a common platform of discussion gathering together governments, institutions, regulators, TSOs and all other relevant actors.

- **Ensure that the public interest and effective needs of consumers are taken into account** when making decisions on infrastructure projects.

In order to be effective, regulators shall be independent from the political power and the regulated entities. A stable political and social context represents a precondition for the development of cooperation in the Mediterranean region. Thus, it is relevant for Mediterranean regulators to be independent from the political power and to clarify the different roles that the governments/parliaments and the regulators play in the national energy markets. Governments and regulators should also coordinate consistently with the countries' energy policy objectives.

Regulators shall have efficient control and enforcement powers in order to duly perform their mission. Regulatory independence, transparency and accountability are core principles for

strong regulators. The nomination of the Board is important to guarantee that these principles are implemented. As long as the independence of the Board members is ensured, different nomination options are acceptable, and indeed the nomination processes differ between the various Mediterranean countries. All regulators should be endowed with an autonomous budget. With this perspective in mind, the role of **MEDREG** will be crucial in **promoting more transparency in energy markets**, encouraging harmonized regulatory frameworks, fostering the creation of efficient markets and supporting decisions to set sustainable energy policies at national level, such as the deployment of RES. MEDREG should also play a role in promoting adequate regulatory incentives for infrastructure investments.

4. Rationale of the report

To encourage new investments it is necessary to be conscious of the real situation of energy infrastructure networks in the Mediterranean basin. For this reason, the main objective of this report is to provide the vision of Mediterranean regulators on existing and planned energy infrastructure in the Mediterranean region. Through this report, MEDREG would like to encourage an active debate on energy investments that reinforces synergies among governments, international financial institutions, TSOs, multilateral organizations, and the academic world.

Considerations expressed in this report are based on a survey on national investment conditions, filled by MEDREG members in 2013. Specifically, this report will provide a detailed mapping of existing and planned energy infrastructure considering the following aspects:

- Current and future cross-border interconnection projects, focusing on **future priority projects and their implementation schedule**;
- The **role played by political uncertainty and access to finance** in determining TSOs' evaluation of projects;
- **Major barriers affecting investment plans** in interconnections;
- Involvement of national regulatory authorities to determine a **specific regulatory framework for investments**;
- For electricity infrastructure, the **role of national renewable energy targets** in selecting infrastructure projects;
- For gas infrastructure, the **impact of infrastructure projects on national security of supply**.

With this report MEDREG intends to provide Mediterranean energy stakeholders with general recommendations based on the perception of regulators, collected through the bottom-up approach of the Association. This report has the aim to contribute to re-define how decisions related to energy infrastructures of regional interest are taken. These

decisions should be based on a **collective assessment of each country's needs and technical capabilities**, in order to establish an integrated and synchronized Mediterranean energy market.

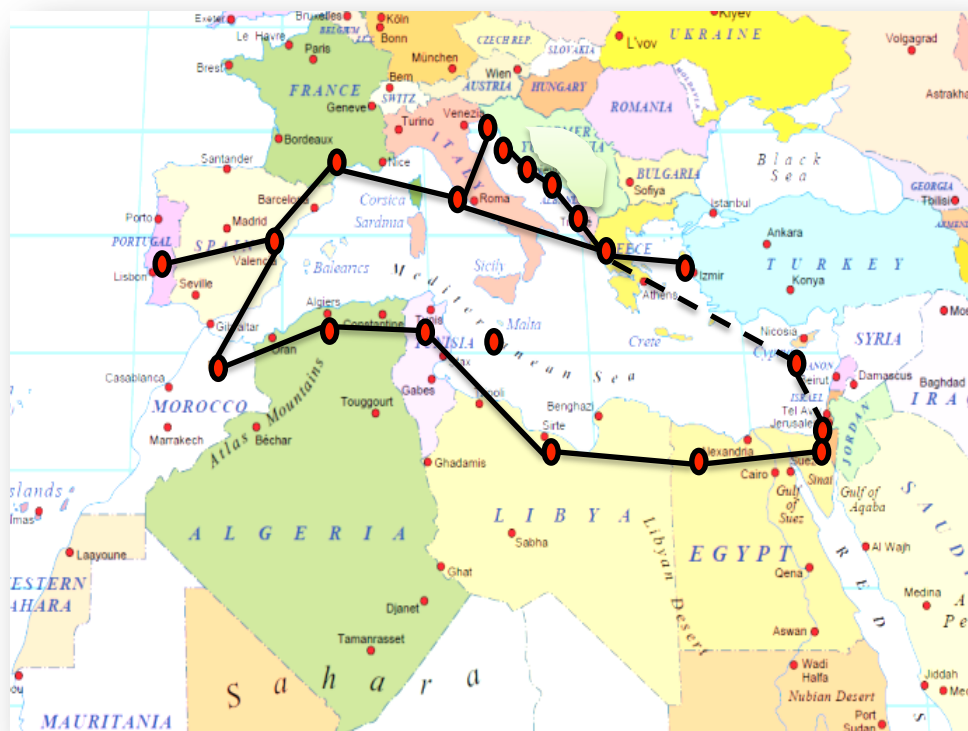
Electricity

This section of the report analyses current and future electricity cross-border interconnection projects within the Mediterranean countries. The following sections provide detailed information on **technical aspects pertaining to existing and planned interconnection projects**. This helps evaluating the strength and usefulness of each project with regard to the interconnected countries. It aims at showing how interconnections among countries will increase as a consequence of the infrastructure reinforcement planned by each country. Moreover, these sections highlight the **role of regulatory agencies in planning for interconnection projects**. They investigate if the renewable energy targets (RET) can provide better deployment when coupled with sound interconnection projects. Finally, several measures are used to assess barriers characterizing interconnection projects in each country.

Findings are based on the answers received from nineteen MEDREG members to the electricity section of the questionnaire on investments, in addition to references available on relevant public websites.

5. Analysis of existing and planned electricity infrastructure

Figure 1: Electricity interconnection projects within Mediterranean countries



This study focuses on regulated, cross-border interconnections that interest MEDREG countries. Interconnection projects that involve one or more MEDREG countries but are outside the Mediterranean region are listed, but not investigated, in the analysis.

Appendix I and II to this report provide detailed information on each existing and planned interconnection project in the region. These include the year when the interconnection started operating, the neighbouring countries involved, voltage levels, line capacity and method of financing which can be either commercial (i.e., private) or public funding. For planned interconnection projects additional information is given on the project planned year of operation, the project type and its status, as well as financial availability.

5.1. Analysis of existing infrastructure

5.1.1. South Mediterranean countries

Recognizing the benefits of electricity trade, several bilateral and sub-regional initiatives are in place to interconnect electricity networks of Southern Mediterranean countries, aiming at establishing an integrated electricity system for electricity exchange and trade. The primary interconnection schemes among Southern Mediterranean countries are:

- The Maghreb block, which includes Algeria, Morocco, and Tunisia. It was initiated in the 1950s and subsequently evolved into multiple high-voltage transmission interconnections between the three countries. Morocco was connected to Spain in the late 1990s, and Morocco, Algeria, and Tunisia are now all synchronized with the European high-voltage transmission network.
- The eight-country block (Egypt, Iraq, Jordan, Lebanon, Libya, Palestine, Syria, and Turkey - EIJLLPST), which was initiated in 1998 by Egypt, Iraq, Jordan, Syria, and Turkey as part of an effort to upgrade their electricity systems to a regional standard. Lebanon, Libya, and Palestine later joined the group. It is currently expected that if Turkey becomes fully synchronized with the European grid this will result in synchronizing the EIJLLPST electricity network with the grids in Turkey and Europe.

Although the Maghreb and EIJLLPST interconnections have existed for some time, electricity trade among these countries has remained at modest levels especially when considering availability of resources and geographical proximity. This is due to barriers such as limited generation reserve margins, the absence of a harmonized regulatory framework and institutional weaknesses, both at the national and regional level.

According to a 2010 Plan Bleu study¹, net exchanges among Mediterranean countries amounted to 73 TWh in 2007. Only a tenth of the total intra-Mediterranean exchanges concerns trade among the Southern shore countries, including exchanges with Europe (Morocco–Spain). These reduced quantities derives from the limited capacity of the existing electrical interconnections. The following table shows the energy exchange levels in both blocks (as of 2010). It summarizes the rate of utilization of interconnections (“Average load”

¹ Habib El Andaloussi (2010) ‘Infrastructures and Sustainable Energy Development in the Mediterranean’, Plan Bleu

factor), i.e. the ratio between the yearly energy exchanged (MWh) and the maximum capacity (net transfer capacity -NTC- value multiplied by the number of hours in a year) for existing interconnections.

Table 1: Levels of energy exchange

Interconnection	Max transfer capacity (MW)	Energy exchanged (GWh/Year)	Load factor (%)
Spain–Morocco	700	4227	69.0
Morocco–Spain	700	15	0.2
Morocco–Algeria	400	613	17.0
Algeria–Morocco	400	662	19.0
Algeria–Tunisia	150	141	11.0
Tunisia–Algeria	150	122	9.0
Libya–Egypt	180	152	10
Egypt–Libya	180	70	4
Egypt–Jordan	450	363	9
Jordan–Egypt	200	9	1
Egypt–Palestine	17	134	90
Jordan–Palestine	20	158	90
Jordan–Syria	350	69	2
Syria–Jordan	200	20	1
Turkey–Syria	250	97	4

5.2. Analysis of planned infrastructure

5.2.1. North Mediterranean countries

The European Union (EU) has identified twelve priority corridors and areas covering electricity, gas, oil and carbon dioxide transport networks. It proposes a regime of "common interest" for projects contributing to implementing these priorities. These projects have been selected by twelve regional groups established by the new guidelines for trans-European energy infrastructure (TEN-E). Carrying the label "projects of common interest" (PCI) they will benefit from faster and more efficient permit granting procedures and improved regulatory treatment. They may also have access to financial support from the Connecting Europe Facility (CEF), under which a €5.85 billion budget has been allocated to trans-European energy infrastructure for the period 2014-20. For a project to be included in the list, it has to have significant benefits for at least two Member States; contribute to market integration and further competition; enhance security of supply, and reduce CO₂ emissions. Among the abovementioned PCI projects, soke concerns the Mediterreanen region:

- **France - Italy interconnection between Codrongianos (IT), Lucciana (Corsica, FR) and Suvereto (IT)**

Repowering of existing tri-terminal HVDC interconnection between Sardinia, Corsica and mainland Italy via a 358 km DC -submarine cable (onshore and offshore). It has been made a final decision on the investments for this project, so financing is now available.

- **France - Italy Interconnection between Grande Ile (FR) and Piossasco (IT), currently known as Savoie-Piemont project**

A new 190 km HVDC (VSC) interconnection will be built between Grande Ile (FR) and Piossasco (IT) via an approximately 320 kV underground cable and converter stations at both ends (two poles, each of them for a maximum of 600 MW power capacity). The cables will be laid in the security gallery of the Frejus motorway tunnel and along the existing motorways (onshore). This project is in the construction phase and shall be operating by 2019.

- **France - Spain interconnection between Aquitaine (FR) and the Basque country (ES)**

A new 320 kV or 500 kV (voltage not yet available) HVDC subsea cable interconnection of approximately 360 km and with a capacity of 2000 MW (to be defined) will be built between Aquitaine and the Basque country, via the Biscay Gulf (offshore). This project is in its feasibility study phase.

- **Portugal - Spain interconnection between Vila Fria - Vila do Conde - Recarei (PT) and Beariz - Fontefría (ES)**

A new 400 kV AC double circuit (OHL) of 162 km (112 km in Portugal and 41 km in Spain) will be built between Beariz - Fontefría (ES) and Vila Fria - Vila do Conde - Recarei (PT), with only one circuit being installed on the Fontefría - Vila do Conde section (onshore). New 400 kV substations will be built in Fontefría, Boboras, Vila Fria and Vila do Conde. This project is in its permitting phase and shall be operating by 2016.

- **Bosnia and Herzegovina - Croatia Interconnection between Banja Luka (BA) and Lika (HR)**

A new 400 kV AC interconnection line (OHL) of 155 km (45 km in Croatia) with a capacity of 1320 MVA will be built between Banja Luka and Lika (onshore). This project is in the prefeasibility phase and shall be operational by 2022.

- **Israel - Cyprus - Greece between Hadera and the Attica region, currently known as the Euro Asia Interconnector. Interconnections between Hadera (IL) and Vasilikos (CY), and between Vasilikos (CY) and Korakia, Crete (EL)**

The project consists of a 600 kV DC underwater electric cable and any other essential equipment and/or installation for interconnecting the Cypriot, Israeli and the Greek transmission networks (offshore). The project will have a capacity of 2000 MW and a total length of around 820 nautical miles/around 1518 km (329 km between Cyprus and Israel, 879 km between Cyprus and Crete and 310 km between Crete and Athens) and allow for reverse transmission of electricity. The dumping depth of the cable will exceed the 2000 meters under the sea in some areas between Israel and Cyprus. The dumping depth of

the cable will exceed the 2000 m under the sea in some areas between Israel and Cyprus and will exceed the 2500 m under the sea in some areas between Cyprus and Greece. The projects are in their pre-feasibility phase and are expected to be operation by 2017, 2019 and 2018.

- Italy - Montenegro Interconnection between Villanova (IT) and Lastva (ME)**
 A new HVDC interconnection line with a capacity of 1000 MW will be built between Italy and Montenegro via 375 km of 500 kV DC subsea cable and converter stations at both ending points in Villanova (IT) and Lastva (ME) (offshore). This project is in the construction phase and shall be operational by 2017.
- Italy - Slovenia between Interconnection between West Udine (IT) and Okroglo (SI)**
 A new 120 km 400 kV AC double circuit OHL with a capacity of 2x1870 MVA will be built between Okroglo and Udine (onshore). This project is in the feasibility study phase and shall be operational by 2022.
- Italy - Slovenia interconnection between Salgareda (IT) and Divača - Bericevo region (SI)**
 The project includes a new 300-500 kV HVDC underground cable between Italy and Slovenia with a length of about 150-200 km and a capacity of 1000 MW. This project is in the feasibility study phase from the Slovenian side, and in the permitting phase from the Italian side and shall be operational by 2022.

5.2.2. South Mediterranean countries

The MEDRING study (concluded in 2010) performed a cost/benefit analysis for some of the future projects in Southern Mediterranean countries. The total annual benefit associated with each interconnection project was measured taking into account the reduction in fuel and investment costs for generation capacities as well as the increase in security of supply. The following table shows the results of this study.

Table 2: Cost/benefit analysis for future interconnection projects in Southern Mediterranean countries

Country 1	Country 2	Project	Total annual benefit (in Mio US \$)	Annuity cost of the project (in Mio US \$) Country	Benefit / Cost Ratio
Spain	Morocco	Addition submarine cable (440 kV)	7.2	7.7	0.94
Morocco	Algeria	400 kV double circuit line	10	3	3.33
Algeria	Tunisia	400 kV double circuit line	9.5	1	9.72
Tunisia	Libya	400 kV double circuit line	4.9	3	1.63
Libya	Egypt	500 kV double circuit line	12.4	6.5	1.93
Egypt	Jordan	Additional 400 kV line	6.8	9.2	0.74

Country 1	Country 2	Project	Total annual benefit (in Mio US \$)	Annuity cost of the project (in Mio US \$) Country	Benefit / Cost Ratio
Jordan	Syria	Additional 400 kV single circuit line	5.9	2.8	2.13
Turkey	Greece	400 kV single circuit line	16.4	4.6	3.56
Algeria	Spain	DC submarine cable	90	46.5	1.93
Algeria	Italy	DC submarine cable	26.2	35.6	0.74
Tunisia	Italy	DC submarine cable	19.8	33.2	0.6
Libya	Italy	DC submarine cable	55.3	46.5	1.19

The MEDRING study has strongly recommended that the definition of the necessary technical measures is made in advance and in agreement with most of the Mediterranean countries, as the study proved that a disturbance in one country can have critical effects in another, if it is not accurately controlled.

6. Investment planning

6.1 Planning Horizon

In this analysis, the interconnection projects are classified as follows:

- **Short term projects** are current and future projects that will be operational within 5 years (2014-2019);
- **Medium term projects** are future projects that will be operational in 5 to 10 years' time (2019-2024); and
- **Long term projects** are future projects that will be operational in more than 10 years (beyond 2024).

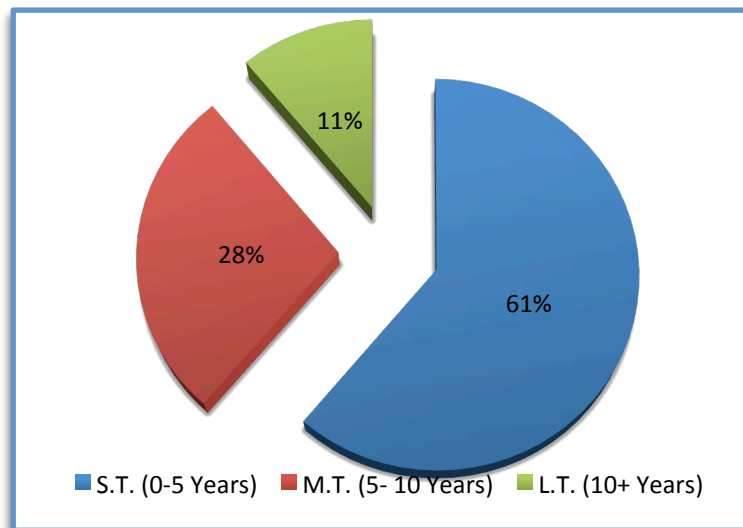
From the answers to the MEDREG questionnaire, it can be noticed that it is easier to predict investments in the short and medium term, rather than in the long one. Cross border projects are generally planned on a 5 to 10 years' horizon. In the Mediterranean, it seems however difficult to forecast what the interconnection needs will be in the longer run.

Table 3: Planning horizon

Country	Short Term Planning	Medium Term Planning	Long Term Planning
<i>Albania</i>	√	√	
<i>Algeria</i>			
<i>Bosnia</i>	√	√	
<i>Croatia</i>	√		
<i>Cyprus*</i>			
<i>Egypt</i>	√		
<i>France</i>	√	√	√
<i>Greece</i>	√		
<i>Italy</i>	√	√	
<i>Israel*</i>			
<i>Jordan</i>		√	√
<i>Malta</i>			
<i>Montenegro</i>	√		
<i>Morocco</i>			
<i>Palestine</i>	√		
<i>Portugal</i>	√		
<i>Slovenia</i>			
<i>Spain</i>	√		
<i>Tunisia</i>			
<i>Turkey</i>	√	√	√
	61%	28%	11%

The results reported in Table 3 take into consideration that Cyprus, Israel, Malta are currently working in island mode, although the PCI project Cyprus/Greece/Israel is currently being studied.

Figure 2: Planning horizon



6.2 Status

Interconnection projects that are expected to be operational at different time horizons (short, medium and long term) have to run through different phases of project development. In order to assess the state of the art of these projects, we distinguish 4 phases in this report:

- **Feasibility** phase: studies are undertaken to check whether the project is viable;
- **Permitting** phase: administrative steps are undertaken to obtain all the necessary authorisations to proceed with the project;
- The phase where the final **investment decision** is taken is crucial in order to continue with the project;
- **Construction** phase: where the physical infrastructure is built.

Figure 3 summarizes the total number of existing and future Mediterranean interconnection projects. Most Mediterranean projects are currently in their feasibility phase, which means that there are several obstacles that are drawing the projects back. Albania and Croatia are the only countries who succeeded to take the financial step to enter the permitting phase of their projects, whereas few projects are in the construction phase.

Figure 3: Status of existing and future projects

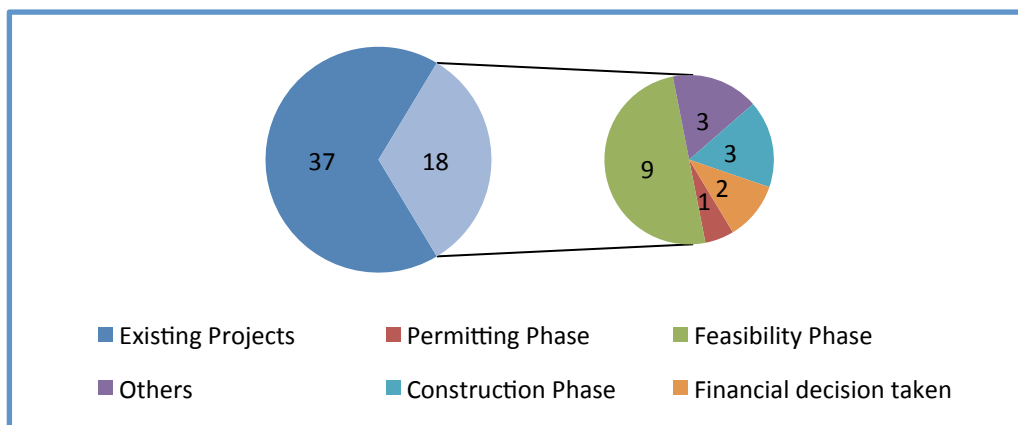
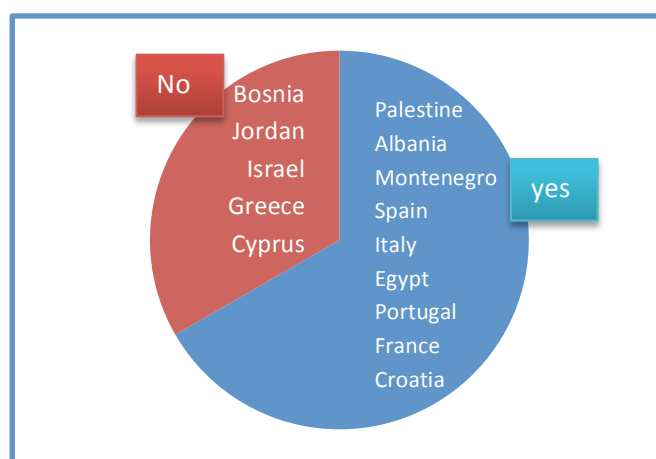


Figure 4 shows that most of the countries consider interconnection projects are part of their national plans. Israel, Greece, and Cyprus are working in island mode, while the reasons for Bosnia and Herzegovina and Jordan remains unclear.

Figure 4: Interconnection projects as parts of national plans



7. Existing investment regulatory frameworks for investment planning

While at a first glance the regulatory frameworks for investment planning of Mediterranean countries are heterogeneous, at a closer look there are less differences than expected.

7.1. The harmonized legislation of North Mediterranean countries

In seven EU Mediterranean countries², the investment planning is harmonised by EU legislation³. At the national level, every year **the transmission system operator submits a ten year development plan to the regulator**, indicating the main transmission infrastructure that needs to be built or upgraded. This plan has to be related to the demand,

² Croatia, France, Greece, Italy, Portugal, Slovenia and Spain. Cyprus and Malta are exempted.

³ EU Electricity Directive 2009/72/EC and EU Electricity Regulation n°714/2009

offer and exchanges forecasted at national level. **This plan should present the main projects to be developed or updated for the following ten years, as well as list the investments to be implemented in the coming three years.** It should also provide a detailed timetable for all these aspects.

If the TSO does not implement an investment foreseen for the subsequent three years, the regulator may take measures to ensure that the investment in question is made, if it is still considered as relevant. Regarding the annual investment plan, regulatory powers differ according to the TSO unbundling model implemented at national level.⁴

At the EU level, the TSOs must present regional investment plans which are updated every two years and develop a non-binding ten-year network development plan (TYNDP). National plans need to be consistent with the regional and the EU plans. The national regulator monitors and assesses the implementation of these plans. These common rules do not prevent EU countries from including national provisions in their regulatory frameworks. Albania, Bosnia and Herzegovina and Montenegro, as members of the Energy Community, have to apply the abovementioned rules by 2015. Their national TSOs are already taking part in the development of the European TYNDP. In Italy, investments in cross-border interconnections are supported by extra remunerations (+2%) with respect to the WACC standard.

As for **projects that are considered of common interest**, which fulfil certain conditions and are **granted priority status** at EU and at national level, a special EU regulation is in force.⁵ Projects labelled as PCI benefit from faster and more efficient permit granting procedures as well as improved regulatory treatment. They may also obtain financial support from the EU.

7.2. Country-specific legislations for Southern Mediterranean countries

Looking South and South-East, regulatory frameworks for investment planning widely differ. For example, **in Egypt existing interconnection projects were established before the creation of the regulator. However, when planning future projects, the transmission company that is affiliated to the electricity holding company under the supervision of the ministry of electricity and renewable energy is the sole responsible for planning the interconnection projects.** In Algeria, the regulator gives the highest priority to securing electricity supply at the national level through new generation projects. Investments in interconnection projects are given lower priority.

Many countries have set or are about to set targets to increase their share of renewable energy. As RES needs to be integrated into the grid, it has a substantial impact on investment planning. In most cases, there is a renewed attention for the role of RES, which in some countries includes specific targets to be reached by 2020. It is worth noticing that **special plans to boost investment in RES are also considered in some countries** (Appendix III).

⁴ The EU Electricity Directive provides for different unbundling models: the Ownership Unbundling Model and the Independent Transmission Operator Model (where there is no clear disposition in the texts regarding NRA powers in annual investment plans), and the Independent System Operator Model (where the NRA approves the annual investment plan). Each national government decides which model to apply at national level.

⁵ Regulation (EU) No 347/2013 of 17 April 2013 on guidelines for Trans-European energy infrastructure.

8. Barriers to investments: The perception of regulators

In 9 countries out of 18 respondents to this question (Albania, Croatia, Cyprus, Egypt, France, Greece, Jordan, Israel and Spain) the TSO considers the impact of policy uncertainty in investment decisions. This uncertainty may be of political or economic nature. In eight countries (Algeria, Bosnia and Herzegovina, Italy, Libya, Malta, Montenegro, Portugal and Turkey) TSOs do not consider political uncertainty as a major factor to determine investments.

Availability of sufficient, reliable, efficient, safe and well managed interconnections infrastructure acts as a key element for market integration. At the same time, establishing interconnections represents both a regulatory and an investment challenge.

The key determinants for interconnection investments can be grouped into three broad categories: financial feasibility, a clear legal and regulatory frameworks including cross-border cooperation and the ability to address environmental and social concerns.

This challenge has resulted in developing different financing schemes to improve the cross-border interconnection of grids. Uncertainty on different aspects can influence the decision to invest:

Technical aspects

These aspects concern the physical features of the interconnected systems, such as synchronization, magnitudes and directions of the anticipated power flows, physical distance covered by the interconnection, technical and operating differences between interconnected systems.

Economic and financial aspects

These aspects include costs for the purchase and/or production of fuels used in electricity generation, capital costs for building generation facilities, and income from power sales.

Externalities

These aspects embody indirect financial, social and environmental benefits, such as employment of labor, impacts of improved power supplies in fostering development of local industry, better power quality, income from power exports, the experience and incentive due to additional cooperative activities between countries, and improvement in reducing pollutant emissions due to the potential optimization of resources.

Necessary Agreements

Agreements can be very complex as they can involve a variety of national, sub-national and even international parties to assent to plans for designing, building and operating interconnections. They should provide frameworks for power purchase and pricing, siting of power lines and related infrastructure, power line operation and security, environmental performance and liability for power line failure.

8.1 Classification of barriers by relevance

The survey on which this report is based specifically investigated the perception regulators have of eight barriers that can increase investors' uncertainty and hinder the proper development of cross-border grids. These barriers are the following:

- a. **Regulatory and/or legal obstacles** (e.g., administration, permitting, licencing, etc.)
- b. **Lack of interest in interconnection projects from the public sector**
- c. **Technical barriers**
- d. **Financial feasibility of the project** (namely technical and financial feasibility, e.g., adequate revenues)
- e. **Insufficient market demand** due to the underdevelopment of markets
- f. **Lack of national reforms**
- g. **Political instability** and/or lack of clear institutional frameworks, including geopolitical barriers (e.g., conflicts or tensions between countries).
- h. **Lack of coordination and/or cooperation** (e.g., between TSOs, between TSOs and regulators)

A radar graph is used to understand in a glance the relevance that each barrier has in every MEDREG country who replied to this question. The greater the blue area, the more concerning that specific barrier.

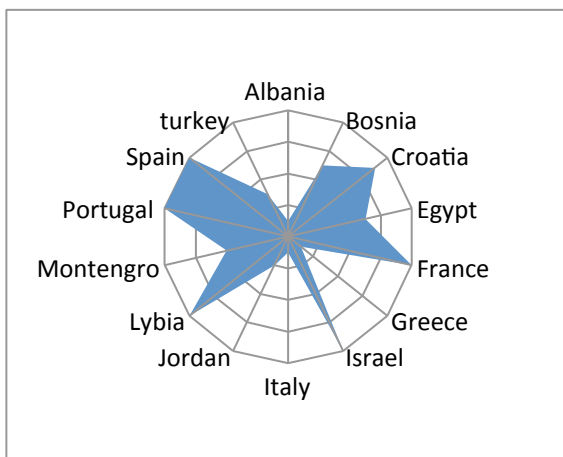


Figure 5: Regulatory and/or legal obstacles

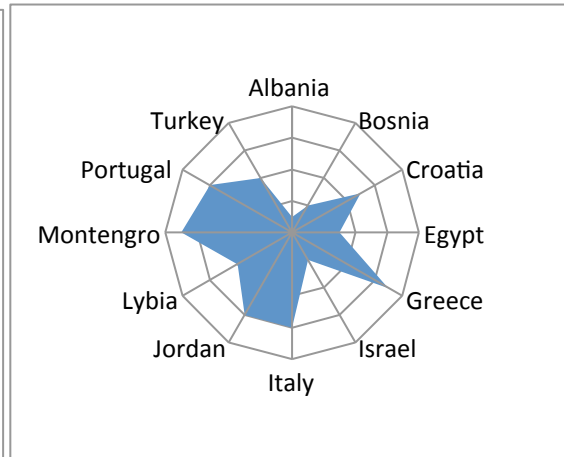


Figure 6: Lack of interest in interconnection projects

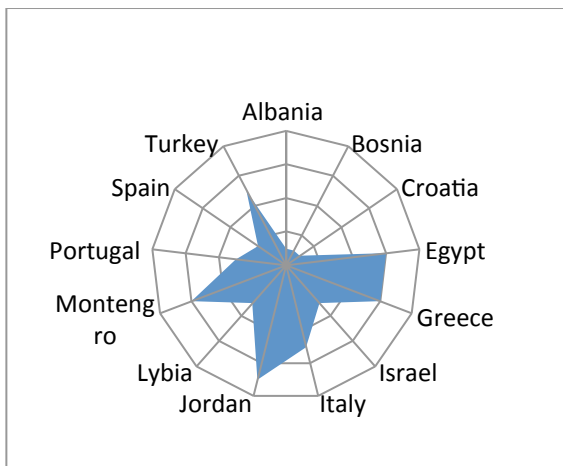


Figure 7: Technical barriers

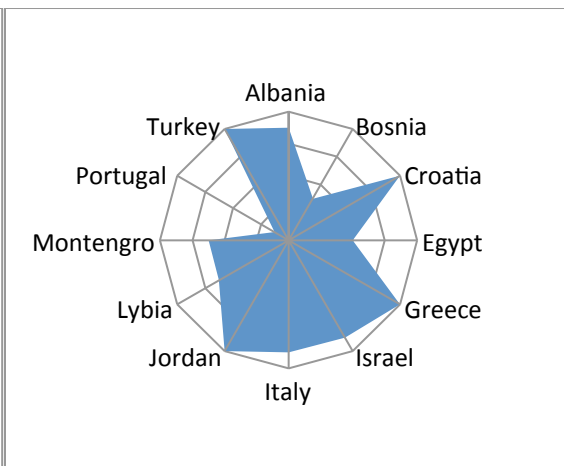


Figure 8: Financial feasibility of the projects

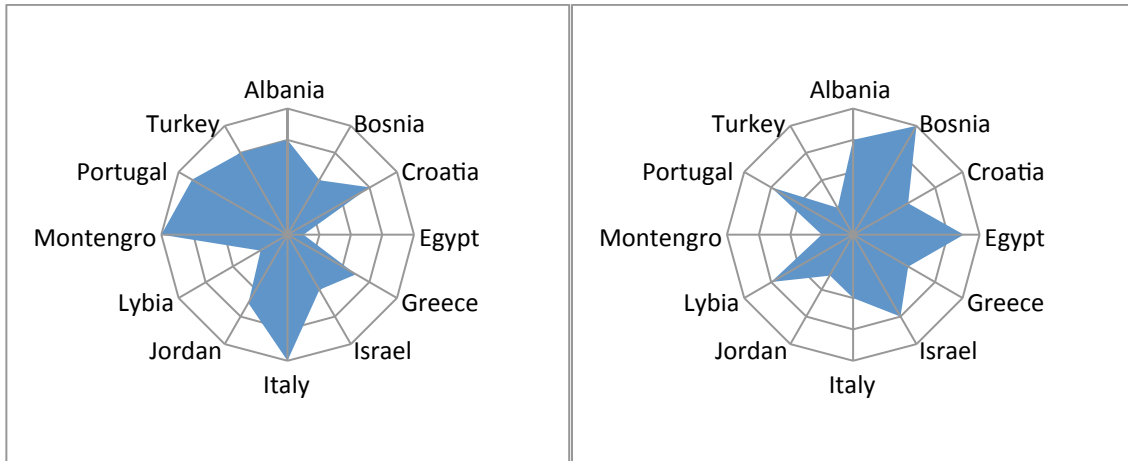


Figure 9: Insufficient market demand

Figure 10: Lack of internal reform

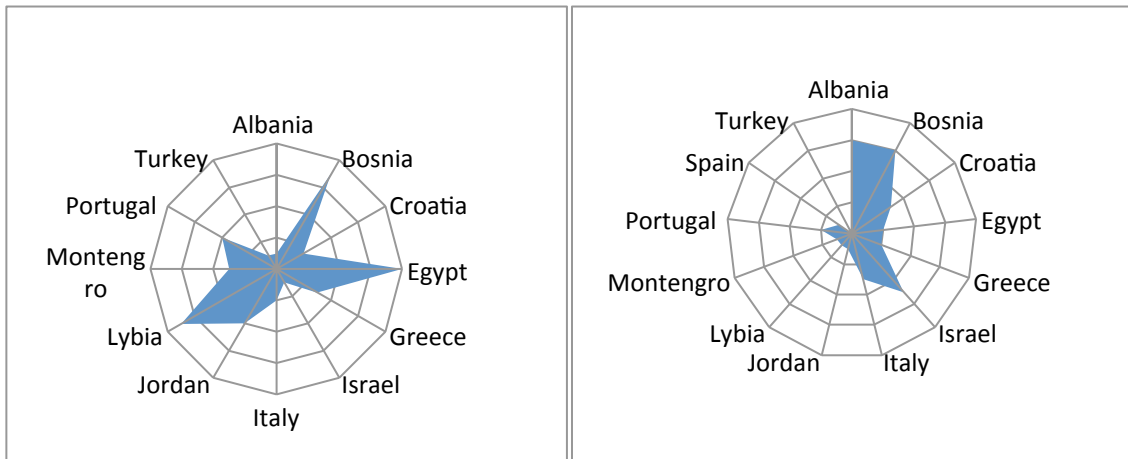
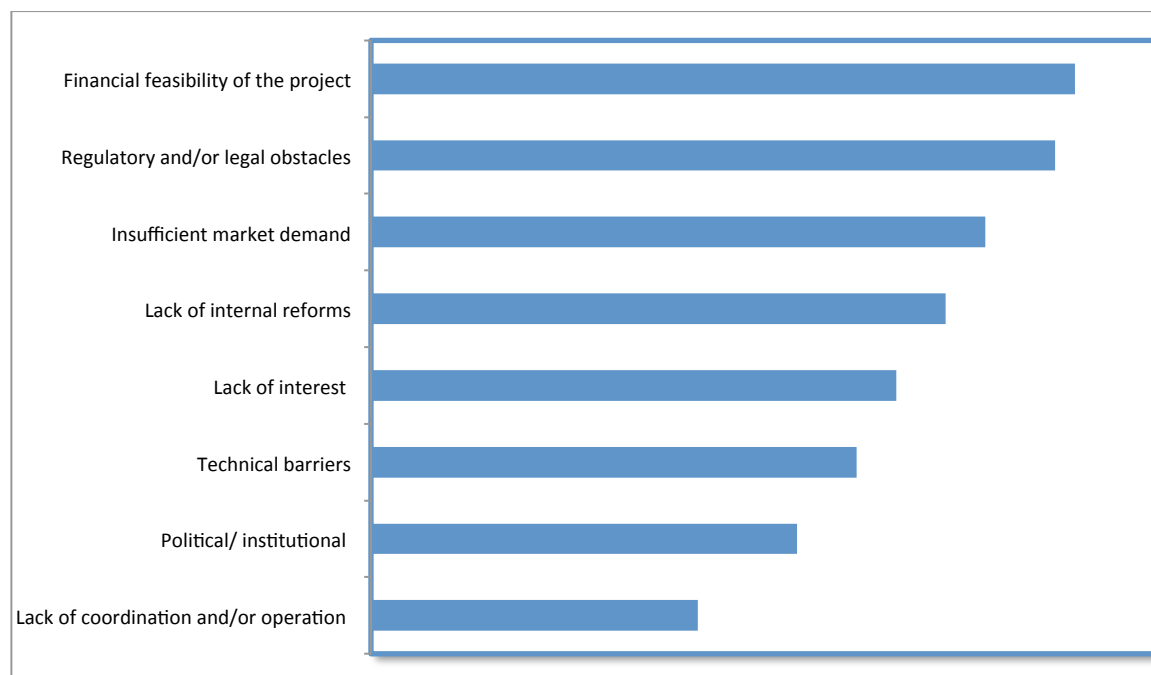


Figure 11: Political instability/No clear institutional framework

Figure 12: Lack of coordination and cooperation

Figure 13: Impact of barriers



Graph 13 ranks the barriers by relevance. According to MEDREG regulators, financial feasibility of the projects as well as Regulatory and legal obstacles represent the most challenging barriers to infrastructure investments, while the lack of coordination is the less important obstacle. Although the priority of the barriers considerably differs from one country to the other, all of the above barriers are significant.

Looking in detail at the national pictures, Table 4 lists the three most relevant barriers in the deployment of investments in electricity for each regulator, in order of priority.

Table 4: The three most relevant barriers for each MEDREG country

Country	Three most relevant barriers
<i>Albania</i>	<ul style="list-style-type: none"> - Financial feasibility of the project - Insufficient market demand - Lack of internal reforms
<i>Bosnia and Herzegovina</i>	<ul style="list-style-type: none"> - Lack of internal reforms - Political instability and/or lack of clear institutional framework - Lack of coordination and/or cooperation
<i>Croatia</i>	<ul style="list-style-type: none"> - Financial feasibility of the project - Regulatory and/or legal obstacles - Insufficient market demand
<i>Egypt</i>	<ul style="list-style-type: none"> - Technical barriers - Financial feasibility of the project - Insufficient market demand
<i>France</i>	<ul style="list-style-type: none"> - Regulatory and/or legal obstacles - Technical barriers

Country	Three most relevant barriers
<i>Greece</i>	<ul style="list-style-type: none"> - Technical barriers - Financial feasibility of the project - Lack of interest in interconnection projects
<i>Israel</i>	<ul style="list-style-type: none"> - Regulatory and/or legal obstacles - Financial feasibility of the project - Lack of internal reforms
<i>Italy</i>	<ul style="list-style-type: none"> - Insufficient market demand - Financial feasibility of the project - Lack of interest in interconnection projects
<i>Jordan</i>	<ul style="list-style-type: none"> - Financial feasibility of the project - Technical barriers - Lack of interest in interconnection projects
<i>Libya</i>	<ul style="list-style-type: none"> - Regulatory and/or legal obstacles - Political instability and/or lack of clear institutional framework - Lack of internal reforms
<i>Montenegro</i>	<ul style="list-style-type: none"> - Insufficient market demand - Lack of interest in interconnection projects - Technical barriers
<i>Portugal</i>	<ul style="list-style-type: none"> - Regulatory and/or legal obstacles⁶ - Insufficient market demand - Lack of interest in interconnection projects
<i>Spain</i>	<ul style="list-style-type: none"> - Regulatory and/or legal obstacles - Political instability and/or lack of clear institutional framework - Lack of interest in interconnection projects
<i>Turkey</i>	<ul style="list-style-type: none"> - Financial feasibility of the project - Insufficient market demand - Technical barriers

⁶ Priority 1 attributed by the Portuguese regulator ERSE to the "Regulatory and/or Legal obstacles" is related essentially to the processes for the permitting and licensing of the infrastructures, as well as with the social and environmental barriers that the promoters usually need to overcome. From ERSE's perspective, the regulatory obstacles in Portugal are not as critical for the implementation of investments.

Gas

Natural gas is of critical relevance for the overall Mediterranean energy trade. While MENA countries are among the world's leading gas producers, European countries are counted among the greatest consumers. As a consequence, the Mediterranean basin has the potential to become the marketplace where these two significant amounts of supply and demand meet. Looking at some data coming from the MEDREG 2012 Status Review of Gas Network Infrastructure, it is possible to notice that the region displays a relevant consumption level of over 300 bcm/year. However, the traded amount of the gas is around 80 bcm/year, barely a quarter of the regional demand. Infrastructure investments have therefore a high potential to boost regional gas trade.

9. Analysis of existing and planned gas infrastructure

Figure 14: Gas interconnections (mcm/d)

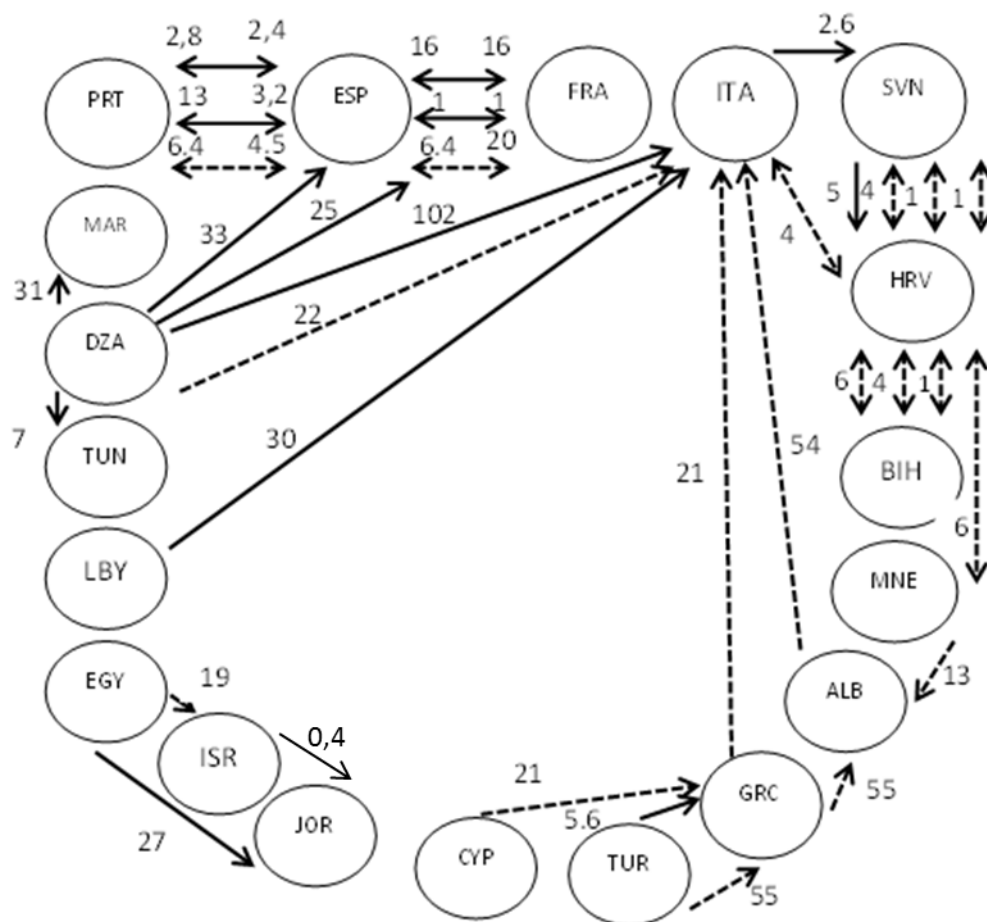
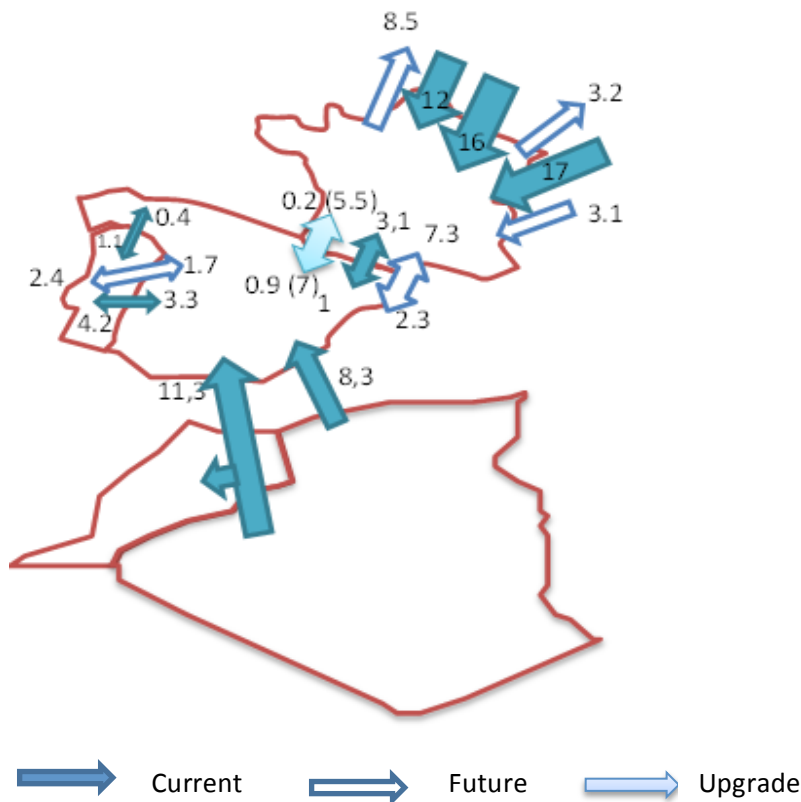


Figure 14 shows at a glance the existing and projected gas interconnections among MEDREG countries. While the geographical form of the Mediterranean Basin is that of a ring, gas trade did not develop circularly, as it happened for electricity trade. Gas interconnections geographically divide the Mediterranean into three separate corridors: Western, Eastern and Central Mediterranean. Thus, there are vertical, not horizontal, gas trade links in the region, which mark three separated trade zones. A regional market stretching from Algeria through Spain to Portugal and France creates the Western gas trade zone. In the Central Mediterranean, Italy, interconnected to the Balkan countries, is both a transit and consumer country. The two main producers of this zone are Algeria and Libya. The Eastern Mediterranean, on the other hand, is less interconnected than the two other zones. Egypt appears to be the main exporter, with lines linking it to Jordan and Israel. Turkey has potential as a transit country and also to serve as an hub in its region. However, this potential cannot be fully exploited until it is connected to the Arab gas pipeline. Appendix V summarizes the main characteristics of existing and planned gas infrastructure projects.

9.1. Western Mediterranean

In the Western Mediterranean a regional gas market exists among Algeria, Morocco, Spain, Portugal and France. Algeria is the single exporter to the Moroccan gas market, and it is one of the dominant suppliers to Portugal, Spain and France. Algerian gas is transported to the Iberian Peninsula via two separate undersea transmission lines. The oldest one is the 1,620 km Maghreb - Europe Gas Pipeline, operational since 1996 connecting Algeria to Morocco, Spain and Portugal. It has a capacity of 11,5 bcm per year. A recent project, MEDGAZ, has come into existence in 2011. The 210 km MEDGAZ pipeline directly links Algeria to Spain and transports 8bcm gas per year. The Spanish gas network operates as the transmitter of Algerian gas to Portugal and Spain via four bidirectional interconnections. The Tuy and Badajoz interconnections link Spain to Portugal. The Irun and Larrau interconnections are directed towards France. Capacities of these interconnections are limited, currently varying from 0,1 to 4,2 bcm. This sets a barrier to the entrance of Mashreq gas to Portugal, France and other countries.

Figure 15: Western Mediterranean interconnections (bcm/y)



The region is interested by two new interconnection projects. The “Val de frades” project is planned to start operations in 2017. It will allow bidirectional flow between Portugal and Spain. The 162 km length pipeline will have an annual capacity of 2,36 bcm from Spain to Portugal and of 1,67 bcm in the opposite direction. The Midcat project will in turn connect France and Spain as of 2020: the pipeline will be around 25 km long and allow an annual 2,5 bcm flow from France to Spain and 7.3 bcm flow from Spain to Algeria.

In addition to the new interconnections that will foster trade in the region, increase in the capacity of current interconnections is also critical in terms of regional trade. As noted above, the Irin/Biriatou interconnections between Spain and France have now limited capacities. With the capacity increase planned by 2015, these twin interconnections will annually have total amounts of 7 bcm from Spain to France and 5.5 from France to Spain.

Additional gas will enter Western Mediterranean through the capacity developed by France at its Northern borders. From 2015 to 2020, three new interconnections will be built at the French borders with Belgium (8.5 bcm/year), Switzerland (3.2, bcm/year) and Germany (3.1 bcm/year). Additionally, a new interconnection project between France and Belgium is expected to start operations in 2015 and have an annual capacity of 8.5 bcm.

Finally, LNG terminal projects bring great potential to increase Western Mediterranean gas trade. Currently, the capacity development of the French terminals of Dunkirk and Fos Cavaou terminals and of the Spanish terminal on the Northern Coast would add 22 bcm/year of gas to the trade of the West Mediterranean. France is also building the Fos Faster terminal, which will have a capacity of 18,25 bcm/year. On the supply side, Algeria is now

extending the Arzew terminal, which will have an annual additional liquefaction capacity of 6 bcm.

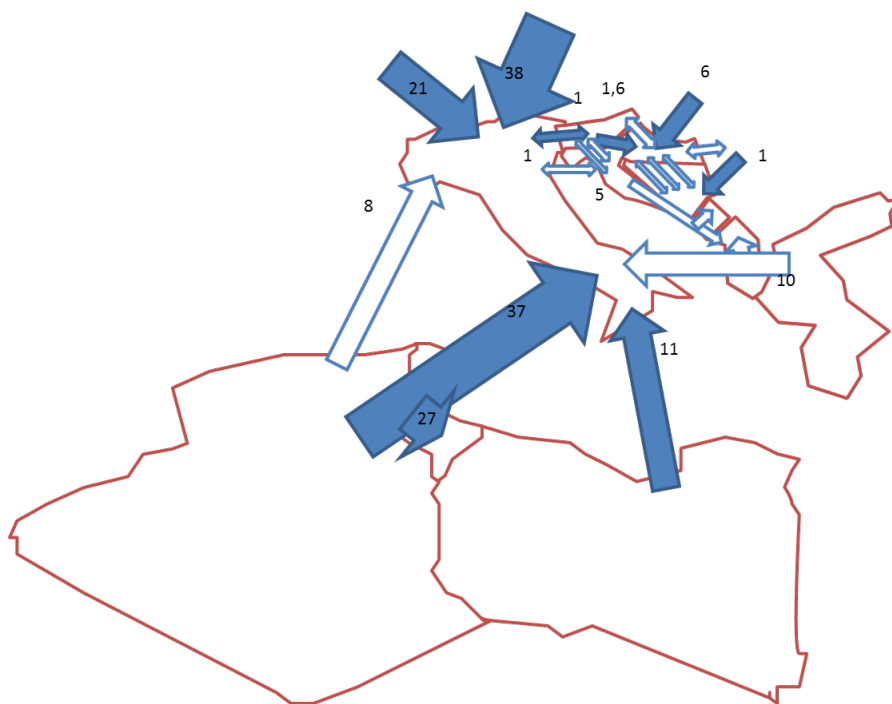
9.2. Central Mediterranean

In the Central Mediterranean, the two gas suppliers are Algeria and Libya. Italy, on the other hand, is the main consumer of this corridor. Slovenia, Croatia, Bosnia and Herzegovina have relatively smaller gas markets. Montenegro, Albania and Malta currently have no gas consumption. The main gas artery of the central Mediterranean is the Transmed pipeline which starts from Algeria, passes through Tunisia, Sicily, Italy and reaches the Slovenian borders. This 2200 kms line has been active since 1983 (doubled in 1997) and has a capacity of 37 bcm/year.

Another submarine pipeline is the Greenstream pipeline connecting the onshore Wafa field and the offshore Bouri field to Italy. The 550-kms-long pipeline transports 11 bcm gas annually. Due to the political turmoil that interested Libya in 2011, the pipeline was shut down, reopening shortly after. Italy also imports gas from Northern Europe and Russia via interconnections from Switzerland and Austria.

In the Balkans, Slovenia and Croatia are part of the regional gas trade as Slovenia has a bidirectional flow with Italy and Croatia is connected to Slovenian network. However Bosnia and Herzegovina is not connected to regional countries. The majority of its gas is imported from Russia via Serbian border. The other two Balkan countries, Montenegro and Albania, have not yet developed gas infrastructure and they do not currently consume gas.

Figure 16: Central Mediterranean interconnections (bcm/y)



Various ongoing projects have the potential of diversifying trade routes and sources, eliminating bottlenecks and introduce natural gas to non-gas consuming countries through the region. Italy strengthens its central position with new submarine pipelines. The Galsi project (Gasdotto Algeria Sardegna Italia) will allow Italy to introduce gas to the Sardinia island (as well as to the French island of Corsica) and import an additional 8bcm/year gas from Algeria through a direct flow. The project is expected to be in service with a 861 km long pipeline in 2019.

Two more submarine pipeline projects are under consideration in the Balkans. The Trans-Adriatic (TAP) project, whose construction is scheduled to start in 2016, will transport the Caspian Basin gas to Italy as an extension of the Southern Corridor passing through Turkey. The TAP will be 870 kilometers long (Greece 545 km; Albania 211 km; Adriatic Sea 105 km; Italy 8 km) and have a 10-20 bcm/year of capacity. The project will start operations in 2020 on the condition that the Azeri Shah Deniz 2 project and the TANAP (Trans-Anatolian Project) are simultaneously realized. The IGI-Poseidon pipeline, that will directly link Greece to Italy, is designed to transport from 10 to 14 billion cubic meter of natural gas per year from sources available in Turkey (via ITGI project) and Eastern Mediterranean region (via EastMed pipeline). The future of the project relies upon individuation of the gas supply sources. On the other hand, considering Galsi, TAP and IGI-Poseidon all together, by 2020 Italy may take the role of Central Mediterranean gas hub.

The Balkans is interested by two additional projects: Ionian Adriatic Pipeline (IAP) and the Bosnian interconnection with Croatia. The IAP will be 516 Km long and connect Croatia and Montenegro with Albania. It shall have a capacity of 5 bcm/year. The Bosnian interconnection with Croatia, still in its projection phase, has been part of the Balkan gas ring project and will enable Bosnia to diminish its dependency from the Russian gas.

LNG is an important means of distribution in the Central Mediterranean as well. Algeria is one of the main world LNG exporters and it exports mainly to Europe and Asia. In addition to the liquefaction plants in Libya, Egypt, and Algeria, there are numerous regasification plants located in Southern Europe, such as Spain (Huelva, Cartagena, Barcelona), France (Fos, Montoir de Bretagne, and soon, Dunkirk), Italy (Panigaglia, Rovigo and Livorno), Turkey (Marmara, Ereğli), and Greece (Revithoussa).

Italy is the country involved in the highest number of LNG construction projects. Six different LNG regasification terminal projects are reported. They should provide additional 49 bcm/year to the Italian LNG network. Interconnection projects in other countries include the Fier terminal in Albania and three regasification terminals in Greece. These regasification terminals located around the Adriatic sea will provide additional source to the planned pipeline interconnection projects of Central Mediterranean. Finally, there is an LNG terminal project in Malta, which would make the country a new gas consumer in the region.

9.3. Eastern Mediterranean

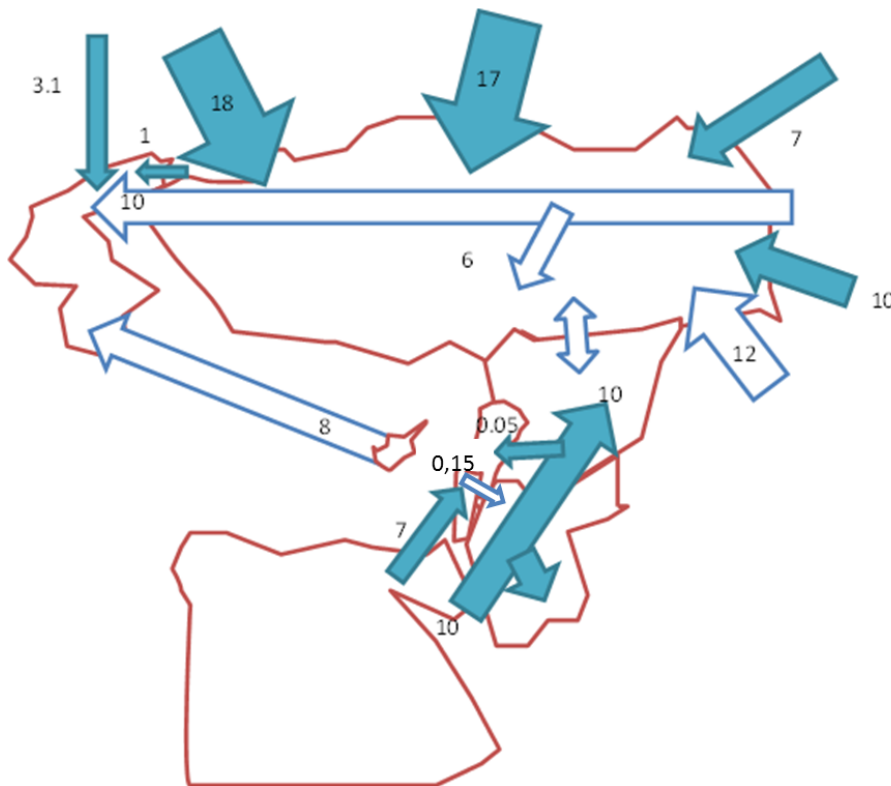
The Eastern Mediterranean regional market is not complete. The two main gas markets in the region, those of Egypt and Turkey, are not interconnected. This missing link separates Turkey and Greece from the MENA countries.

Turkey is the most interconnected country in the corridor, as it imports gas from Russia, Azerbaijan and Iran and gets LNG from 2 different entry points. Turkey and Russia recently agreed on the construction of the Turkish Stream project originating from Russia and passing beneath the Black Sea. It is critical to assess how the revision of Russian export project will unfold, also in the context of European market. However, Turkey's exit capacity is limited, as it has only one export point with Greece. The interconnection between these two countries does not allow large amounts of gas to flow (no more than 1bcm annually).

Egypt is the main natural gas supplier for the rest of the corridor, through two branches of pipelines. One of them goes to Israel, while the other passes through Jordan, Syria and ends in Lebanon. The lack of alternative sources and routes sets a barrier to the increase of gas trade as well as to security of supply.

An essential step to eliminate trade barriers would be completion of the Arab gas pipeline and the construction of a connection between Syria and Turkey. This would not only allow Egyptian gas to flow to Turkey, but also enable other regional countries to import gas from the Caspian basin.

Figure 17: Eastern Mediterranean interconnections (bcm/y)



Other Turkish investment projects include the Iraqi interconnection and the Trans-Anatolian Pipeline (TANAP). TANAP is projected to transport gas from the Shah Deniz 2 field to Europe via Greece and connect it to the Trans-Adriatic Pipeline. TANAP will be a critical step to eliminate the current congestion in the Turkish-Greek border.

A game changer in the region is the newly found gas resources in the Eastern Mediterranean offshores. These sources will enable four countries to have indigenous production: Lebanon, Cyprus, Israel and Palestine. According to the US Geopolitical Survey (2010), the estimated reserve in the region is around 3.5 trillion cubic meters. As the consumption levels of the producers-to-be are diminishing, we can expect a great part of the amount to be introduced into regional trade.

New investment options include building one of the following infrastructure: offshore LNG liquefaction terminals, a pipeline to Turkey or a pipeline to Greece, thereby offering gas to the European markets. The LNG terminal option is the most practical but the least economic option when compared to possible submarine pipeline projects. The pipeline project, however, will require intergovernmental agreements, considering the vastness and variety of the Exclusive Economic Zones (EEZ) of Eastern Mediterranean countries. The route of the EastMed pipeline, project from Cyprus to Greece with a capacity of 8-14 bcm/year, is designed to avoid the EEZ impacted by disputes like the one between Turkey and Greek Cyprus. The most developed investment project regarding marketing of the gas in this region is the pipeline from Israel to Jordan that will be put into service in 2016.

10. Investment Planning

A great part of the projected investments in the Mediterranean region should be implemented in the short term. As Appendix V shows only 3 three out of the 32 projects are expected to be finalized in after 2020. While the electricity projects are classified as short, medium and long term projects in the above parts, the reported gas projects are scheduled to start operation no later than 2020. Table 5 shows that investment plans of regional countries are not longer than 10 years.

Table 5: National investment plans

	Time span of the investment plans	Period of investment plans
Algeria		10
Croatia		10
Jordan	2020	
France	2022	10
Italy	2025	10
Spain	2016	8
Portugal		10
Turkey		3
Greece	2022	10
Cyprus	2020	10
Israel		According to national needs

Appendix VI puts the various projects described above on a timeline. From 2015 to 2017, the Iraqi gas is expected to enter Mediterranean markets through the new interconnection with Turkey. The IGB Greece- Bulgaria Gas Interconnector, will connect SEE with supply sources from Caspian Region, Middle East, East Med and LNG (through existing/new re-gas terminals in Greece and/or Turkey). Diversified Gas, imported to Bulgaria via IGB, could be transited taking advantage of national networks and other interconnections, such as IBR

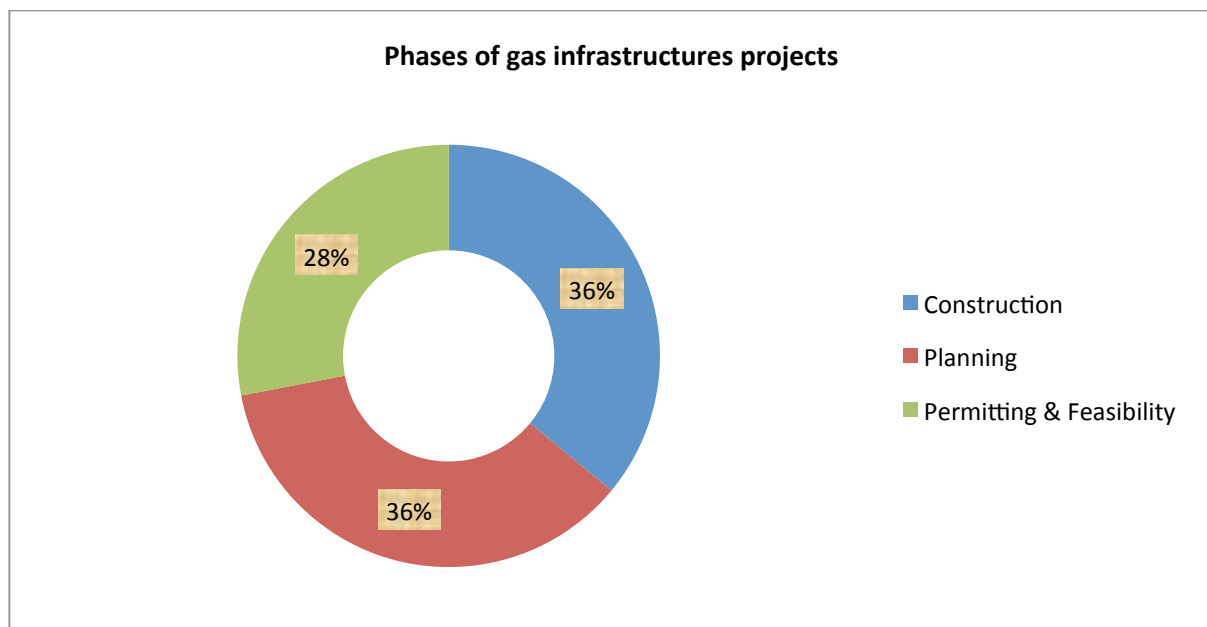
(BG-RO), IBS (BG-SER). In connection to the Southern Corridor, IGB will guarantee to SEE access to gas supply and flexibility of the Italian market and will be pivotal in securing strategic relevance for other North-South interconnection being sponsored by EU.

The new LNG terminals in Greece and the finalization of Galsi pipeline in Italy will further diversify the resources in Southern and Eastern Europe. A similar development will take place in Western Mediterranean, with capacity increases in the bilateral interconnection points, new interconnections with Belgium and Switzerland as well as capacity developments in the LNG terminals (Appendix VI).

From 2018 onwards, the introduction of offshore resources coming from the Eastern part of the Mediterranean will make an important impact on Mediterranean gas markets. The EastMed project will allow the transport of 8-14 bcm/year from the region to the European consumers being directly connected to Greece and to Italy via Poseidon pipeline. The Trans-Anatolian Natural Gas Pipeline project, on the other hand, will be fully operational in 2020, allowing 10-20 bcm of gas to be transported from Azerbaijan via Turkey to Greece, Albania and Italy. However, the Trans - Adriatic project has to simultaneously become operational.

The phases of these different projects are summarized in figure 18.

Figure 18: Phases of investment projects



11. Regulatory framework

A variety of regulatory frameworks exist throughout the Mediterranean. This heterogeneity stems from different approaches to regulate markets and methods to plan investments. The European Union plays an important role, not only concerning member countries, but also with regards to the other countries of the region. We can divide Mediterranean countries into three categories: countries having EU membership; countries candidate to join the EU or

having prospects of doing so; countries part of Mediterranean-EU partnerships; and countries that are loosely connected to the EU regional initiatives.

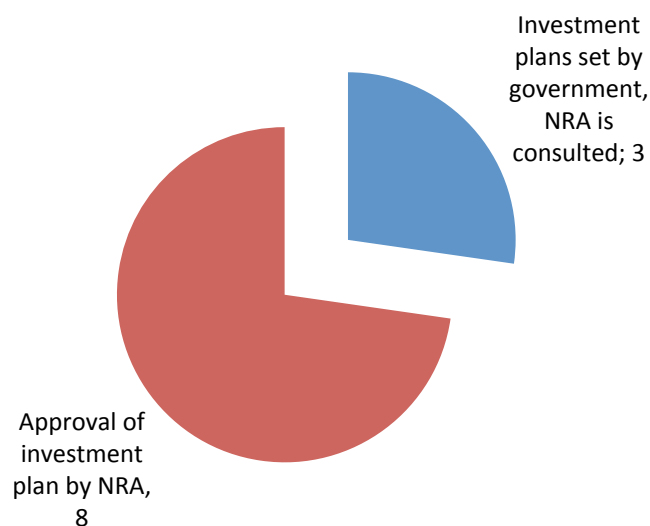
Table 6: MEDREG members' relations with the EU

EU members	Prospect EU members	Partners to the Mediterranean-EU initiatives	Less involved in EU regional initiatives
Croatia Cyprus France Greece Italy Slovenia Spain Portugal	Albania Bosnia and Herzegovina Montenegro Turkey	Algeria Egypt Israel Jordan Morocco Tunisia	Lebanon Libya Syria

The EU membership harmonizes the investment planning framework of member countries, thereby providing a uniform regulatory framework among EU-Mediterranean countries. The European Network of Transmission System Operators for Gas (ENTSO-G) also coordinates investment planning regionally and on a continental basis. Additionally, gas TSOs deliver Ten Year Network Development Plans and Gas Regional Investment Plans for the coordination of investments, partially involving EU perspective members as well.

Investment decisions in the EU usually come after Preliminary Market Surveys and Open Season Procedures have taken place to test the market demand for investments. Investment projects that help removing regional trade bottlenecks benefit from the particular status of PCIs from the European Union. PCIs have favorable permit granting procedures and improved regulatory treatment. The Trans Adriatic Project, which involves Greece, Albania and Italy, is an example of a PCI project. The detailed regulatory framework of some EU-Mediterranean countries, as well as of Jordan and Turkey, is outlined in Appendix VI.

Figure 19: Involvement of NRAs in investment projects



12. Barriers to investments: The perception of regulators

Natural gas network investments are highly exposed to uncertainty, as they require high amount of capital and long construction phases, with high sunk costs. The cost of a gas network facility starts to be covered only after several years of activity. As a result, investors try to avoid uncertainty as much as possible. For example, the Greek regulator (RAE) note that some projects could not obtain Foreign Direct Investment (FDI) due to geopolitical uncertainty.

The Spanish regulator (CNMC) additionally notes that the Spanish TSO considers the impact of policy uncertainty in the gas demand estimation, especially regarding electricity demand and generation (potential reduction due to increase with indigenous coal). The timeframe selected by industry to make investment decisions during uncertainty period is also subject to change.

In Turkey the impact of policy uncertainties (geopolitical, economic or of other sort) are considered in the evaluation approach.

In Spain, generally the timeframe to make investment decisions is five years. Nevertheless, due to the economic crisis and its consequences on gas demand, investments have been frozen except for international interconnections and isolated systems.

In Greece, the TSO's abilities to invest have been hampered by the financial crisis as well. Limited access to financing resources and increased debt costs are among the main problems faced by the Greek TSO. However, private participation in the PCI projects and EU financial assistance (grants and loans), can potentially provide the financial resources that are needed.

To evaluate implementation barriers together with uncertainty, countries' responses to the major implementation barriers (detailed in the electricity section) affecting the investment plans are analyzed below.

In order distinctly detect the weight of each of the above-mentioned barriers, a radar graph is used. The greater the shaded area, the more challenging is the barrier. Only countries with a NRAs in charge of gas were included in the analysis.

From the answers to this question of the survey, it seems clear that regulators are aware that the realization of gas projects may encounter geopolitical, regulatory and commercial challenges, which, if not properly addressed, may hinder the harmonized development of these resources in the Mediterranean region.

Geopolitical challenges are perceived as particularly relevant from countries that have recently experienced gas discoveries (such as Cyprus), as they may undermine the viability of infrastructure trade project. Indeed, gas discoveries can be a game changer, both at national and regional level. Regulators have a substantial role to play in this context, as the management of the exploration, development of infrastructures and export of gas reserves will mostly be driven by national energy policies.

Concerning the financial barriers to projects, it should be noted that the creation of adequate risk-reward ratios is a core competence to be trusted to independent national regulators, as part of their regulatory assessment and review of network investments. As one of the core objectives of MEDREG is to promote the role and competences of national independent regulatory authorities and to ensure their successful activity in the Euro-Med context, the Association took notice of the need to study more in detail what are the reasons that lead to unbalanced network costs across the Mediterranean region.

12.1 Classification of barriers by relevance

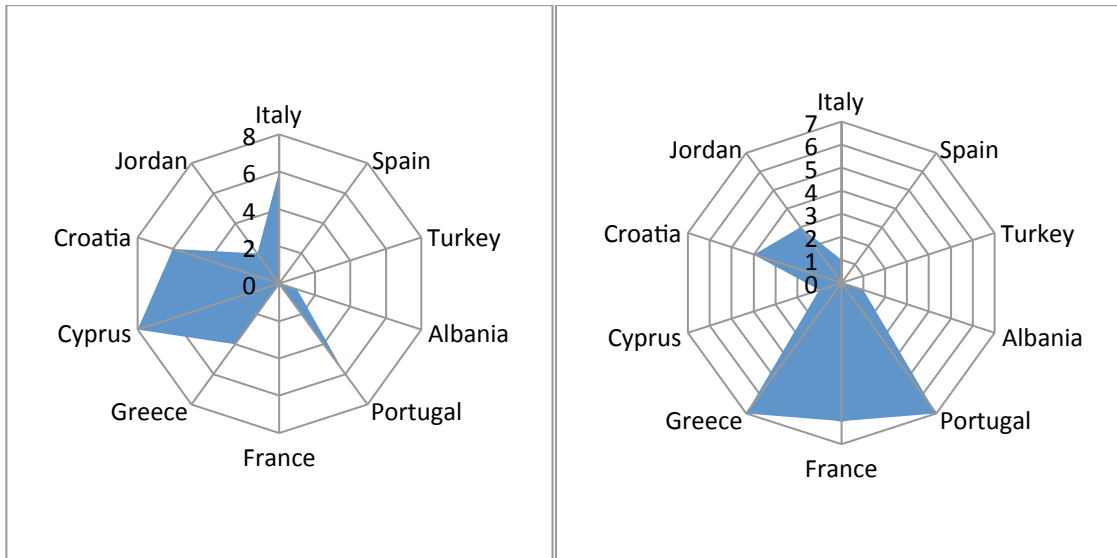


Figure 20: Lack of interest in interconnection projects

Figure 21: Regulatory and/or legal obstacles

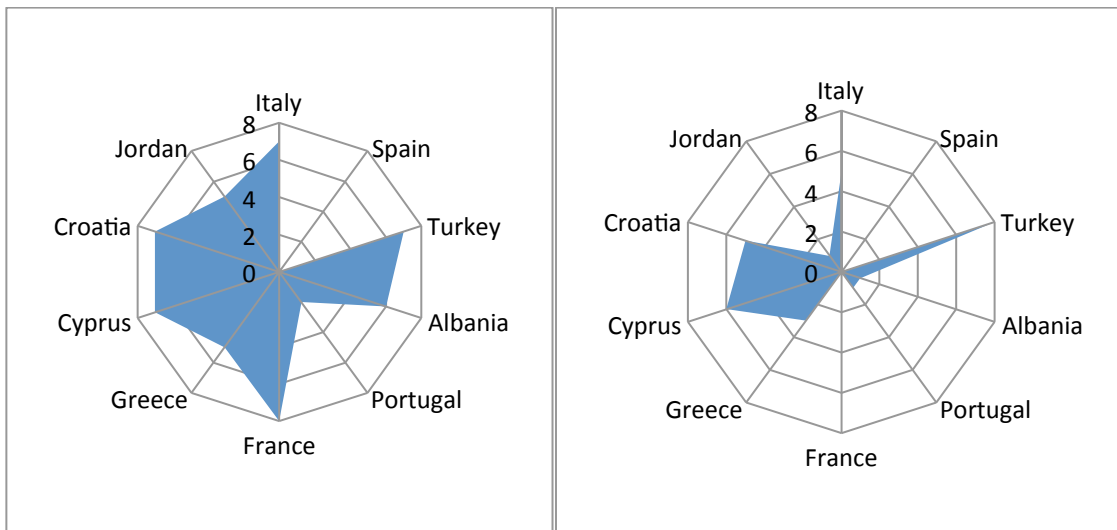


Figure 22: Financial feasibility of the project

Figure 23: Technical barriers

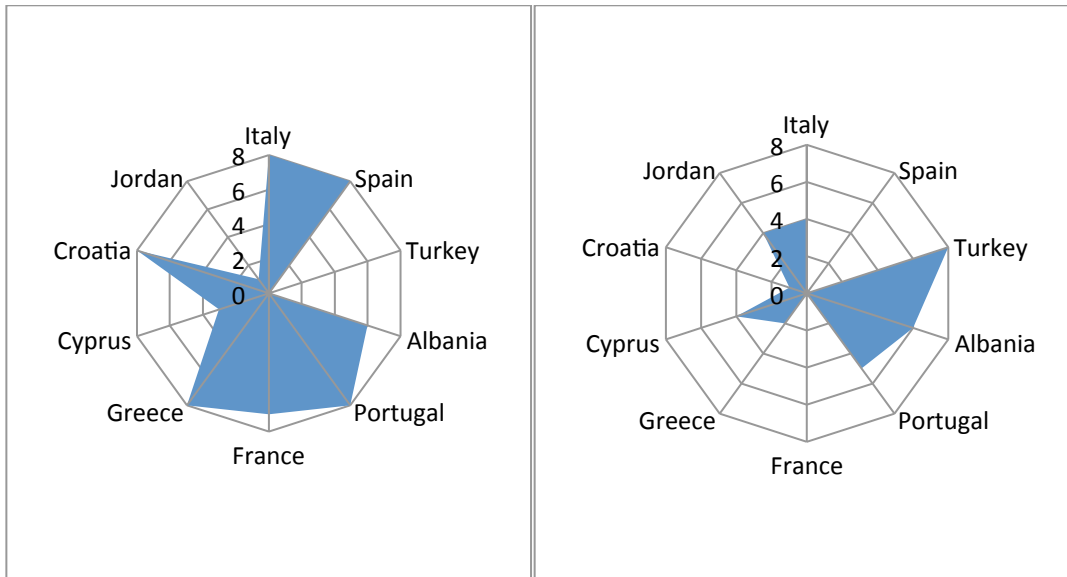


Figure 24: Insufficient market demand

Figure 25: Lack of internal reforms

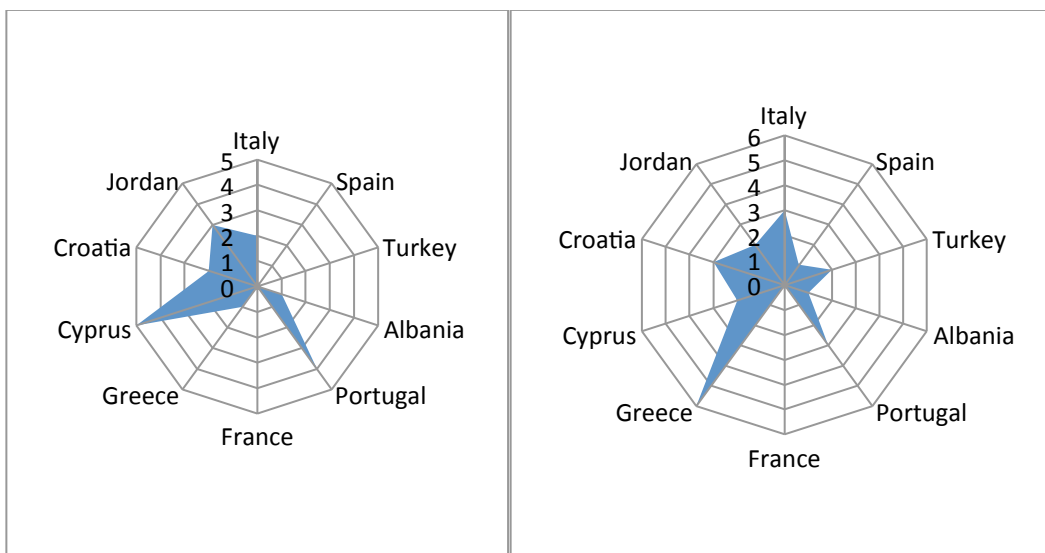


Figure 26: Political instability and/or lack of clear institutional framework

Figure 27: Lack of coordination and/or cooperation

Figure 28: Impacts of the barriers

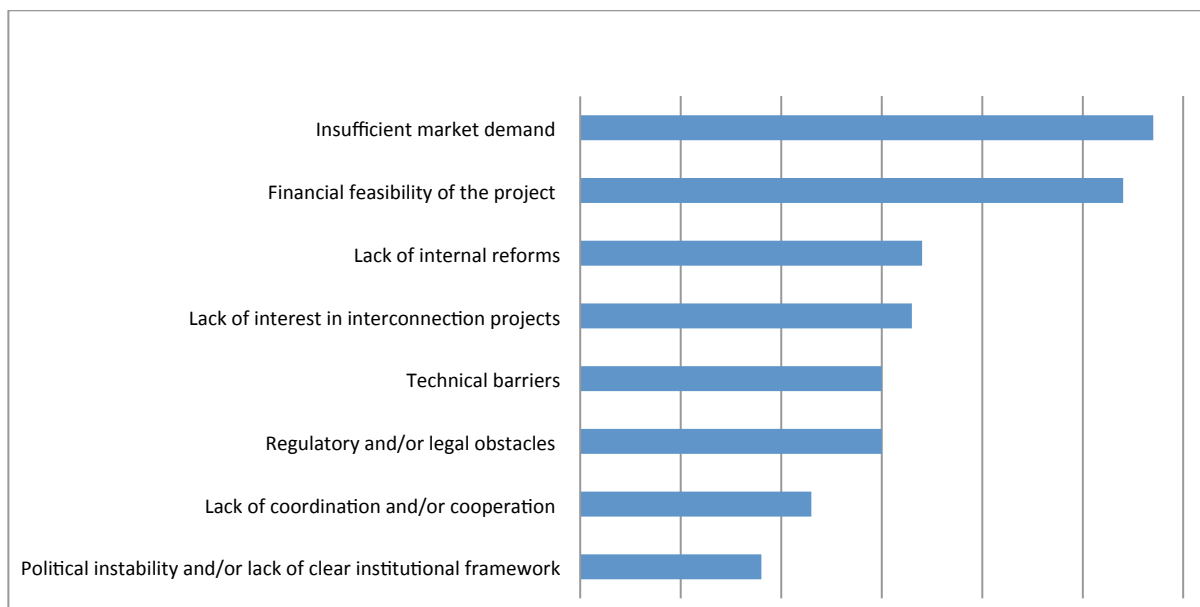


Table 7: The three most relevant barriers for each MEDREG country

Country	Three most relevant barriers
<i>Albania</i>	<ul style="list-style-type: none"> - Financial feasibility of the project - Insufficient market demand - Lack of internal reforms
<i>Croatia</i>	<ul style="list-style-type: none"> - Insufficient market demand - Financial feasibility of the project - Lack of interest in interconnection projects
<i>Cyprus</i>	<ul style="list-style-type: none"> - Lack of interest in interconnection projects - Financial feasibility of the project - Technical barriers
<i>France</i>	<ul style="list-style-type: none"> - Financial feasibility of the project - Insufficient market demand - Regulatory and/or legal obstacles
<i>Greece</i>	<ul style="list-style-type: none"> - Insufficient market demand - Regulatory and/or legal obstacles - Lack of coordination and/or cooperation
<i>Italy</i>	<ul style="list-style-type: none"> - Regulatory and/or legal obstacles - Technical barriers

Country	Three most relevant barriers
	- Insufficient market demand
<i>Jordan</i>	<ul style="list-style-type: none"> - Financial feasibility of the project - Lack of internal reforms - Regulatory and/or legal obstacles - Political instability and/or lack of clear institutional framework
<i>Portugal</i>	<ul style="list-style-type: none"> - Insufficient market demand - Regulatory and/or legal obstacles⁷ - Lack of interest in interconnection projects
<i>Spain</i>	<ul style="list-style-type: none"> - Insufficient market demand - Lack of coordination and/or cooperation
<i>Turkey</i>	<ul style="list-style-type: none"> - Financial feasibility of the project - Technical barriers - Lack of coordination and/or cooperation

⁷ Priority 2 attributed by the Portuguese regulator ERSE to the "Regulatory and/or Legal obstacles" is related essentially to the processes for the permitting and licensing of the infrastructures, as well as with the social and environmental barriers that the promoters usually need to overcome. From ERSE's perspective, the regulatory obstacles in Portugal are not as critical for the implementation of investments.

Conclusions and Recommendations

Through this report MEDREG mapped existing and potential cross-border infrastructures within the Mediterranean region, both in the electricity and gas sectors. The main data in support of this report were kindly provided by MEDREG members.

MEDREG's report confirms that successful infrastructure management and investments in the energy sector require effective cooperation, mainly between regulators and TSOs. Secure interconnections would allow cross-border energy exchange between market players in neighboring countries. For electricity, they would also guarantee the secure operation of the power system, allowing generation reserves to be pooled to deal with unexpected outages affecting generation and transmission facilities, or sudden fluctuations in electricity demand. For gas, improved interconnections would support the deployment of increased security of supply. In several non-EU Mediterranean countries there is no sufficient installed capacity to cover the domestic need for energy, and consequently not much is left for cross-border trade. In 2012, the WB estimated that countries in the MENA region would need to spend more than \$30 billion in five years to develop a grid capacity that can support their relevant capacity expansion plans, including renewables. These calculations do not take into account the additional money necessary to develop mechanisms in support of energy balancing and the deployment of smart grid systems to integrate RES with conventional sources of power.

In order to mitigate risk perceptions and foster reciprocal trust, fruitful dialogue with all main stakeholders also appears relevant, starting with governments, operators and consumers. The work done highlighted relevant information related to existing interconnections as well as obstacles and challenges for cross border infrastructures development. In particular, Mediterranean countries face four major challenges related to the development of their electricity and gas sectors:

- **Unclear institutional architecture at national level:** regulators, TSOs, operators and other actors should cooperate with clear distinction of roles at national level. Sometime considerable conflicts of interest occur, heavily affecting the credibility of the country face to foreign investors.
- **Lack of sound cost-benefit analysis (CBA) :** In some Mediterranean countries there are no effective methodologies for evaluating the estimated costs and benefits of new infrastructure projects. Thus, it is very difficult to have a clear view on the economic profitability of single interconnection projects, which result in less than effective investment plans. The lack of Cross-Border Cost Allocation (CBCA) methodologies may also be significant. Building on CBA, CBCA has the potential to support the realization of interconnections. In areas such as the Mediterranean one, where financing conditions suffer from lack of transparency, regulatory decisions based on CBCA could help clarifying the benefits and costs for each country involved, thus facilitating appropriate cost allocation among hosting and positively impacted third countries.
- **Lack of innovative financing mechanisms** for the successful implementation of new infrastructures. As the estimated financing needs of the Mediterranean region will be

probably higher than the potential contribution of public funding, the key challenge will be to identify what conditions are necessary to attract investments from IFIs and the private sector for new interconnection projects. Nevertheless, support from IFIs would encourage the establishment of a favorable investment framework and demonstrate, for instance, the economic viability of specific technologies for developing innovative business models. The challenge will be not only to attract investment but also to ensure that the projects generate sufficient revenues allowing for reimbursement of the credits. Innovative financing mechanisms should be accompanied by public/institutional support, notably to facilitate the conclusion of intergovernmental agreements. A dedicated public fund for Mediterranean PCIs could also be considered.

- **Lack of transparency:** Mediterranean energy markets are mainly managed by state-owned monopolies that influence prices and trading conditions. For this reason, foreign investments tend to be discouraged by scarce information on market prices and available transmission capacity. This problem is coupled with a lack of legal obligations for the monopolist, which makes it increasingly difficult for a third party to access the market.
- **Significant subsidization:** in some non-EU Mediterranean countries governments tend to heavily subsidize domestic prices, without any market mechanism in place. This hinders the development of cost-reflective energy prices, which are key to foster private investment in the energy sector.

Overall, these challenges lead to an unclear prioritization of barriers to investments. During the public consultation on an earlier version of this report, MEDREG asked respondents to amend the priority list on the impact of barriers according to their own view. According to the global evaluation of all respondents, which expressed a single opinion on the electricity and gas sector, the two lists of barriers that MEDREG developed for electricity and gas should be amended as follows:

- 1) Political instability and lack of a clear institutional framework
- 2) Lack of internal reforms
- 3) Insufficient market demand
- 4) Lack of coordination and cooperation
- 5) Financial feasibility of the project
- 6) Regulatory and/or legal obstacles
- 7) Lack of interest in interconnection projects
- 8) Technical barriers

While being different from the list proposed by regulators, the respondents' list keeps the same three barriers at the top of the ranking, albeit in a different order. This shows that there is a shared perception of the three main investment barriers to investment, as well as confirms that regulatory obstacles are progressively being addressed in a satisfactory way.

According to the findings of this report, the Mediterranean energy community can be built only carefully considering the above mentioned issues. All actors, governments, the European Union, regulators, operators, financiers, and other stakeholders should strongly commit towards a well coordinate and efficient regional strategy.

Based on the findings of MEDREG's report, the recommendations below are considered as a necessary first step to facilitate the creation of a sound environment for investments in the Mediterranean region.

1. Establish competitive and reliable energy markets

The majority of existing electricity and gas infrastructures have been built so far for security of supply needs. Today, *infrastructure investments are also driven by market forces and face regional competition*. Public policy decisions are therefore decisive to foster and secure investments. In some MEDREG countries they are even more relevant than economic factors to develop their internal markets. Policy makers should devote considerable efforts to link investment plans to the progressive opening of their national markets.

2. Promote deeper harmonization of national regulatory frameworks

The absence of a regulatory level playing field between the Northern and Southern shore of the Mediterranean is particularly negative for investments, as different sets of rules exist in the various Mediterranean sub-regions. In particular, it should be noted that *South-South dialogue and regulatory harmonization need strong improvements* in order to build efficient cross-border interconnections. The European Union in the last years has made good and substantial steps towards a more harmonized regulatory framework. This regional process could be eventually replicated in the Mediterranean region. Nevertheless, in the *absence of a formal commitment among Mediterranean policy makers, all stakeholders have to voluntarily engage now to establish deeper legal harmonization*. Stronger cooperation between EU, Middle East and North African countries is also a precondition to establish a regional energy market with a sound investment climate. It is advised that the *Euro-Mediterranean Platforms on Electricity, Gas and Renewable Energy Sources and Energy Efficiency strongly promote the establishment of a set of common rules to support a fair and reliable framework for energy investments*.

3. Increase the use of existing interconnections in the Southern shore

In spite of the existence of several South-South Mediterranean interconnections, electricity trade among these countries has remained modest. *The average level of use is not more than one third of the total capacity*. This can be mainly attributed to the political and economic barriers at national and regional levels. In several cases, technical issues also add to the problem. Integrated resource planning is therefore essential at the national as well as at the regional level to review, understand, and provide input to the planning decisions of the interconnection projects. *For an integrated resource planning process to be effective, it should include both a meaningful stakeholder process and a proper oversight from an engaged regulator*. In particular, a successful utility's resource plan should take into detailed consideration the following aspects: reserves and reliability, supply options, load forecast, demand-side management, fuel prices, environmental constraints, evaluation of existing resources, integrated analysis, time frame, and uncertainty. A proper assessment of the existing situation would help designing a consistent methodology to evaluate energy infrastructure investments and take adequate planning decisions.

4. Evaluate the economic benefits of new cross-border infrastructure projects

The potential increase of investment volumes will create strong needs for *political consensus and investment bankability*, thus requiring the definition of an appropriate regulatory framework. The case of the European Union clearly shows this is the way ahead to maintain and reinforce investments. Developing sound methodologies for CBA will help supporting the investment decisions in the region. The economic assessment shall also take into account security of supply and social considerations. An effective way to ensure risk-adjusted returns to investors could also be through 'priority premiums', which compensate the additional risk and complexity of new projects.

5. Enhance cooperation between regulators and TSOs

The dialogue and *technical coordination between regulators and TSOs*, both at national and regional level, is becoming pivotal to build an effective and efficient regional energy market. It contributes to the transparency and stability of the regulatory and economic frameworks, which is essential for attracting investments in the Mediterranean basin. MEDREG recognizes the central role of TSOs in identifying investment needs and assessing infrastructure projects. *It is advisable that TSOs regularly provide data to regulators and are responsible for drafting investment plans, which are then subject to regulatory scrutiny.* MEDREG believes that the regular and transparent exchange of information and know-how among regulators and TSOs could synergize the efforts for cooperation in the Mediterranean. The 2013 cooperation agreement between MEDREG and Med-TSO and the 2014 Memorandum of Understanding signed with Med-TSO and the EC to implement the Euro-Mediterranean Platform on Electricity are positive steps already taken in this direction.

6. Design a Ten-Year Network Development Plan for the Mediterranean region

The assessment of overall costs and benefits deriving from infrastructure investments (in particular new ones) is a complex task and needs very careful consideration. In the medium term the improvement of the use of existing infrastructures and the definition of common rules regarding new ones. In the medium to long term, it could be beneficial for the region to develop a *Mediterranean TYNDP based on a sound methodology developed by TSOs and assessed by regulators.*

7. Identify projects of Mediterranean common interest

Considering the European experience regarding the PCIs and following the example of the Energy Community, MEDREG could also consider a list of infrastructure projects that are of interest for the whole region. The selection process should be transparent and non-discriminatory.

According to the data on electricity and gas flow analyzed in the report and the responses to the MEDREG's public consultation, under the current forecasts for demand and given their known technical specifications, some projects seem particularly relevant for the energy development of the MENA region.

For electricity, there are three main electricity corridors of strategic benefit to the Mediterranean region. These three corridors are the west corridor (Morocco - Spain), the central corridor (Maghreb - Italy, most notably the submarine cable between Tunisia and Italy) and the east corridor (Middle East - Turkey). They have the potential to contribute in enhancing the region's electricity security and environmental goals by diversifying its

energy supply and increasing trade of RES-generated electricity. However, in order to successfully carry the significant flow of energy forecasted for these interconnections, the corridors require significant reinforcement of the corresponding South-South interconnections, in particular the underexploited cross-border interconnection between Algeria and Morocco.

For gas, the capacity developments of Spanish interconnections with Portugal and France will be of critical importance in terms of introducing further amount of gas to the region from North-Western Africa and North-Western Europe. The North-South interconnection will be further enhanced by the introduction on the market of newly explored Eastern Mediterranean gas resources. TANAP, together with simultaneously built new pipelines through Adriatic will serve to the goal of diversifying resources for south-Eastern European countries.

8. Support technology innovation to improve the condition of vulnerable consumers

The great and growing level of investment involving renewable energy sources is dramatically changing electricity markets. During the last twenty years, Southern Mediterranean countries have elaborated different institutional schemes with the aim to promote the usage of renewable energy sources (RES). While every country has developed its own approach, most of them have raised the bar of their objectives concerning generation and development of RES. Almost all the countries have passed or are discussing legislation regulating the sector. However, incentive measures tend to be limited and only a few of these regulations foresee the use of feed-in tariffs as a means of support. In most cases, the use of authorization procedures or tax exemptions is preferred. Countries currently allowing third party access are Algeria, Israel, Morocco, and Tunisia. New regulatory regimes (e.g. balancing) are necessary to integrate RES in the electricity grids. *Power systems will be deeply impacted by technology innovation, which is subject to a complex interplay between the public sector, private market actors and the surrounding institutional environment. Regulators should put in place a solid knowledge in order to transfer this value to final customers* (e.g., smart grids). In particular, distributed generation could represent an important chapter that links greater investment in RES to the reduction of fuel poverty and the creation of better conditions for vulnerable consumers. Technology innovation is also key to improve specific national aspects of Mediterranean energy markets concerning consumers, such as technical safety, quality of service and provision of transparent and complete information to the benefit of household consumers.

This report was prepared by the MEDREG Electricity and Gas Working Groups (ELE and GAS WGs) under the supervision of the MEDREG Secretariat in the period June 2013 -February 2015.

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Data and comments were provided by the members of the ELE and GAS WGs.

List of acronyms

Term	Definition
AC	Alternate current
AfDB	African Development Bank
bcm	Billion cubic meters
CBA	Cost-benefit analysis
CBCA	Cross-border cost allocation
CEF	Connecting Europe Facility
CNMC	Spanish National Commission for Markets and Competition
DC	Direct current
EBRD	European Bank for Reconstruction and Development
EIB	European Investment Bank
EIJLLPST	Egypt, Iraq, Jordan, Lebanon, Libya, Palestine, Syria and Turkey
ENTSO-G	European Network of Transmission System Operators for Gas
EU	European Union
FDI	Foreign Direct Investment
HVDC	High-voltage, direct current
kV	Kilowatt
MEDREG	Mediterranean Energy Regulators
Med-TSO	Mediterranean Transmission System Operators
MENA	Middle East and North Africa
MW	Megawatt
MWh	Megawatt hour
NTC	Net transfer capacity
OHL	Overhead line
OME	Observatoire Méditerranéen de l'Energie
RAB	Regulatory Asset Base
RAE	Greek regulator for electricity and gas
RET	Renewable Energy Targets
TEN-E	Trans-European energy infrastructure
TSO	Transmission System Operators
TWh	Terawatt hour
TYNDP	Ten-year Network Development Plan
UfM	Union for the Mediterranean
VSC	Voltage source converters
WACC	Weighted average cost of capital
WB	World Bank