How to stimulate infrastructure investments from a regulator’s perspective
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Fact finding and review of challenges
This booklet is based on a report elaborated and published by MEDREG in January 2019 which assesses the level of development of power systems and identifies certain challenges and priorities for the stimulation of pertinent infrastructure investments. This publication highlights the report’s main findings and recommendations in an accessible and reader-friendly manner.
Investment decisions in electricity systems are of crucial importance as they have to ensure that the supply capacity of the generation of electricity and the infrastructure match the consumers’ needs in the long run.

In the Mediterranean region, there is a huge contrast between the Northern and the Southern shore of the basin.

In the North, supply development was achieved some decades ago and the financing of investment is relatively easy, resulting from a secure investment environment.

In Southern and Eastern Mediterranean Countries (SEMCs), investment relates to managing scarce financial resources and limited industrial and human capacities. On top of this, the rapid increase of populations’ needs make system planning even more challenging.

What is MEDREG doing to stimulate investments in the South?

MEDREG assesses the level of development of power systems and identifies priorities and challenges for the stimulation of relevant investments.

An efficient approach to system development calls for the following:

- A clear national strategy,
- A coherent description of the system and its compatibility with the energy mix and
- A careful reflection on the level of vertical coordination along the electricity chain.

In Europe, regulators mostly focus on the proper development of transmission and distribution networks and on ensuring the security of supply, through an adequate generation capacity. Although the regulators’ scope of competence in terms of investment is often limited to network infrastructures, when important generation developments are also required, network and generation planning have to be jointly addressed.

In the wider Mediterranean region, this means that either regulators have to cooperate with other institutions (mainly the Ministries) or their competencies are upgraded accordingly, and may differ from the European situation.

**RECOMMENDATION:**

The intervention of regulators must be linked to national energy policy objectives, for example in the context of a dialogue with public authorities and electricity companies. The regulator’s independence should guarantee objectivity and a high level of expertise when assessing investment plans.
The demand for electricity continues to grow rapidly in the Southern shore of the Mediterranean, where consumption has increased ten-fold since 1980 and most countries are still struggling to meet basic electricity demands.

The existing growth trend will demand investments of over €715 billion by 2030 to ensure the additional generation required in the Mediterranean basin, while a further 3,000 MW of the North-South interconnections will be necessary, counting for an investment in the order of €20 billion by 2020.

Looking forward, governments are expected to meet this challenge by expediting new projects and upgrading their infrastructure, investing heavily while trying to increase the role of the private sector in power generation as partners and financiers.

Among the different predictions that are made on the energy development of the region, OME, MEDREG and ADEME jointly worked on the development of an "Energy transition scenario", which assumes that all Mediterranean countries will deploy existing Renewable Energy Sources (RES) technologies and sound energy efficiency policies. Should this be the case, power generation in Mediterranean countries would increase in 2040 only by 22% (or 240 GW), against the 77% foreseen under the "Business as Usual" scenario.

Even though the transition scenario maximizes energy efficiencies and renewables, it is still characterised by a huge need of investments in generation, transmission and distribution assets.

Such a context calls for an efficient and coordinated development at a regional level.
In principle, electricity trading should improve the region’s energy security, especially in countries that suffer recurring power outages. The integration of the Mediterranean electricity systems with the sharing of resources, such as power generation, technical requirements and know-how, could promote the reduction of costs and risks of investment in infrastructure with subsequent benefits for the final consumer.

The sharing of ancillary services is essential to facilitate RES development, while cross-border interconnections are necessary for allowing it. Sharing services can be enhanced by market mechanisms and through specific Transmission System Operators (TSOs)’ agreements.

Flexibility, which is also strongly shaped by the regulatory context, is key in power systems with significant RES.

The Northern and Southern shores of the Mediterranean basin present different characteristics that offer varied potentials and complementarities.

The integration of the two shores of the Mediterranean is a key issue for the stability and sustainable development of the region and implies the following:

• Grid integration in the Mediterranean countries limiting the impact on climate change;
• Continuation of the extension and integration of Mediterranean electricity systems;
• Promotion of the progressive integration of Power Systems; and
• Enhancement of cross-border electricity exchanges as well as RES integration in the Mediterranean region through the coordination of both national development plans and rules to access the grids.
3.1 Systems’ maturity

When considering investments, the concept of maturity of electrical systems is a significant point.

How can the maturity of an electrical system be measured?

The maturity of an electrical system can be measured by several parameters such as the number of connections related to the total population, the degree of development of the various uses of electricity, the reliability of the production and, more generally, the reserve margins and level of security of the supply.

Networks can be seen as the cornerstone of electricity systems, allowing the integration of new generation assets or new consumers.

Networks, generation and demand have to be jointly addressed to help developing systems in a coherent manner;

Long-term projections are therefore crucial, including a vision of the steps to follow when designing the process towards a “mature” system.

In terms of the security and reliability of supply, the standards adopted vary greatly from one country to another. The expected levels of security change with the degree of development of the systems, in a logic that prioritises access first and, then, promotes the strengthening of reliability. Competition is possible on systems with a very high level of maturity.

Efficient investment coordination requires integrated and centralised planning to ensure consistency of choices in the development of generation and networks.
The development of a project takes several years and begins with the identification of a need. Investment plans must gather all the relevant information required to identify the additional needs for infrastructures, select projects and determine their value, and must take into account the likely evolution of market trends. Cross-border investments are particularly challenging.

In the European Union, infrastructure development mainly consists in reducing congestion and developing cross-border transmission capacity, with the objective of achieving a single electricity market and allowing the large-scale integration of renewable energy sources.

In SEMCs, the context is different: infrastructure development must address the strongly increasing demand and the interconnections’ role remains very limited.

In the EU, countries have developed network development plans at national, regional and community levels. In a competitive market context, where networks and supply are unbundled, investment plans are based on detailed information, an analysis of the energy systems and how their insufficiencies are translated into infrastructure needs. The European Network of Transmission System Operators for Electricity and Gas must publish every two years a Ten-Year Network Development Plan (TYNDP) with a particular focus on interconnections. The TYNDP analyses long-term scenarios, investigating possible developments regarding the energy mix, demand, location of new needs and testing the robustness of systems in terms of the security of the supply.

In terms of regulation, the costs of transmission and distribution grids have to be covered through tariffs on the use of the infrastructures, the role of the regulators being to control that costs are transparent and efficient. Additionally, regulators also have to ensure that these new assets are actually needed and serve the general interest.

It is crucial to understand the principles that must be used for assessing the value of the projects and how to quantify the various benefits provided by new interconnectors.

Assessing investment needs in cross-border interconnections is more challenging than at a national level because it requires a higher level of coordination between the interested countries.

In Europe, countries share a common view in terms of regulatory orientation and market design, and wholesale prices can be assumed to reflect the marginal generation cost.

Outside the EU, however, there is no clear picture of a shared vision about the role of interconnections and of a market design, and the security of the supply is generally a prominent objective of new interconnectors.

In the Mediterranean, Med-TSO developed certain methodologies for building a Mediterranean Network Development Plan which resulted in the description of actual interconnections and the status of the networks in the Mediterranean area, as well as long-term scenarios including a reference to possible new corridors and the related capacity and concepts of economic evaluation of projects.

RECOMMENDATION: In non-EU Mediterranean countries, it is crucial to elaborate a coherent analysis of expected energy developments to assess the priority investments.
Electricity systems in the Mediterranean region are quite different.

On the European side, systems are robust, presenting high levels of consumption and generation as well as properly developed international trade.

In the South, the consumption per capita is low when compared to the EU, albeit progressing rapidly. These countries have comparable issues regarding access to financing, insufficient development of infrastructures and geographical characteristics that hinder high levels of interconnections. This situation makes the security of the supply a dominant concern and calls for regular upgrades of the electricity system, with regard to both generation and networks, thereby making investment a key issue in most of the countries. However, investments in new lines are strongly impacted by economic and financial difficulties, especially including national currency devaluation issues.

Main data on electricity systems in the Mediterranean region (2016).

<table>
<thead>
<tr>
<th>Countries</th>
<th>Total generation (TWh)</th>
<th>Load (TWh)</th>
<th>Pump storage consumption (TWh)</th>
<th>Exchange balance (Export - Import) (TWh)</th>
<th>Exchange VS Load [%]</th>
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Integration of the national electricity market

In the EU, national electricity markets are well integrated, with interconnections allowing complementarity between countries. For example, France, Portugal and Slovenia are big exporters while Greece, Italy and Spain import large amounts of power.

Even if there has been the development of certain regional initiatives in the Maghreb and the Mashreq regions, international electricity trade is very limited in most cases in SEMCs, except for those connected with Europe, such as Morocco, which imports about 15% of its load from Spain.

Energy mix

When considering the challenges faced by Southern countries when planning investments, it is important to differentiate situations according to the energy mix and, in particular, the access to domestic primary energy sources:

- Thermal plants powered by fossil energy sources (gas and coal mainly) represent the bulk of the generation.
- RES plays a significant role only in a few non-EU countries (Egypt, Morocco and Turkey).

- Gas is an important driver for power generation development, leading countries to often address electricity and gas systems development in a joint manner.

In the EU, cross-border solidarity and complementarity have become a central driver. Reflections are developed with regard to the co-optimisation of electricity and gas systems. This ambition could be spread over the Mediterranean region.

4.2 Focus on Southern and Eastern Mediterranean Countries (SEMCs)

Comparable trends in energy developments in the SEMCs

- Large increase in electricity demand due to rapid population and economy growth;
- Traditional fossil fuels remain the main source of supply of electricity for domestic consumption;
- Additional generating capacity is needed to meet the increasing demand;
- The utilisation of electricity interconnections remains low despite their potential to substitute power generation and provide stability to the system.

Assessing the social value of interconnection projects: An arduous task in the Mediterranean region

While in the EU the market design and the level of development of electricity markets make it possible to run market simulation models to evaluate projects according to wholesale prices, such an approach is much more difficult to implement in the wider Mediterranean region.

Assessing the social value of interconnection projects is hindered by the lack of harmony within the system operation and the conditions are less favourable than in Europe for efficient cross-border integration. The topology of existing systems in SEMC countries is very different and the networks are less meshed because they follow the seashore where the population is concentrated. In addition, the lack of reserve margins on the generation side and the sustained increase of consumption in a context of non-competitive organisation of markets make even harder the development of a harmonised approach to network development.
Zooming on MEDREG’s members’ national situation

**ALGERIA**

**FACTS**
- An average of 8% annual growth of the electricity demand from 2011 to 2016, which translates into sustained investment needs.
- Demand concentrated in the Northern part of the country with 28 isolated networks accounting for about 1 TWh of consumption.

**CHALLENGES**
- Developing an efficient electricity system within a context of strong increase of demand peaks.
- The use of existing interconnections is very low: interconnections are mainly used for the purpose of security of the supply, but not for commercial transactions or the integration of renewable energy sources.
- The problem of technical and non-technical losses is also crucial and should be addressed by a specific framework.

**RECOMMENDATION**
- Algeria should be getting more benefits from the existing infrastructure.

**EGYPT**

**FACTS**
- Confronted with several power shortages in the past years, the government made massive investments in generation.
- These investments will lead to an increase in installed capacity of 107 GW by 2035 but have also led to the issue of overcapacity and increased debt within the public sector.

**CHALLENGES**
- On the distribution level, fraud and power losses are major concerns; they represent about 20% of the energy distributed.

**ONGOING MEASURES**
- Roll out of pre-paid meters to ensure that generators are paid for the electricity produced;
- Roll out of 250,000 smart meters in Cairo by 2035 to reduce fraud and non-technical losses.
Zooming on MEDREG’s members’ national situation

**JORDAN**

**FACTS**
- In 2016, 95% of the consumed energy was imported; demand increased by 6.4%.
- The rate of electrification is 99%.
- The electricity mix has evolved towards a decrease of fuel oil, which is replaced by gas.
- The electricity system organisation articulates a single buyer and independent producers.
- Every process in the value chain is regulated.

**CHALLENGES**
- Dealing with reduced energy imports (gas and electricity) in a context of sustained increase of needs, as well as developing RES which are expected to represent 20% of power generation by 2020.
- Losses at the distribution level.

**ONGOING MEASURES**
- Jordan adopted a National Energy Strategy for 2007–2020 to increase the share of local energy resources, reduce dependency on imported oil, diversify energy resources and enhance environmental protection.
- Jordan issued a Renewable Energy and Energy Efficiency Law in 2012 which resulted in 14 PPP projects developed between 2012 and 2015, amounting to an investment commitment of $2.4 billion.
- Decentralised energy projects are also promoted.

**LEBANON**

**FACTS**
- Lack of installed generation capacity, high subsidies, and high losses.

**CHALLENGES**
- Installed capacity is 2.3 GW compared to a peak demand of 3 GW (June 2017).
- Offshore generators are connected to the grid, but their contracts are ending in 2021.
- Previous interconnection agreement with Syria, Jordan and Egypt. However, political problems led to a reduction in these electricity imports, specifically from Syria.

**ONGOING MEASURES**
Zooming on MEDREG’s members’ national situation

MOROCCO

FACTS

• Liberalisation of the energy sector began in 1995 and was followed by a more far-reaching energy strategy to deal with renewables promotion.
• The existence of this institutional environment resulted in the development of 6 PPP projects between 2012 and 2015, attracting nearly $7.7 billion in investments.

CHALLENGES

• The stabilisation of the remuneration, in particular a RES quota and targets, is essential to provide the necessary guarantees and represents a positive step toward attracting PPI investments in the renewable sector. However, such measures alone will not suffice. Those instruments need to be accompanied by long-term strategies that are capable of generating an environment conducive to investment.

ONGOING MEASURES

• Promotion of a centralised investment strategy, to attract a few flagship projects, in combination with a policy to develop green growth and an industrial sector specialised in components related to RES generation.

TURKEY

FACTS

• The Turkish power network was synchronised with the European grid in 2015, thereby favouring the potential energy exchange of the Eastern Mediterranean electricity network with the European grid. However, the exchange of power in this project is still low. Nearly all the initiatives of cross-border energy interconnections are limited to emergency operations instead of economic energy exchange.
• Turkey has interconnections with most of its neighbouring countries.
• Turkey did not complete the synchronous connection with neighbouring systems; however, it is actively pursuing the synchronisation of its network with the European Network of Transmission System Operators for Electricity (ENTSO-E).
• The total installed generation capacity of Turkey has reached 85.1 GW and the total generating capacity has been 295.5 TWh by the end of year 2017. It is expected to reach 99.9 GW and 331.8 TWh at the end of 2018.
IN SUMMARY

- SEMCs – except Turkey – experience problems related to the following:
  - demand increase;
  - quality of power supply;
  - non-technical losses;
  - revenue collection for operators; and
  - finances.

The main reason for Turkey’s exception is that the country has a fairly advanced regulatory system.

- Regarding interconnections, the use of existing capacity is low for almost all cross-border interconnections between Southern countries.

- The fact that intra-regional interconnections are not properly exploited shows that the interconnection investment in the Southern shore is mainly driven by considerations related to the security of supply rather than to the development of a regional market.

- This situation also testifies of the persistence of regulatory gaps among Southern Mediterranean countries.
In the Mediterranean, the development of interconnections is an important objective. However, we must go further in order to reach a sufficient level of operational reliability. For that, a regional approach is appropriate to link together countries with strong synergies at the geographical and energy levels.

Focusing on regional integration, MEDREG analysed existing and future electricity interconnection projects that could be important for MEDREG countries on a national basis, simultaneously taking into account the different infrastructure developments between sub-regional initiatives. The geography of the Southern shore of the Mediterranean is characterised by a high concentration of cities along the coast, with areas of low population density. Such configuration resulted from two main sub-regional initiatives that historically tried to develop electricity interconnection in the SEMCs, one in the Maghreb sub-region and one in the Mashreq sub-region.
Currently, the regional energy interconnections of the Maghreb block (Algeria, Morocco and Tunisia) are well developed. However, currently, the electricity exchanges are limited to mutual aid and annual trade contracts with the European Union.

Looking at the existing and future cross-border electricity interconnections in the Maghreb countries

5.1 The Maghreb sub-region

Electricity cross-border interconnections in Algeria are already developed in a south-south route, connecting Algeria with Morocco on its west border and with Tunisia on its northern and eastern border.

A FEW FACTS
- Algerian interconnections with the other Maghreb countries are well developed.
- However, their use of the cross-border electricity trade is mainly for the purpose of security of supply, and not for commercial transactions or for the integration of renewable energy sources.
- There are no existing infrastructures between Algeria and Libya.
- The Algerian grid is already synchronised with the European high-voltage transmission network, making it possible to directly interconnect its network with the European grid, thereby facilitating electricity exchanges on a north-south route. Two new potential interconnectors, connecting Algeria to Spain and Italy, explore such a possibility.
MOROCCO

Morocco is interconnected at cross-border level with Spain and Algeria, and its grid is now synchronised with the European high-voltage transmission network.

A FEW FACTS

- On its eastern side, Morocco is connected to Algeria with three lines. The level of energy they exchanged is very low with a load factor of energy trade at 17%.
- On its northern side, the Moroccan-Spanish interconnection is the only cross-border line that connects North Africa with the EU and is widely used with energy imports representing 15% of total load demand in Morocco.
- The regional energy interconnections are well developed but the electricity exchanges are limited by the mutual aid and annual trade contracts with the EU.
- International financing of these projects is accessible.
- However, better utilisation of the present interconnection will still require some hardware investments, mainly on new lines with the related reinforcements within the connecting countries.

TUNISIA

The Tunisian network is synchronised with the European high-voltage transmission network, thereby facilitating potential cross-border lines on the north-south route. However, the electricity network of Tunisia is currently connected only with its North African neighbours, Algeria and Libya.

A FEW FACTS

- Five transmission lines connect Tunisia to Algeria; however, the rate of electricity exchanged on the Tunisian-Algerian interconnectors is low with 9%.
- Only one line connects Tunisia to Libya.
- Even if transmission lines are not exploited, further electricity interconnections are under evaluation in the south-south direction as well as Europe, such as with Italy (ELMED) and Libya.
In the Mashreq, eight countries (Egypt, Iraq, Jordan, Lebanon, Libya, Palestine, Syria, and Turkey) are part of an interconnection project to upgrade their electricity systems to a regional standard.

Egypt, Iraq, Jordan, Syria and Turkey are also linked with a trading agreement for mutual assistance through the exchange of surplus power.

The program would yield great economical and technical benefits for interconnected countries by reducing investments in constructing new power stations and exchanging energy among the networks, thereby improving their economics and exchanging knowledge and experience in power system planning and operation.

Looking at the existing and future cross-border electricity interconnections in the eight Mashreq countries

**EGYPT**

Existing electricity cross-border infrastructures connect Egypt with Libya on its western border and with Jordan and Palestine on its eastern border.

**A FEW FACTS**

- Interconnectors from Egypt to Libya and Jordan are not fully exploited, with load factors equal to 4% and 9% respectively.
- Electricity trade is relevant only in the interconnection with Palestine where the load factor reached 90%.
- Considering the continuous increase in the demand for electricity in Egypt, several infrastructure projects are under study for the future, two of which are particularly relevant in the Mediterranean region:
  - One is the upgrade of the Egypt-Jordan interconnection aiming at doubling the current capacity to 1100 MW.
  - The second is the construction of an HVDC submarine cable between Turkey and Egypt. The objective is to develop a new corridor in the Eastern Mediterranean region with an estimated capacity of about 3,000 MW.
- Despite the enlargement of its cross-border network, the exploitation of existing infrastructures remains a challenge considering the current low rate of power exchange between Egypt and its neighbouring countries.
ISRAEL

The electric system of Israel works autonomously as an island that must be self-sufficient and capable of fully meeting its own demands. The Israel electrical grid is only connected with Palestine and it supplies the electricity demand in the West Bank and Gaza.

A FEW FACTS

• Israel has always been dependent on imports to meet its energy needs.
• However, the recent, significant natural gas discoveries exceed the projected Israeli demand and, as such, Israel could become a net exporter of electricity generated from gas.
• As a consequence, different projects are under study to develop cross-border interconnections:
  ▪ The main ongoing project is the so-called Eurasia Interconnector that should link the electricity networks of Israel, Cyprus and Greece, being the first electricity bridge between Europe and Asia. The construction of the new link could represent a new important route for Israel gas exploitation. The project will end the energy isolation of Cyprus and will create the electricity highway from Israel–Cyprus–Greece, through which the European Union can securely be supplied with electricity produced by the gas reserves in Cyprus and Israel.
  ▪ The second ongoing project consists of a submarine cable between Israel and Turkey.

JORDAN

The Jordanian electricity cross-border infrastructures connect the country with Egypt, Palestine and Syria and are part of the “Eight Country Interconnection Project”.

A FEW FACTS

• None or nearly no energy is exported from Jordan to Egypt (load factor equivalent to 1% in 2015 and 0% in 2016). However positive developments can be expected according to the higher generation capacity in Egypt. On the contrary, the interconnection that links Jordan to Palestine usually provides a satisfactory level of electricity trade since the load factor reaches 90%.
• Even if the rate of energy exchanged is significantly low, other cross-border electricity infrastructures are planned for the future to enhance the cross-border cooperation between Jordan and its neighbouring countries:
  ▪ Upgrade of the Egypt–Jordan interconnection which aims at doubling the current capacity to 1,100 MW.
  ▪ New interconnection with the West Bank which is currently under development and involves an increase of the voltage level with Palestine to 400 kV.
  ▪ Jordanian–Saudi electric connection.
LEBANON

The Lebanese electrical grid is only connected with Syria at a cross-border level.

A FEW FACTS

• Since the start of the war in Syria in 2011, Lebanon’s electrical grid resembles an energy island: Electricity imports were disrupted and a substantial new demand for electricity estimated at 500 MW arose from the influx of more than 1.5 million Syrian refugees to Lebanon.
• This led to a wider gap between the demand and supply of electricity.

LIBYA

The Libyan electricity grid is connected with Egypt and Tunisia. Such interconnections are part of the “Eight Country Interconnection Project” joined by Libya in 1992.

A FEW FACTS

• The Libyan–Egyptian interconnector used to provide an exchange of energy equal to a load factor of 10% before 2016 and the beginning of the unstable Libyan political situation.
• Further improvements of the cross-border interconnections on both eastern and western borders of Libya are projected:
  • The new line with a capacity of 1,000 MW should enhance the network connections of Tunisia, Libya and Egypt.

PALESTINE

The Palestinian electricity grid is closely linked with the Israeli electricity sector. The Palestinian Territories depended on Israel for 90% of its electricity supply in 2015, ranging from 64% in Gaza to 99% in the West Bank, with the exception of the transmission lines from Jordan and Egypt to the West Bank and Gaza respectively.

A FEW FACTS

• In 2008, the West Bank started importing 20 MW of power from the Jordanian grid.
• Gaza also started to import 20–30 MW of power from Egypt.
• Further projects to strengthen the electricity trade between Palestine, Egypt and Jordan are planned:
  • Construction of a 220kV transmission line from Egypt into Gaza
  • Construction of a new 400kV line from Jordan to the West Bank.
DETERMINING APPROPRIATE REGULATORY TOOLS TO ENCOURAGE INVESTMENTS

6.1 How MEDREG helps regulators evaluate investments carried out by transmission operators

Based on the assessments of the situations, MEDREG identifies infrastructure gaps that may justify new investments, assesses the added value of new projects proposed by TSOs and checks the relevance of costs and project management.

6.2 A set of regulatory tools adapted to different countries

The objective of MEDREG is to help members share their experience and see what tools might be of use in the region, keeping in mind that there is no “one-size fits all” approach. EU regulators have a “savoir-faire” to share, in particular in the relationship with TSOs and decision-makers, and should give suggestions to Southern Mediterranean countries. The approach to address the development of electricity infrastructure in the Southern countries should be based on a step-by-step sharing of knowledge, co-learning and benchmarking.

When choosing the regulatory tools and measures, several parameters relating to the characteristics of countries must be considered:

- Investment types: A distinction has to be made between national and international projects (interconnections, for instance) as well as infrastructures and projects that have a potential market value (power generation).
- Level of development of national systems and regulatory gaps: Interconnections have to be addressed in the light of the systems they link together. Obstacles to using interconnections often come from internal constraints at a national level.
- Reliability of the system: At all times, power systems hold reserves to maintain reliability in the event of a plant failure or other unpredicted changes in supply and demand. Sharing reserves between balancing areas means that each balancing area can maintain less reserve capacity.
6.3 Factors driving investment needs and policies

- Southern and Eastern Mediterranean countries are expected to grow at twice the rate of the Northern ones till 2030.
- 60% of the population will be based in the countries belonging to the Southern shore of the basin by 2030.

This situation will generate a huge need in infrastructural projects and investments along the Southern shore of the Mediterranean.

6.4 Parameters considered by investors

- Affordability of new investments: National and international investors want to minimise risks and optimise investments; they demand a corresponding risk-related return. When evaluating the risks, the factors considered are institutional stability, transparent rules, trust in court decisions and guarantees provided by the investors’ counterparts.
- Level of development of the power sector: It informs about the capacity of the systems to accommodate an increase in demand or the connection of new generation facilities.
- Government policies: The policies on energy-related issues are critical, in particular regarding renewable energy development. Economic incentives as well as the acceptance of NRAs and TSOs play a central role in driving RES development.
- Interconnections: They allow to share reserves between facing grids and may decrease the need for conventional generation reserves. Achieving such sharing will, however, require appropriate technical and regulatory developments and convergence.
- System’s stability: Innovative technologies can contribute to address this factor.
- Level of maturity of the energy system.

6.5 Investment perspectives

- Increase in the generation capacity in the Mediterranean of about 150 GW, of which 15% is from the RES.
- Increase in electricity demand of about 90 GW.
- Related investments amount to €220–250 billion.
- The TSOs estimate the construction of about 33,000 km of HV lines with around €20 billion of investments.

This requires the strengthening of the High Voltage network and the integration of the two shores of the Mediterranean.

Different kinds of investments can be envisaged in national and regional perspectives:

- Changes and improvements in network and generating stations.
- New power stations including new RES generating stations.
- Strengthening of domestic grids.
- Fostering of the electricity exchanges between bordering countries.
6.6 The need for TSO coordination

WHAT FOR?

- For better utilisation of existing and planned interconnections capacity.
- For coordination of balancing areas between neighbouring TSOs, encompassing a larger geographical scope.

In the Mediterranean, 14 clusters of cross-border interconnections should be developed by 2030

Med-TSO identified and suggested a list of 14 cross-border interconnections for 2030 in order to develop an integrated, reliable and efficient network in the region.

To cover these important investments, the countries in the Southern shore will have to attract the private sector to complement the public financing. Alternative business models need to be developed including private-sector participation, under the form of Public and Private Partnership (PPP) for instance.

In this respect, an adequate regulatory framework and proper enforcement of laws contribute to building confidence. Investors look at the independence of regulatory institutions and processes, access to credit, government effectiveness and responsiveness, political stability and public opinion on private provision of infrastructure services. The greater the political and financial stability, the lower is the perceived country risk and, hence, the lower the return required on the investment.

The success of this coordination demands an effective cooperation between TSOs and regulators in a step-by-step process, which includes technical, legislative, regulatory aspects. Med-TSO and MEDREG could advise on the agreements and rules governing the sharing of the responsibilities on the “coordinated” balancing area between the involved TSOs.
PRIORITY RECOMMENDATIONS

IN SUMMARY

STIMULATE INVESTMENT BY
- Assessing the priorities at national and regional levels;
- Approaching the energy systems as a whole to ensure the coherence of choices: elaborate long-term planning that includes the assessment of needs and possible options to fulfil them, articulating the development of energy supplies, power generation, transmission and distribution networks, interconnections;
- Promoting stability and transparency in terms of institutional organisation and regulation for national and foreign investors; and
- Elaborating correct, appropriate and long-term planning to meet the forecasted demand.

DEVELOP ELECTRICITY INFRASTRUCTURES THROUGH
- Investments from the government and the private sector; and
- Stable regulatory environment to mitigate risks for foreign investors.

FOSTER INTERCONNECTIONS IN THE SOUTHERN AND EASTERN SHORES THROUGH
- Guidance from the regulators to the TSOs;
- Shared responsibilities between the national TSOs to coordinate the balancing area across the border; and
- Balanced responsibility between NRAs and TSOs that would guarantee a joint approach in each country.

INCREASE CROSS-BORDER TRADE BY
- Establishing constant technical and political cooperation.

Institutions such as MEDREG and Med-TSO are increasingly involved in supporting concrete technical and institutional collaborations at regional and international levels, promoting lasting exchange and leading to further compatibility of the region’s countries.
IN DETAIL

CLARIFY THE INSTITUTIONAL ARCHITECTURE AT THE NATIONAL LEVEL:

- Establish independent power generators and envisage the possible cohabitation between a regulated and a competitive sector in Southern countries;
- National objectives should be clarified in order to properly design the rules and set up incentives to each category of actors; and
- International public financial institutions should also be involved to ensure that these objectives are sustainable in the medium and long term.

IMPROVE INVESTMENT PLANNING CAPACITY:

- Plan a long-term vision that articulates all the relevant dimensions of power systems;
- Assess the possible tools to be mobilised, including energy efficiency on the consumers' side; and
- Estimate carefully the financial charge of investments to avoid risk of consumers exiting the grid; and
- Consider scrupulously the outcome of price evolution when planning future capacity.

ENSURE A PROPER LEVEL OF TRANSPARENCY AND KNOW-HOW:

- Set institutional stability and transparency of the rules;
- Improve governance to allow effective pricing of energy and clarity of duties for the stakeholders; and
- Participate in capacity-building activities for key energy decision-makers within the SEMC countries in order to share knowledge and information between EU states and the region, specifically on investment planning, technical standards and renewable energy project financing.

LET REGULATORS PLAY THEIR ROLE:

- Regulatory authorities participate to creating a sound investment climate. They ensure that investment processes are managed efficiently while working closely with operators;
- They contribute to determining long-term objectives for energy systems development and the organisation of the power system;
- They adapt rules to foster the development of more interconnections and fill the regulatory gaps hindering energy flows across borders; and
- They facilitate arrangements of mutual benefits when regulators are present in interconnected countries.
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