Towards an Integrated Mediterranean Electricity Market

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Electricity Ad hoc Group (ELEC AG)
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Contents

- An Overview on the Electricity Status at the Mediterranean
- Regulatory and Internal Market Status at the MED. Countries.
- National systems priorities and Prospective of Transmission Rights
- Legal framework for the management of electricity interconnections in the Mediterranean Region.
- Recommendations for future developments

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Contrasts and differences among Mediterranean Countries

南方国家
- 持续增长的人口 (+2.3% 年均增长 1971-2005)
- 发展中国家 (GDP 在 €1,186 和 €9,600 之间)
- 城市化并集中在地中海海岸
- 增加能源需求
- 既是出口又是进口能源的国家

北方国家
- 工业化国家
- 能源进口国
- 高能量消耗
- 经济和社会需求总体上得到满足 (平均 GDP 超过 €20,000 人均)

本项目由欧洲联盟共同资助

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Socio-economic trends in the Med region

**Population growth**
- **North**: Blue line
- **South**: Red line

**Economic growth**
- **GDP - USD billion**
- **Average annual growth rate 1970-2005**: North: 2.6%, South: 4.0%
- **Average annual growth rate 2005-2030**: North: 2.1%, South: 4.1%

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Current and Future Energy Demand of Med. Countries

Total energy demand:

2005: 989 Mtoe
2030: 1,428 Mtoe

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Installed Capacities and Electrical Energy Production in the Mediterranean Countries in 2005

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Evolution of Electric Power Generation

Same path will be followed in the South-East by electricity consumption: growth rate of 4.6% per year until 2030: total estimated generation of 1385 TWh by 2030 a need for 255 GW new capacity and relevant investments: overall 450 b $ by 2030

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Current and Future Electrical Supply Mix in MED Region

424 GW in 2005

796 GW in 2030

Source: OME - MEP 2008

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CO₂ emissions are expected to grow at 1.5% per year between 2010-2030, reaching 3,000 Mt in 2030. South Mediterranean countries should account for over 50% of total emissions in the region.

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Benchmarking For The Regulatory and Internal Markets Status/Development in MED. Countries
Indicators Considered in Benchmarking Regulatory Status and Internal Market

- Legislative and regulatory framework
- Financial viability of the industry
- Unbundling of the industries
- Removing obstacles to competition
- Market access
- Market arrangements
- Implementation of national market
- Regulation
- Technical and commercial rules and agreements
- Infrastructure requirements for market operation
- Imports and exports

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## Benchmarking Criteria

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<th>Number of questions used in Evaluation</th>
<th>Benchmarking Category based on number of yes</th>
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## Benchmarking of the Legislative and Regulatory Framework

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<th>Legislative basis for market mechanisms</th>
<th>Legislative basis for industrial restructuring</th>
<th>Provision for private participation</th>
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*This project is co-financed by the European Union*
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Status of Internal Electricity Markets in MED. Countries

- **Fully vertically integrated**
  - Egypt
  - Algeria
  - Bosnia
  - Jordan

- **Single Buyer Model**
  - Malta

- **Wholesale**
  - Greece

- **Full Competitive Market**
  - France
  - Italy
  - Portugal
  - Spain
  - Turkey
### Projected Market Developments

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National systems priorities and Prospective of Transmission Rights
These have been evaluated on two time horizons; 2015 and beyond (e.g. 2020)

- Priority regarding the Regional Electricity Trade
- Transmission Rights
Priority Purposes of International Trade

- Efficient long term investment planning
- Access to cheap electricity
- Reduced redundancy requirements within the total system
- Improved quality of supply
- Improved security of supply

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Interconnection TLs owned by an independent regional TSO, jointly owned by participants.
National links in network owned and operated by National TSO, bound by an open access agreement.
Central dispatch of an interconnection network, with national dispatchers taking dispatch instructions as a priority.
National dispatch with advice from a coordination center relating to the Regional Power Pool entry and exit points.
Centrally managed short term market power exchange.
Centrally managed Balancing Market.
Regional Regulator coordinating the enabling of national regulation and then enforcing it.
Regional Regulator providing arbitration services for international trades.
Regulation managed by national regulators with an association to debate the Regional Power Pool issues.
Transmission wheeling tariff unrelated to internal Transmission Use of System (TOUS) tariff set by regional regulator.
Priorities for Cross Border Trade

- **Security of Supply**" has the first priority among all countries.
- Among all transmission rights, countries experience cross border trade through bilateral contracts prefer: **central dispatch of an interconnection network, with national dispatchers taking the regional dispatcher instructions as a priority**
- Countries which experience cross border trade through market implementation have preferences regarding more powerful regulatory involvement.
Legal Framework for the Management of Electricity Interconnections in the Mediterranean Region

This project is co-financed by the European Union
This Study has been organised in 6 thematic chapters:

1. Legal and institutional framework
2. Capacity Calculation and Allocation
3. Transit Tariff
4. Balancing System
5. Cross Border Power Exchange through Bilateral Contracts
6. Other relevant measures or comments
Mediterranean Markets

1. Spain
2. France
3. Italy
4. Turkey
5. Morocco
6. Egypt
7. Albania
## Status Electricity Markets

<table>
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<tr>
<th>MedReg members</th>
<th>STARTUP DATE</th>
<th>COMPANY</th>
<th>SPOT MARKET</th>
<th>FORWARD MARKET</th>
<th>ADJUSTMENT MARKET</th>
<th>MARKET MODEL</th>
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<td>National Single Buyers</td>
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Figure 22  Inter-Mediterranean power exchanges in 2007 (in GWh)

Source: Plan Bleu (données UCTE; Eurelectric; UAPTDE; Comelec; Compagnies & OME)
Similarities have been identified

- **NRAs powers**
  - set or approve rules regarding the management and allocation of interconnection capacity,
  - fix or approve methodologies used to assess balancing services,
  - require to the TSOs to modify their congestion and balancing

- **Regarding the capacity calculation and allocation capacities**
  - mechanism of auction for the allocation capacities,
  - Assessment of the available capacities realized by the TSOs
  - Submission of the capacities rights to the principle of use it or loose it or sell it
Differences

- Often between North shore and South shore
- Capacity calculation and allocation:
  - implicit or explicit auction
  - yearly, monthly, daily
- Transit tariff / Balancing
- Bilateral Contracts
Recommendations

- Greater convergence should be encouraged in the Mediterranean region
- Energy regulators should promote a transparent framework
- The EU experience (The Northern Shore of the Mediterranean) represents an example to follow
- Disseminate knowledge regarding operation of cross border exchanges in a Market Environment
- Organize capacity building programme on cross border exchange operation.
  - e.g.: workshops addressing interconnection capacity calculation, allocation, Transit fees, etc.
Recommendations For Future Developments
To avoid too low power transfer capacity some measures have to be adopted. These can be classified as ‘soft’ measures and ‘structural’ measures.

- Soft’ measures are essentially based on the adoption of special control schemes or defense plans aimed at preserving the system integrity and avoiding the spread of disturbances from the affected areas to the neighboring ones.
- ‘Structural’ measures to enhance dynamic security based on the installation of devices having the capability to control specific electrical quantities, such as SVCs and back-to-back or HVDC links.

Examples of possible profitable structural measures to the Med ring system include: installation of SVC (or similar devices) at the Egyptian-Libyan border to enhance voltage stability and the installation of a DC link between Egypt and Jordan to increase the power transfer capability and fully exploit the capacity of the submarine cables between the two countries.
Super Grid Across The Mediterranean

- The networks in southern Mediterranean countries were linked as a chain, not as a “spider-net” like the UCTE ones. This increases losses and reduces potential power exchange between south and north Mediterranean.

- Full synchronous solution suffers problems when the closure of the MedRing took place. For example REE proposals, for L/T interconnection, where inter-area oscillations exists, are:
  - Reduction of the power flow deviations.
  - New defence plans / network developments.

- Regional initiatives (i.e. MSP and Desertec) regarding the establishment of RE plants in the south Mediterranean and export its energy to the north Mediterranean countries request substantial power exchange between south and north Mediterranean.

- A proposal to overcome these constraints is to have a hybrid grid (i.e. AC/DC) as well as to have HVDC power corridors across the Mediterranean.

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Projects for Cross Mediterranean Interconnections
Super Mediterranean Grid
Develop Corridors for Interconnections with other Power Pools

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Experts’ Group Meeting On Electricity Interconnections With the Caspian Region
Recommendations

➢ It is recommended to agree on an action plan which includes the following activities

• Master plan for energy and interconnection expansion within the region,
• An appropriate set of tools such as demand/supply forecasts, least cost supply plans, performance indicators;
• Plans and schedules to remove barriers to access to an open, transparent and competitive electricity markets;
• A plan to enhance Euro-Mediterranean cooperation for the harmonisation of common rules for the electricity markets, reflecting the principles of competition and reciprocity, safety and security;
• Harmonised information systems and statistics for the use in the electricity sector of the Euro-Mediterranean countries.
• A plan to harmonise technical and legal rules of electricity interconnection management.
• Monitoring system to evaluated the progress in each aspect of the action plan
• Establishment of necessary regional institutions to take this responsibilities forward.
Thank You for Your Attention!!

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