Association of Mediterranean Regulators for Electricity and Natural Gas

Adhoc Group on Electricity

Heading to an Integrated Mediterranean Electricity Market

Report

FINAL REPORT

July 2010

This project is co-financed by the European Union

Introduction

FOREGROUND

Based upon the MEDREG Action plan 2010-2011-2012, the "Ad hoc group on Electricity (ELE AG)" has been assigned to examine and, in case, will propose common positions on the following subjects:

- present and future interconnections infrastructure needs (for the establishment of an integrated electricity market) from the technical, economic, and financial perspectives;
- future of Smart Grids in MEDREG countries;
- unbundling of sector activities;
- operational issues concerning cross border exchange and congestion management practices;
- market design;
- transparency of market information and services;
- non discriminatory TPA to infrastructure and services;
- tariff methodologies;
- price regulation.

The aim of the ELE AG is to establish an investor friendly environment in MEDREG countries in the field of electricity generation, transmission, distribution and trade as well as to harmonize the legal and technical framework. Moreover, it will:

- monitor electricity exchange activities among member countries;
- propose unified/general rules/guidelines for electricity exchanges among member countries;
- investigate the possibility of establishing a reliability council;
- carry out work needed towards the eventual development of an electricity master plan within MEDREG member countries; this should be connected with work performed by other projects and entities, institutional or otherwise, in relation to the Mediterranean Electricity Ring (MEDRING) and other interconnections projects;
- establish a recommended implementation plan to implement the recommended cross border trade guidelines;
- establish a benchmarking process for both the internal market organization and cross border practices (including MEDRING implementation status);
- initiate a training program for MEDREG members.

The Electricity Ad hoc group has issued a report entitled “Regulatory Status and Market Implementation”, to capture the electricity market status in MedReg countries. The conclusion of this report is that all countries are working towards the establishment of free electricity markets at different paces determined by internal factors. However, the core question that is standing against that

transform is the financial viability of the industry. All respondent countries are still working towards that goal. Cross border trade still has the potential to grow in all MedReg regions.

Similar to the “Regulatory Status and Market Implementation” report, a report entitled "Interconnection Rules and practices for MedReg Countries", has also been developed to capture the present rules and practices governing exchanges among member countries. The conclusion of this report is that the first step towards the establishment of a regional electricity market is the harmonization of internal market rules. Still, reinforcements for the interconnections as the physical medium of the market are in progress in different parts. Closing the ring around the Mediterranean is waiting removing the hurdles faced between the SEM (South East Mediterranean) and SWM (South West Mediterranean) interconnection and the Turkish connections. Furthermore, a pan Mediterranean guidelines for cross border trade still need to be put in place.
In compliance with the aforementioned work plan, and also as a completion for the previous tasks covered in the other reports, the ELE Ad hoc group is focusing on the following blocks:

- Spain – Portugal (Iberian Market)
- France – Belgium – Netherlands
- Italy
- Turkey
- SWM (South West Mediterranean) countries
- SEM (South East Mediterranean) countries
- SEE (South Eastern European) countries

This draft report is studying the status of each of these blocks based on:

- Internal market of each of the relevant countries in each block
- Interconnection infrastructure between the countries in each block
- The regional market under which each of these blocks operates

In addition a follow up survey has been circulated among member countries, so as to update the data content of the previous reports, and to investigate new data as well.

The Survey structure is as follows:

Part A

- Legislative and regulatory framework
- Financial viability of the industries
- 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

Part B

Basic information on:

- Generators
- Transmission systems
- Distribution systems
- Interconnection projects
- Energy export and import

Part C:

- Internal Structure of the Electricity Sector Organization:
- Priority of purpose for international trade
- Volume of Actual, Imports, and Exports in Total:
- Base Load Imports and Capacity available for Potential Export:

The report contents are as follows:

Chapter 1 Infrastructure of Interconnections
Chapter 2 Financing Infrastructure Projects
Chapter 3 The MedReg Members Electricity Markets (Internal/Regional)
Chapter 4 Benchmarking for the regulatory, and markets status/development in member countries.
Chapter 5 Conclusions and recommendations
Appendix A: Action Plan
Appendix B: Survey Model

Chapter 1

Infrastructure Interconnection Projects

CHAPTER 1

INFRASTRUCTURE OF INTERCONNECTIONS

Having a strong interconnection infrastructure facilitates integration between neighboring markets, lowering operating costs by using most economic generation unit in the interconnected system, and provides opportunities to engage in regional and international Energy trading.

This chapter demonstrates the interconnection infrastructure of seven markets, as a start point that will lead to more emphasis for the internal and regional markets that comprise them. These markets are:

- Iberian Market(Spain – Portugal)
- France – Belgium – Netherlands
- Italy
- Turkey
- SWM (South West Mediterranean) countries
- SEM (South East Mediterranean) countries
- SEE (South Eastern European) countries

IBERIAN MARKET: SPAIN – PORTUGAL

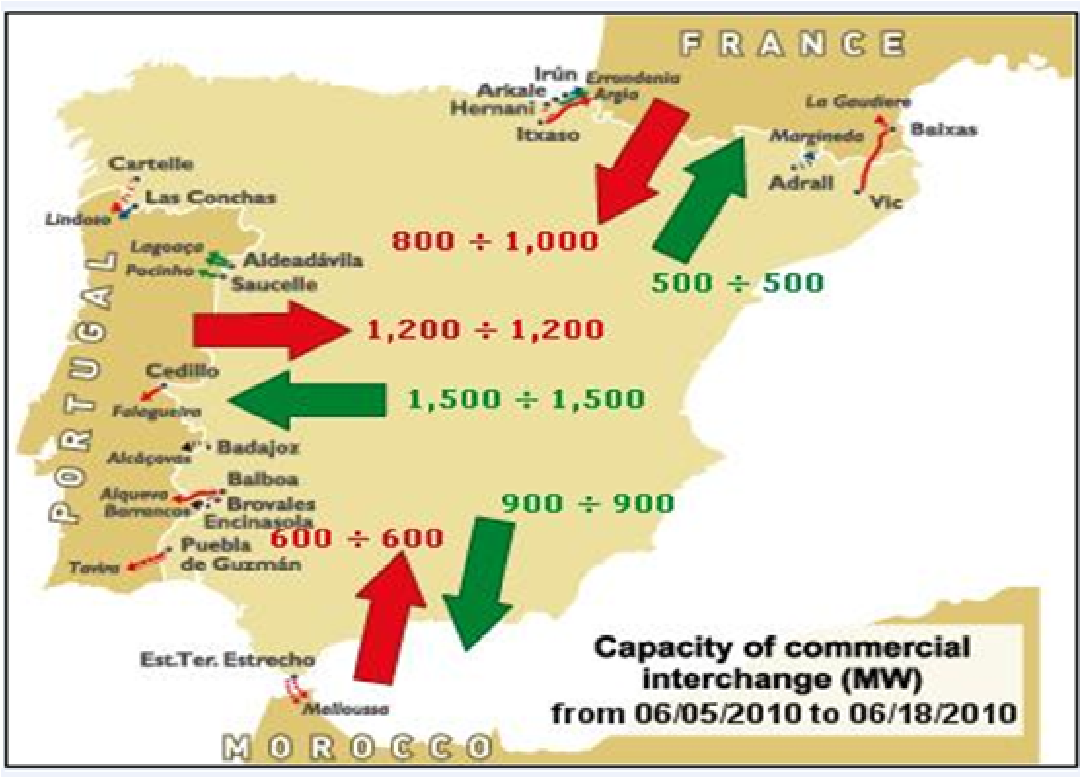


Fig. 1.1
Iberian Market

Existing Interconnections within the Iberian Market:

Cartelle – Lindoso 400 kV
Aldeadávila – Bemposta 220 kV
Aldeadávila – Pocinho 220 kV
Saucelle – Pocinho 220 kV
Cedillo – Falagueira 400 kV
2nd circuit Cartelle – Lindoso 400 kV 2004
Balboa – Alqueva 400 kV

Future Projects

Guillena (ES)-Sotavento (PT) 400 kV
Pazos (ES) –Vila do Conde (PT) 400 kV
Aldeadávila (ES) – Douro Internacional - Valdigem (PT) 400 kV
Santa Llogaia (ES) –Baixas (FR) 400 kV

ITALY

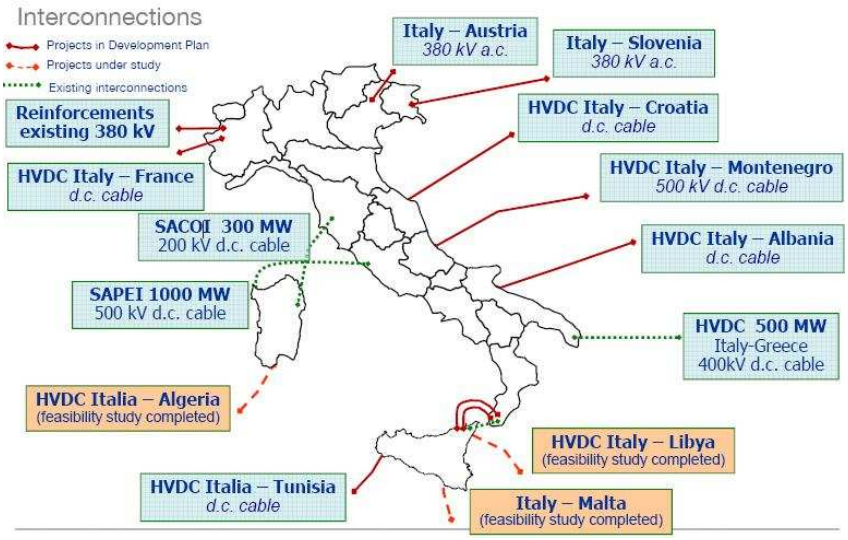


Fig. 1.2

Italy Interconnection Projects

TURKEY

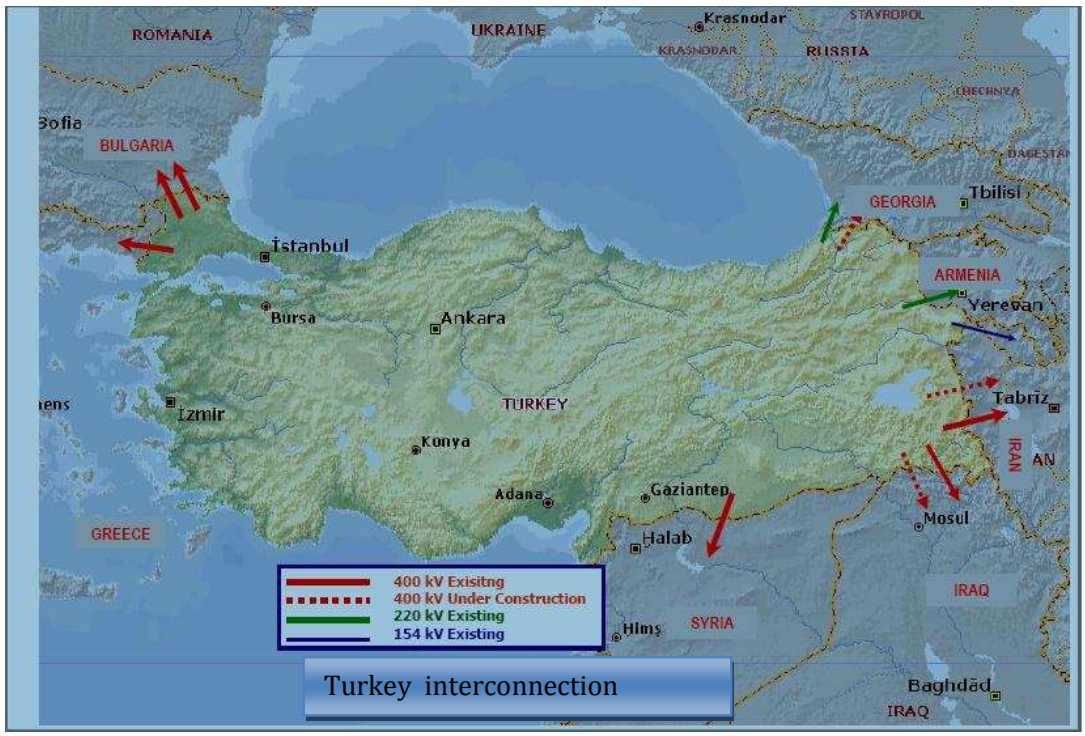


Fig. 1.3

Turkey Interconnection Projects

Existing Projects:

Hopa (Turkey) Batumi - (Georgia) 220 kV

Currently Operated for Import. (Isolated Region Mode)

Kars (Turkey) Gumri - (Armenia) 220 kV

Not operated.

Iğdır (Turkey) – Babek (Nahcievan Azerbaijan) 154 kV

Currently Operated for Import. (Isolated Region Mode)

Doğubeyazıt (Turkey) - Bazargan (Iran) 154 kV

Not operated.

T-Connection (Engil s/s –Bagisli s/s 154 kV line)(Turkey) - Khoy Iran) 400 kV

Currently Operated at 154 kV for Import. (Isolated Region Mode)

Karkey (Turkey) – Zakho (Iraq) 400 kV

Currently Operated at 154 kV for Export. (Isolated Region Mode)

Birecik HPP (Turkey) – Aleppo (Syria) 400 kV

Currently Operated for Export. (Isolated Region Mode)

Hamitabat (Turkey) – Maritsa (Bulgaria) 400 kV
Not Operated.
Babaeski (Turkey) – Maritsa (Bulgaria) 400 kV
Not Operated.
Babaeski (Turkey) – Phillippi (Greece) 400 kV

EXPANSION STUDIES OF THE INTERCONNECTIONS OF TURKEY With

Georgia:

- Construction of a new 400 kV transmission line (Akhaltsikhe (Georgia) – Borçka (Turkey)) together with a DC Back-to-back station at Georgian side are foreseen. Cross border point and route of this new 400 kV line are determined and the construction agreement to confirm the realization of these facilities is signed with Georgian TSO.
- In addition, construction of two new HVAC line together with DC Back-to- back stations, and
  - Construction of a DC Back-to-back station to be connected to existing 220 kV line are under consideration.

Georgia and Azerbaijan :

- A new Project named "AGT Power Bridge" envisaging to study and analyze the high voltage electricity networks of Azerbaijan, Georgia and Turkey from a sub-regional perspective to evaluate and increase the interconnection capacity and exchange of electricity with the financial support of USAID has been launched.

Romania:

- Construction of a 400 kV HVDC submarine cable under Black Sea and converter stations at the end points of the cable. A Feasibility Study is being performed by a consortium led by Vattenfall from Sweden

Iran:

- Providing the operation of the existing 400 kV line at its nominal voltage by constructing a 400 kV S/S at the connection point of the line in Turkey (ongoing).
- Construction of additional 400 kV line with a DC back-to-back station at Van (Turkey) S/S (under consideration).

Iraq:

- Construction of additional 400 kV line. Cross border points and the route of the line has already been determined. Preparation of bilateral Construction Agreement with Iraqi partner is underway.

SWM (SOUTH WEST MEDITERRANEAN)

(Morocco – Algeria –Tunisia)

Existing Interconnection

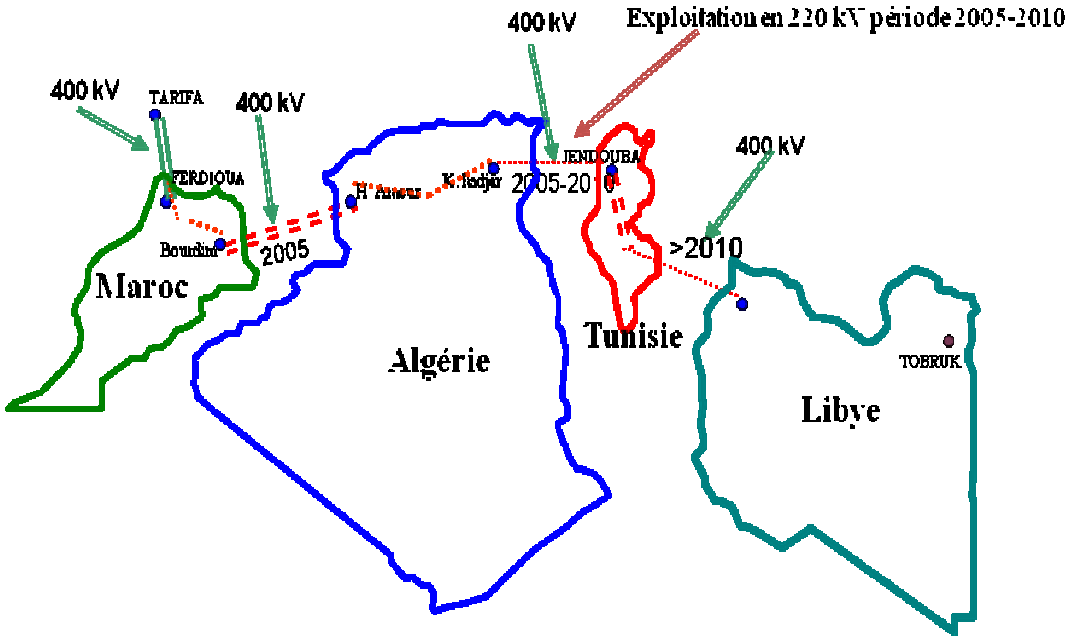


Fig. 1.4
SWM Existing Interconnection Projects

Ghazaouet (Algeria) - Oujda (Morocco) 220 kV
Tlemcen (Algeria) - Oujda (Morocco) 220 kV
El Aouinet (Algeria) - Tajerouine (Tunisia) 220 kV
Djebel Onk (Algeria) - Metaloui (Tunisia) 150 KV
El Aouinet (Algeria) - Tajerouine (Tunisia) 90kV
El Kala (Algeria) - Fernana (Tunisia) 90kV

Lately on 27th of April, the interconnection between Lybia and Tunisia which has been suffering from inter-area oscillation problem since 2003, has undergone a successful test of connection for full three hours.
An optimistic point of view, as the SWM and SEM countries have been interconnected altogether with Europe for these three hours.
This test will soon be scheduled for repetition upon revision of the defence instruments at Morocco.

Future Interconnection:

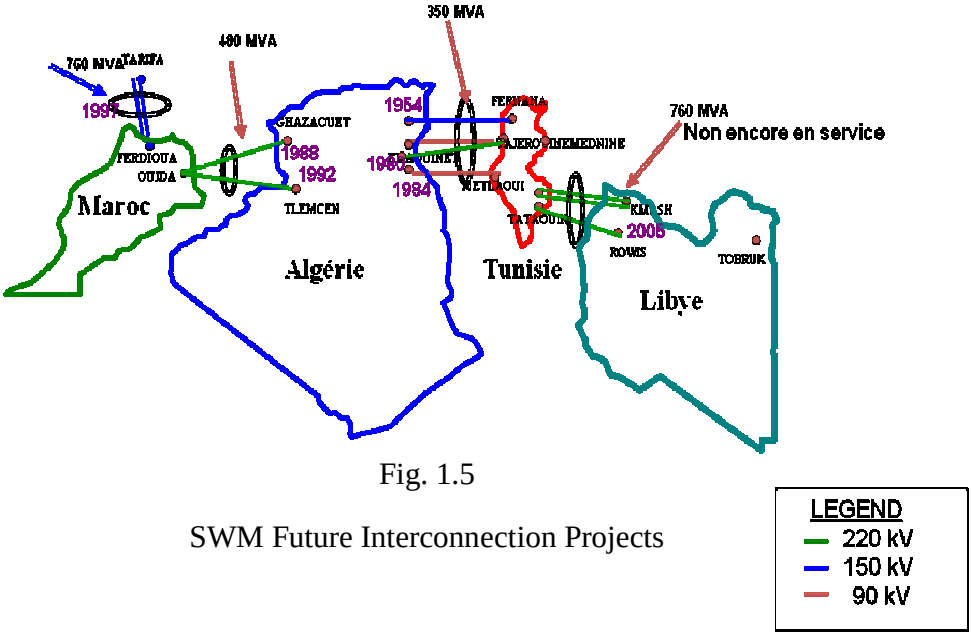


Fig. 1.5

SWM Future Interconnection Projects

Hassi Ameur (Algeria) - Bourdim (Morocc0) 400 kV
K.Hadjar (Algeria) – Jendouba (Tunisia) 400 kV

The SWM network is a control block synchronised to the European network (UCTE). by two connections in 400 KV aero-submarine between the substations:
Pinar Del Rey (Spain) and Meloussa (Morocco).

SEM (SOUTH EAST MEDITERRANEAN)

(Lybia – Egypt – Jordan – Lebnon – Syria)

Fig. 1.6
Turkey Interconnection Projects

Existing Interconnection
Sallom (Egypt)– Tobroq (Libya)220 kV
Taba (Egypt) – Aqaba (Jordan) 400 kV
Jordan-Syria 400 kV
Syria-Lebanon400 kV

Future Interconnection:
Syria-Turkey 400 kV
Iraq-Turkey

SEE (SOUTH EASTERN EUROPEAN COUNTRIES)

(Albania, Bosnia and Herzegovina, Bulgaria, Croatia, FYR Macedonia, Romania)

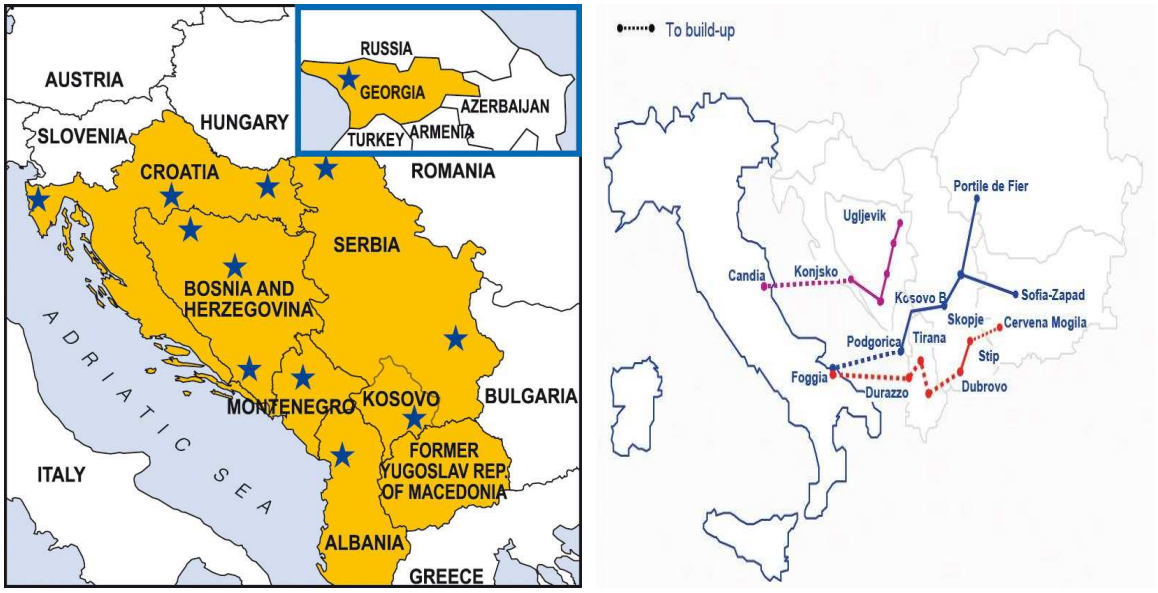


Fig. 1.7
SEE Transmission Corridor

SEE countries noted that strong investments are needed for reinforcing and developing transmission network in order to allow the creation of the regional electricity market to support the development of generation investments.
Besides under-sea interconnections Italy-SEE, the need exists to create new Transmission Corridors within SEE, to guarantee market participants effective trading opportunities. TERNA is interested to develop new projects of transmission developments, together with local TSOs and stakeholders. This will provide SEE region with new state-of-art transmission infrastructures, facilitate the creation of the regional electricity market in SEE , and also will support the development of generation investments in the region, giving a locational signal to producers.
The appropriate injection of private capitalwill guarantees development of SEE transmission grid with the lowest commitment of financial resources.

Chapter 2

Financing Interconnection Projects

CHAPTER 2

FINANCING INTERCONNECTION PROJECTS

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 a regulatory as well as investment challenge.

This challenge has resulted in developing different approaches for investing in this filed, each of which has different aspects and financing schemes that can meet different requirements.

There are several key aspects that affect interconnection of grids:

a. **Technical aspects**:

- Whether interconnected systems operate synchronously or asynchronously
- What the magnitudes and directions of the anticipated power flows are to be?
- What physical distance will be spanned by the interconnection?
- Technical and operating differences among the interconnected systems?

b. Economical and financial aspects:

- "Avoided Costs" such as costs for purchase and/or production of fuels used in electricity generation, as well as capital costs of generation facilities
- The income from power sales, with payments for power made in hard currencies

c. Externalities

- These include indirect financial, social and environmental benefits:
- Employment of labor needed for facilities construction and to operate the interconnection (and associated power plants)
- The impacts of improved power supplies in fostering development of local industry
- Improvements in education & health care due to the "re-spending" effect where electricity price reductions leave households with more disposable income available for other consumption or for investment in productive activities
- Better power quality and more reliable power
- Income from power exports if spent toward social development goals
- The experience and incentive due to additional cooperative activities between countries
- Locally, regionally or globally less air pollutant emissions due to the potential optimization of resources

d. Necessary Agreements:

Pricing agreement

- Specify what the buyers and sellers will pay and receive for electricity and electric system services

- Prices can be specified based on production costs, avoided costs or through negotiations

Legal Agreement

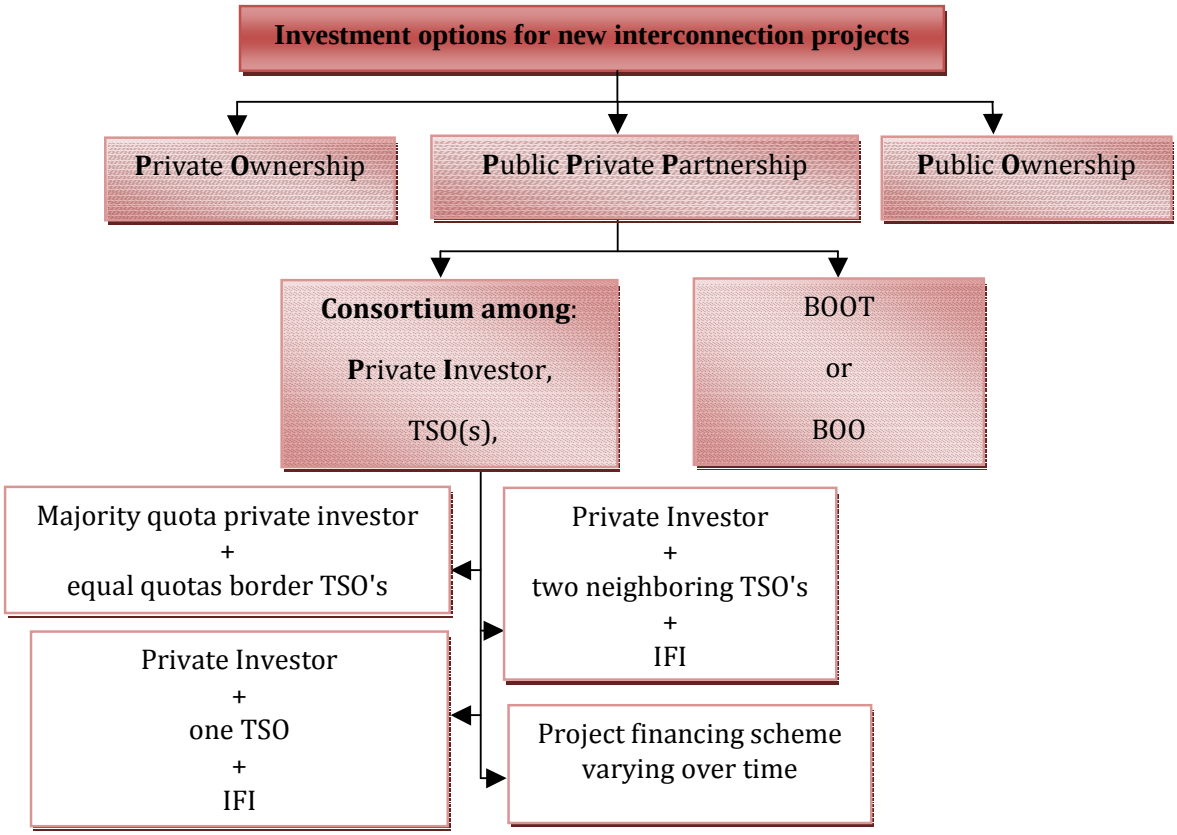
- Legal agreements can be very complex involving a variety of national, sub-national and even international parties to the agreements required for planning, building and operating interconnections
- The agreements should provide frameworks for power purchase and pricing agreements, agreements on siting of power lines and related infrastructure, agreements on power line operation, agreements on power line security, agreements on environmental performance of the interconnection and agreements on liability for power line failure

e. Other Key Issues for Investments in Transmission and Interconnections Infrastructure

- Transmission investment decisions cannot rely exclusively on market mechanism
- They involve externalities and characterized by economies of scale
- There is no evidence that market forces will draw significant investment into transmission capacity
- Transmission expansion requires centralized planning

Investment options for new interconnection projects

The following are different ways of investing in interconnection projects:



Public Ownership

This type of investment is based on joint agreement between the two TSOs, which may be represented in a joint venture company. Equity is provided through TSOs and Financial Institution (s) acts as a lender. This type of investment has the advantage of lower financing costs than private entities, because of being publicly owned or regulated utilities.

This model necessitates solid financial status as well as accepted credit worthiness of the TSOs.

Public Private Partnership (PPP)

PPP models are configured as a mechanism of development of transmission networks, leveraging on private capital availability. It could be is a consortium or Special Purpose Vehicle (SPV), composed of one Private Investor (PI) one or two national TSOs and, if needed an International Financial Institution (IFI), with mission to build and manage the new interconnection line for a set period of time. It will also manage temporary ownership of the new interconnection line, quota of the interconnection capacity, and O&M activities over the new transmission line for the exemption period.

An alternative Approach is BOO or BOOT regulated regime.

PPP Consortium Financing

The financing of Consortium's investment might be performed by taking loans from IFIs or local Banks, as it is likely to benefit from private investor's better rating versus national TSOs one.

Equity Composition Schemes Options - Pros and Cons:

PPP Consortium Model (%)				**Pros**	**Cons**	**Reworth**
PI	TSO1	TSO2	IFI			
50	25	25	-	Better investment incentive for private investor. TSOs can manage the hedging investment risk through the consortium.	The PI decide alone on minor issues. PI+ TSOs may out play third on any play.	High- risk projects , where PI needs solid guarantees
40	20	20	20	The PI is the driving force, but needs at least two of the other players to reach a qualified majority. TSOs can manage the hedging investments risks through the consortium & further guarantees through IFI	The decisions making process may face issues	Financially sound TSOs
70		-	30	TSOs can manage the hedging investments risks through the consortium & further guarantees through IFI Safe investment climate for PI	Need of strong TSO-PI's alignment to carry on projects.	One of the TSO has scarce funds for new infrastructure PPP

BOO or BOOT Regulated Scheme

In this scheme**,** the two TSO's (or one of them) make a competitive tender for a certain transmission interconnection project, and the winning investor signs a contract specifying the characteristics of the transmission service to be provided and an annual payment for the provision. The private investor plans, finances, constructs, maintains and potentially operates the power line, and receives contracted payments for a defined period (BOOT) or without time limits (BOO).

Private Ownership

Private infrastructure investment is popular these days, but Grid expansion and pricing would continue to present a need for regulatory oversight. The injection of private capital in transmission systems may guarantee a faster development of transmission interconnections, with the lowest commitment of public financial resources.

Projects of private investment exist between many countries such as the USA and Canada and between Ukraine and Hungary, where most of these projects are not to interconnect the electricity systems but only to connect an individual power plant, i.e. a new power plant in one country to another country grid.

Chapter 3
Electricity Markets (Internal/Regional)

CHAPTER 3

MEDREG MEMBERS ELECTRICITY MARKETS (INTERNAL/REGIONAL)

In this chapter, a brief introduction to the electricity market is presented. The available internal electricity market structures are introduced with an example of its application in Italy. Furthermore, as a result of installing interconnection lines between Mediterranean countries, the available cross-border-trade methods are illustrated on an example such as Spain-Portugal (Iberian Electricity Market). Finally, some Mediterranean regional electricity market structures are discussed such as Iberian and SEE countries regional electricity market.

The aim of this chapter is to develop a summary of the existing internal and regional electricity market structure and the available cross-border-trade methods used in the Mediterranean countries.

2-1 Introduction to electricity market:

In order to liberalize energy markets, the integrated companies of production, transmission and trading of electricity need to be separated, Fig. 2.1. However, the only monopoly that remains is in the electric power transmission and distribution grid.

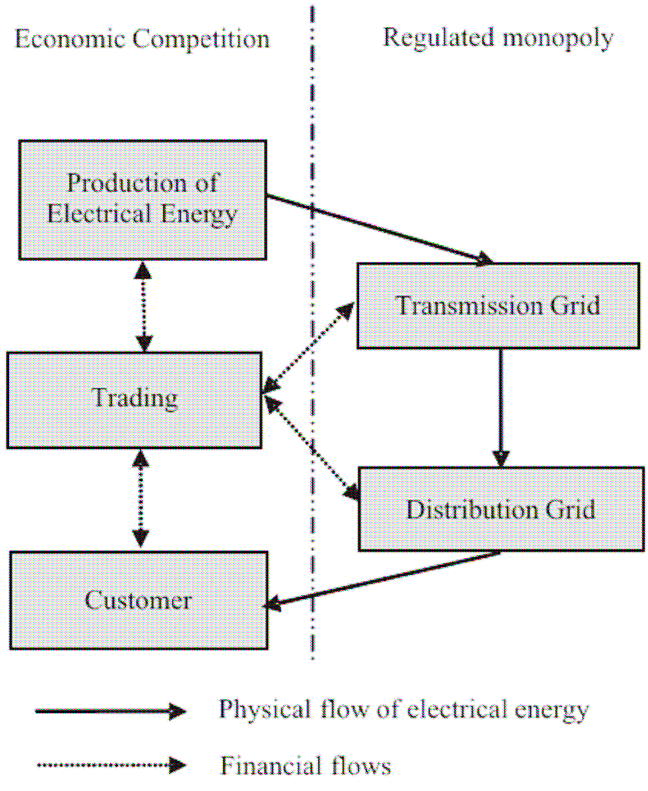


Fig. 3.1 Regulated vs unbundled electricity system

2-2 Internal electricity market structure:

In general, the Mediterranean region is characterized by a number of electricity markets in various stages of early development. The market pricing mechanisms adopted in these countries have a mixed record in encouraging long-term investment in new electricity generation capacity. At the same time, the retail market is facing a number of reform challenges, particularly the need to raise prices to match costs, and to provide the conditions for consumers to choose their suppliers.

Many electricity markets have already been restructured, but are still struggling to find a method to ensure supply adequacy and protection against undue price volatility. The sources of this concern vary throughout the world, and include retail prices set by governments far below the cost of new entry, and the need to compensate for politically imposed price caps in energy markets. Electricity imported penetration and therefore interconnection is relatively high in some countries but relatively low in others.

Types of electricity market bases:

There are some standards for electricity trading:

1) **SB** (**Single Buyer**): The single buyer is the only subject that can buy the electric energy. SB buys the electricity at the lowest cost from the producers and then sells it to customers.
2) **TPA** (**Third Party Access**): Access of third parties to the transmission network. This means the right for every customer or producer to free energy transportation via the transmission system.
   _ **rTPA** (**Regulated Third Party Access**):
   This assumes bilateral contracts between market identities (producers, traders, and customers) for energy retail on condition of regulated prices. The existence of a regulatory authority is assumed at the same time, which designates prices in non-liberalized segments of the power industry. rTPA exists in most European countries.
   _ **nTPA** (**Negotiated Third Party Access**):
   It provides an access to the networks on condition of negotiated prices.

Based on the discussed bases, individual electricity markets can be classified as one of the following four models, Fig. 3.2[1]:

[1] Source: Prof Anton Eberhard, Graduate School of Business University of Cape Town, "Independent Power Producers and Power Purchase Agreements: Frontiers of International Experience," May 2004. Online: http://www.globalregulatorynetwork.org/Resources/IPPmaterials/Presentations/Eberhard.pdf

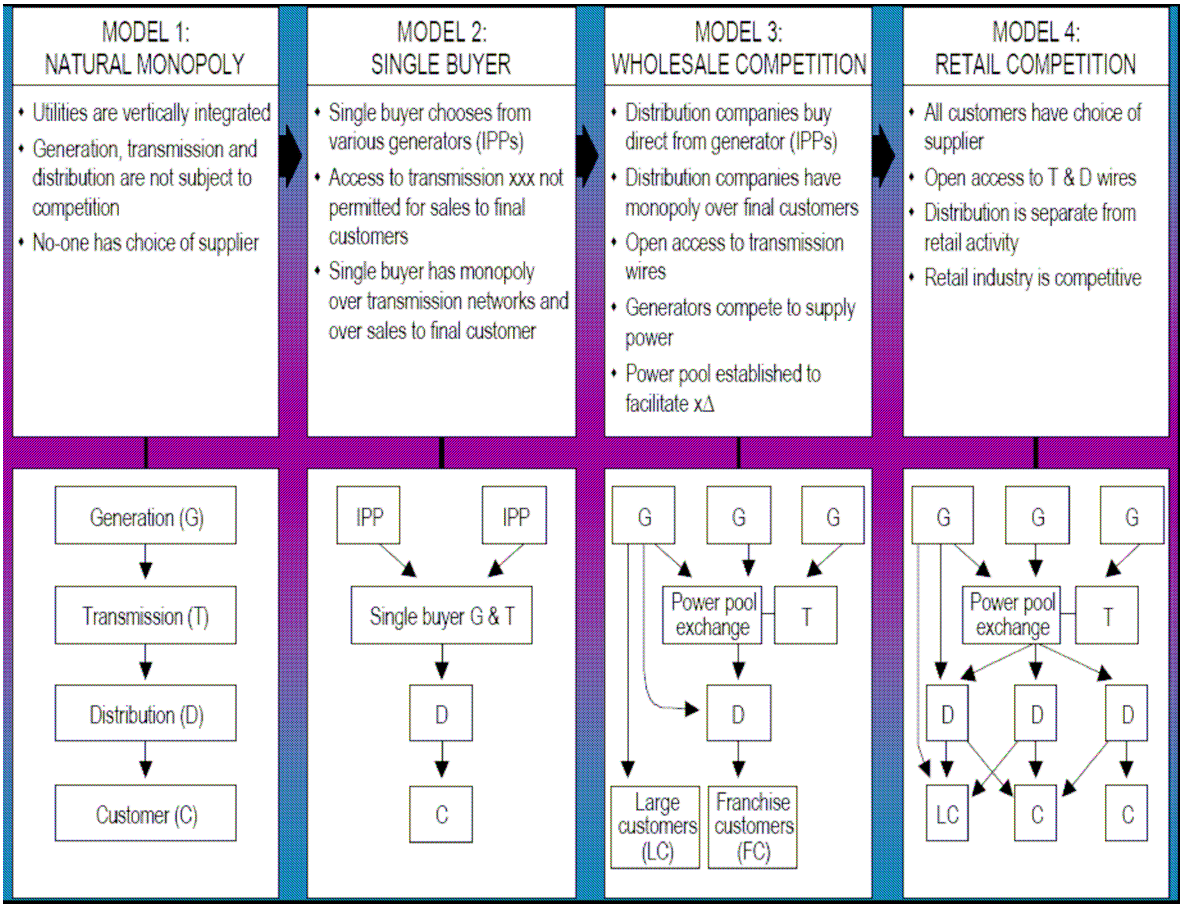


Fig. 3.2 Internal electricity market structure

Power pools:

Power pools can take different forms; the shown table summarizes the four main types, each characterizing a given level of integration.

- **Interconnection:**

  At the low-end of integration are interconnected power systems that are simply synchronized with each other, without any particular coordination or joint optimization of their respective system. Trade is made under long-term power exchange agreements, and additional energy sales only happen in emergency cases. Cost savings are mostly the result of economies of scale in power generation: large projects can sell their output to more consumers, and therefore be more easily viable. Prices are set through negotiations between regulatory authorities.

- **Loose pools:**

  They are more integrated because they coordinate dispatch between power systems and allow more short-term exchange to take place. Reserve (capacity margins) can be shared, resulting in additional savings.

- **Tight pools:**
  In them, all power plants are dispatched from a centralized location, according to least production cost principles, under transmission capacity constraints. This dispatching approach can minimize short-run generation costs and therefore can be the source of additional cost savings.
- **New pools:**
  In these competitive pool arrangements, a spot market replaces all formal and explicit optimization techniques. Competitive markets are responsible for the dispatch, which should be optimal in the absence of market failures.

	Interconnection	***Loose Pool***	***Tight Pool***	***"New" Pool***
Operational System	Synchronized neighboring utilities	Coordinated dispatch	Centralized dispatch	Independent system operators
Capacity Trades	Bulk power contracts between neighboring utilities	Power purchase agreements & wheeling agreements	Power purchase agreements & wheeling agreements	Forward contracts
Energy Sales	Emergency support	Split savings	Split savings	Spot market
Cost Savings	Economies of scale	Reserve Sharing	Least-Cost Planning & Merit order dispatch	Competition
Price Setting Mechanism	Tariffs Set by Regulators	Price Caps Set by Regulators	Price Caps Set by Regulators	Market

In the following subsection, the internal electricity market of Italy is discussed as an example of an existing electricity market structure in one of the Mediterranean countries, as follow[2]:
In 2003, the electricity sector made several advancements in the transition from a vertically integrated system to a liberalized market (the Italian transmission system operator (GRTN) and the Market Operator (Gestore del Mercato Elettrico Spa, or GME)). The main legislative changes that have permitted the start-up of the organized electricity market are as follows:

[2] The Italian Regulatory Authority for Electricity and Gas, Annual report 2004. Online: *www.autorita.energia.it/inglese/annual_report/04_1.pdf*

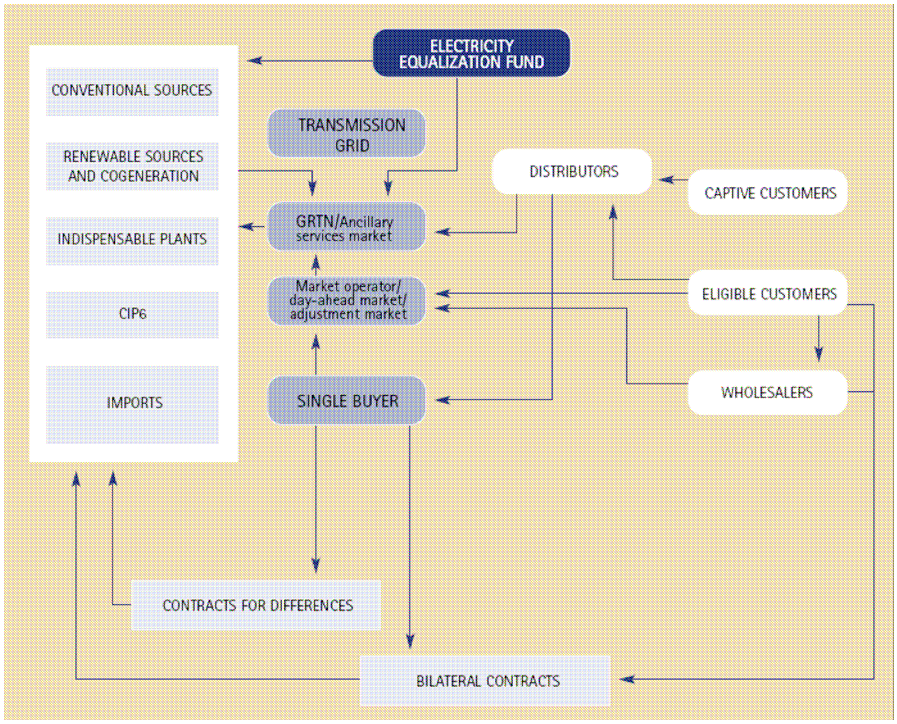


Fig. 3.3 Economic flows in the electricity sector (2003)

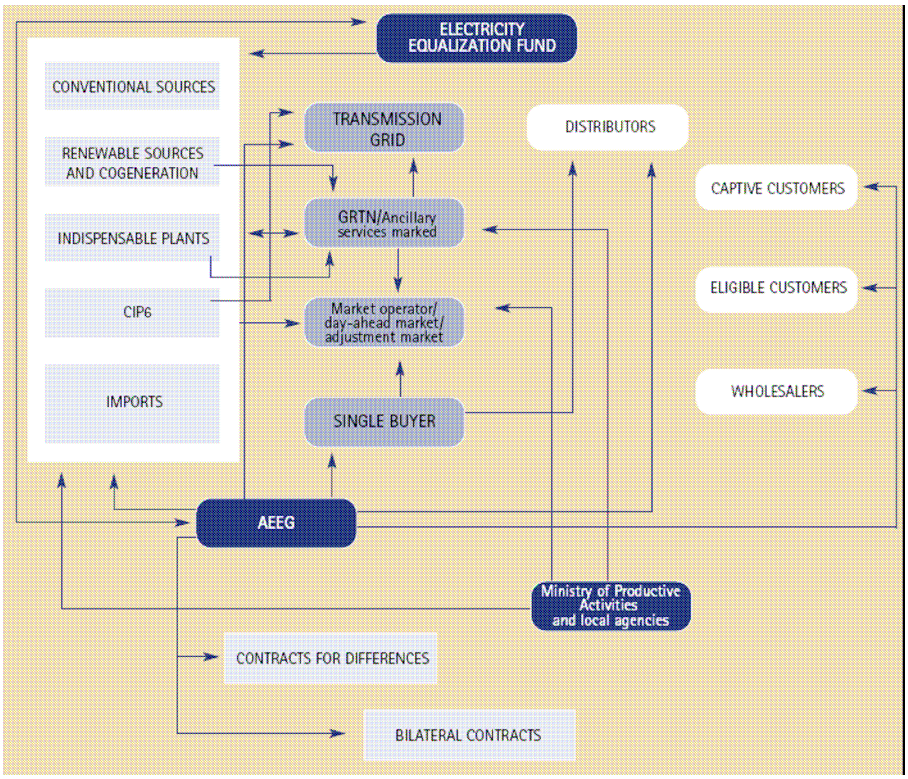


Fig. 3.4 Functional flows in the electricity sector (2003)

- In 2003, a Single Buyer (Acquirente Unico Spa) as guarantor of the supply of electricity to captive market customers, is charged mainly with estimating these customers' demand (bilateral contracts on the free market for quantities not exceeding 25% of estimated demand, participation in transport capacity allocation procedures for imports, as well as in CIP6 auctions and the bidding system according to standards set by the Authority).
- the Trade Ministry approved the market regulations and the means by which GME would take charge of the market. GME must provide the Ministry of Productive Activities and the Authority with a quarterly report on the market's performance and on any reasons why the market regulations should be changed. It must also inform the ministry, the Authority and the anti-trust authorities of any inappropriate or irregular situations that emerge in the market. On the basis of standards set by the Authority, price indices for the electricity market are created by the market operator and transmission system operator (GME and GRTN).

Since the electricity market opened on 1 April 2004, the Authority for Electricity and Gas has no longer been responsible for defining the generation cost, which is now set by a system of competitive bidding. The following diagrams show the current structure of the Italian electric system, with the economic flows among the various parts of the production chain highlighted in Fig. 2.3, and the functional relationships between the production chain and institutional players in Fig. 2.4. Since 2007, the Italian electricity market structure is as shown in Fig. 2.5.

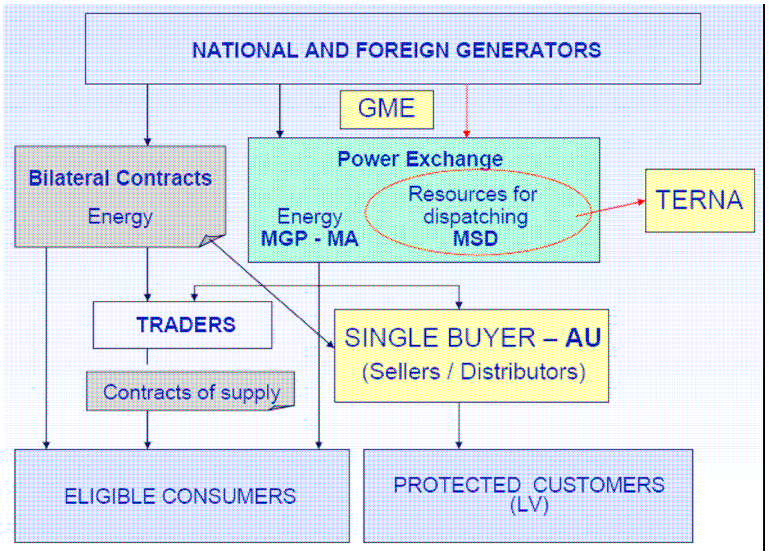


Fig. 3.5 The Italian electricity market structure[3]

[3] Francesco Cariello, MARKET DEPARTMENT, The Regulatory Authority for Electricity and Gas "THE ITALIAN ELECTRICITY MARKET," Oct. 2008. Online: http://www.industrie.gov.tn/fr/projetelmed/images/pdf/10_Italian_market.pdf

Cross-Border-Trade methods:

Regardless of the existence of an internal electricity market, cross-border-trade is implemented between countries in the Mediterranean region. However, with the existence of an internal electricity market and cross-border-trade, regional markets can be established which will lead to an integrated Mediterranean Electricity market.

Ways of electricity trading:

There are two main markets, in which electric power is traded as well as electricity derivates:

- Over-The-Counter market (OTC).
- Classical exchange.

From trader's point of view it is better to trade on the exchange as:

- Dealing on the exchange is better assured, and
- The exchange has better liquidity that provides opportunities for speculative deals for each trader.

Specifics of cross-border trade:

Cross-border trade electric power congestion lead to insufficient transfer capacity between countries. Therefore, the development of methods for allocating free capacity to particular parties interested in electricity transmission, Fig. 2.6.

- Capacity allocation methods

If there is no congestions at the border, it is not necessary to allocate free capacity and every bid for transmission capacity is accepted tax-free. Problems occur on borders where the capacity of the cross-border lines is insufficient for all bids. In such cases the following principles are used for allocating free capacity:

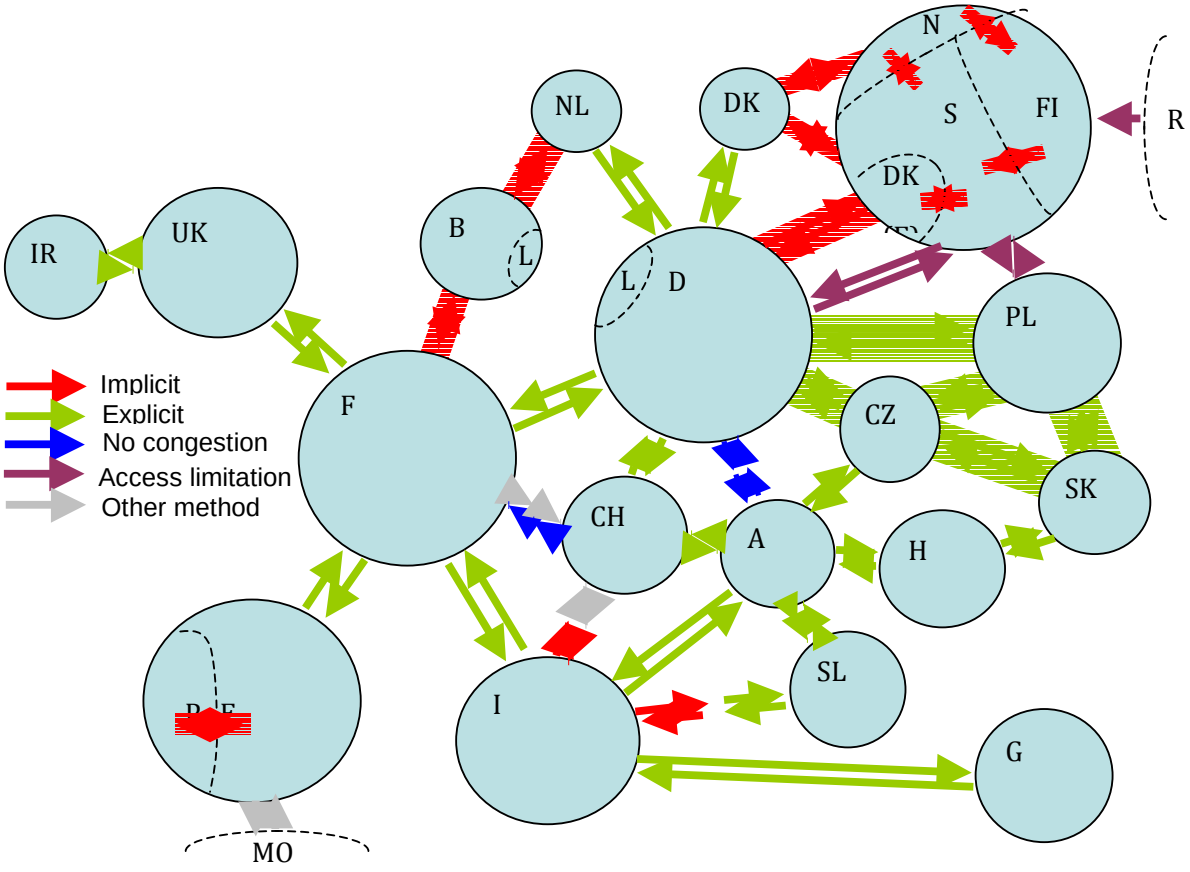


Fig 3.6 Day-ahead transmission capacity allocations across Europe (updated June 2007).[4]

a- Non – market based principles:

- **First-come-first-serve** – This guarantees the allocation of capacity to customers in the same order as they send their requests.
- **Pro rata** – When the demand is higher than the free capacity, each request is reduced proportionally, so that no congestion remains. No request is refused, but none is accepted to the full extent.

b- Auction Principles:

- **Explicit auction** – "Explicit auction is when the transmission capacity on an interconnector is auctioned to the market separately and independently from the marketplaces where electricity is auctioned. Explicit auction is considered as a simple method of handling the capacity on the international interconnections in Europe. The capacity is normally auctioned in portions through annual, monthly and daily auctions. Since the two commodities

[4] Source: Compliance with Electricity Regulation 1228/2003 - An ERGEG Monitoring Report Ref: E07-EFG-23-06. 18th July 2007

transmission capacity and electricity are traded at two separate auctions, there is a lack of information about the prices of the other commodity. This lack of information can result in an inefficient utilization of interconnectors, i.e. less social welfare, less price convergence and more frequent adverse flows."[5]

As mentioned, this is the most widely used way of allocating capacity in Europe. Each TSO (Transmission System Operator) sets the free capacity, and this capacity is allocated by auction. Bids are sorted according to their price, and they are accepted until no free capacity remains. The price of each successful request for capacity can be the same as the bid in the auction ("Pay-As-Bid"), or it could be equal to the lowest accepted bid ("Marginal Bid Auction").

- **Implicit auction** – "With implicit auction the day-ahead transmission capacity is used to integrate the spot markets in the different bidding areas in order to maximize the overall social welfare in both (or more) markets. The flow on an interconnector is found based on market data from the marketplace/s in the connected markets. Thus the auctioning of transmission capacity is included (implicitly) in the auctions of electricity in the market. In implicit auctions the transmission capacity between bidding areas (price areas/control areas) is made available to the spot price mechanism in addition to bid/offers per area, thus the resulting prices per area reflect both the cost of energy in each internal bidding area (price area) and the cost of congestion. Implicit auctions ensure that electricity flows from the surplus areas (low price areas) towards the deficit areas (high price areas) thus also leading to price convergence.

  Implicit auction signifies the concept used for both 'market coupling' and 'market splitting'. There is not necessarily any difference in the calculation algorithms or principals used for market coupling and market splitting. What differentiates market coupling from market splitting is how the algorithm operated and owned, and which results from the central calculation the local markets use subsequently."[5]

  The difference from an explicit auction is that the price for the capacity is included directly in the price of the transmitted energy. The price for the capacity is set by MO (Market Operator) in such way that the amount of the accepted bids does not exceed over the free capacity. MO knows bids from each participant in the market and can therefore set the exact conditions under which the bid can still be accepted. The auction is arranged, and the revenue from it belongs, not to TSO (difference from explicit auction) but to MO.

[5] Source: Online: http://www.nordpoolspot.com/PowerMaket/The-Nordic-model-for-a-liberalised-power-market/Implicit-auction/

- **Market splitting** – "In market splitting the implicit auction of transmission capacity is handled within the day ahead electricity auction by one single power exchange. In the Nordic region Nord Pool Spot performs market splitting since the transmission capacity between the Nordic bidding areas is handled implicitly in the price and bid matching calculation performed at Nord Pool Spot. Sometimes the transmission capacity between the internal bidding areas is not enough to get a complete convergence of price, and the result is that there are different prices in different bidding areas. Thus the term 'market splitting' refers to the fact that the limited transmission capacity leads to a split between to market areas." [5]

  It is developed implicit auction procedure. The electrical energy is transmitted in such way that electricity from areas with lower prices is transmitted to areas with higher prices. Thus prices in areas with lower prices level on with those in areas with higher prices. (This process is like splitting of market from one area to another. The whole auction process has acquired its name from this similarity.). MO in one country manages the markets on both sides of the border by a market splitting process, so very close cooperation is necessary between the two MOs.

- **Market coupling** – "In market coupling the implicit auction is organized in cooperation between two or more power exchanges. Thus the term refers to the coupling of two or more power exchanges. Each power exchange submits the necessary market information to a central coupling algorithm. The TSOs provide the transmission capacity available between the market areas. The central calculation delivers both flows between, and prices in all market areas. The flows between the coupled markets are at least used further in the local bid matching of the power exchanges, but it is also possible that the local market can adapt also the prices and bid results from the central coupling algorithm. It is common to differentiate between price market coupling and tight and loose volume market coupling." [5]

Supranational electricity market structure:

According to the European Commission, the main barrier to the establishment of a Single European Energy Market results from existing difficulties in integrating different national electricity and gas markets.

In order to overcome this barrier, in Spring 2006, the European Regulators' Group for Electricity and Gas (ERGEG), decided to launch the Regional Initiatives, creating three gas and seven electricity Regional Energy Markets (REMs). The creation of these REMs was set as a first step towards a competitive Single European Energy Market. 3.7 identifies the seven ERGEG Electricity REMs.

ERI Baltic Region	ERI Central-East Region	ERI Central-South Region	ERI Central-West Region
Estonia, Latvia, Lithuania	Austria, Czech Republic, Germany, Hungary, Poland, Slovakia, Slovenia	Austria, France, Germany, Greece, Italy, Slovenia	Belgium, France, Germany, Luxembourg, Netherlands

ERI Northern Region	ERI South-West Region	ERI France – UK - Ireland Region
Denmark, Finland, Germany, Norway, Poland, Sweden	France, Spain, Portugal	France, United Kingdom, Ireland

Fig. 3.7 – The seven ERGEG Electricity regional energy markets

The Regional Initiatives can be considered a bottom-up initiative bringing together regulators, the European Commission, Member State governments, companies and other relevant parties to focus on

developing and implementing solutions to improve the way in which regional energy markets are set up toward a single integrated European energy market. Through the Regional Initiatives, specific barriers to trade and competition (such as a lack of transparency and different balancing regimes) are tackled by each country working with its neighbours, and solutions found so as to improve market integration. The Regional Initiatives are already delivering significant improvements e.g. in the area of managing bottlenecks, calculating and allocating grid capacity, and making much needed information (e.g. about capacity) available to the market.

Meanwhile, as top-down activity, complementing the bottom-up initiative represented by the Regional Initiatives, the European Commission and the European Parliament published in July 2009 the 3rd European Legislative Package on Energy enforcing and giving the necessary framework for an European energy markets integration towards the single-EU energy market.

In parallel to those processes, several European countries began to develop unilateral initiatives of integrating their national electricity markets with the neighbour countries.

An example of the existing regional electricity markets is illustrated. Fig. 3.8 shows the existing European supranational electricity markets with their involved MedReg members' countries.

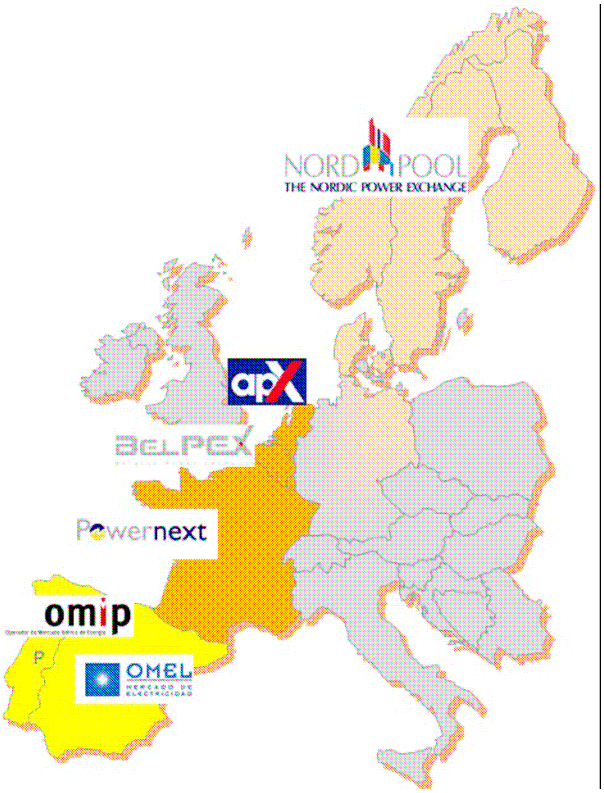


Fig. 3.8 Existing European supranational electricity markets

Fig. 3.8 illustrates the three European supranational markets which are leading the way to future electricity market integration in Europe. The oldest and most well-known supranational market is the Nordic market (Nord Pool). Norway is not part of the European Union, but started reforming already

before the European Union and is following the European electricity market reform process. Nord Pool started as the Norwegian power exchange in 1995 and its day-a-head wholesale auction trading system has extended to Sweden in 1996, Finland in 1998, Denmark in 2000 and partly also into Germany in 2005. The day-ahead auction system uses the internal border capacities to optimize the clearing of orders introduced in the different countries. Every country corresponds to one or more price zones. The Nordic countries have for instance also started harmonizing their intra-day and real time market systems.

Much more recently conceived and relatively fast to launch is the Central Western European market for the moment including France, Belgium and the Netherlands, launched in 2006 (TLC). When a cooperation agreement was first signed in 2003, both France (Powernext, started in 2001) and the Netherlands (APX, started in 1999) had already well-established power exchanges and Belgium was in the process of launching its own exchange. They have chosen to coordinate their existing trading systems, instead of choosing one single system for their day-ahead operations. Apart from this, they also use the internal border capacities to optimize clearing of orders introduced to their day-ahead auctions, like in the Nordic market. In contrast to the Nordic market however, they are for the moment only allowed to use a fraction of the available border capacities. In 2007, this fraction was already about 80%. The rest of the border capacity is still auctioned explicitly in yearly and monthly auctions.

The long awaited Iberian market (MIBEL) was finally launched in 2007. In contrast to the Central Western European market, the so-called exchange poles in Spain and Portugal have divided responsibilities. The Spanish pole OMIE takes care of the day-ahead and intra-day auction markets for both countries and the Portuguese exchange OMIP organizes the futures market. As in the Nordic market, all border capacity between Portugal and Spain is available to the day-ahead market.

I- Spain-Portugal:

The Iberian Market Operator (OMI) shall be structured into two shareholding companies, with their head offices in Spain and Portugal respectively. OMEL and OMIP have not been merged yet but the Boards of both companies are working on it. The exchange of shares between both companies is expected to take place during the course of 2010. Those two market management companies, one with its head offices in Spain, OMI – Polo Español (OMIE), which shall be the management company for the daily market, and another with its head offices in Portugal, OMI – Polo Portugués (OMIP), which shall be the management company for the forward market. The two Boards of Directors of the management companies, OMIE and OMIP, shall comprise the same members and shall have the same chair and deputy chair, with rotation every three years.

The Single Iberian Market (MIBEL,)[6] in day-ahead and intraday horizons, in case of congestion, a market splitting mechanism is implemented as shown in Fig. 3.9 to achieve the following goals:

[6]Jacques de Jong, "The 'Regional Approach' in Establishing the Internal EU Electricity Market - A contribution to regulatory debates in the EU and the US on Standarised Market Designs and Regional Markets," Clingendael International

1- Integration of bilateral trade directly in the market using price acceptant bids in both areas.
2- Curative "Counter Trading" for guaranteeing the cross-border programs in case of capacity reductions.
3- Equal sharing of congestion rents between both systems. Each system assumes separately counter trading costs.

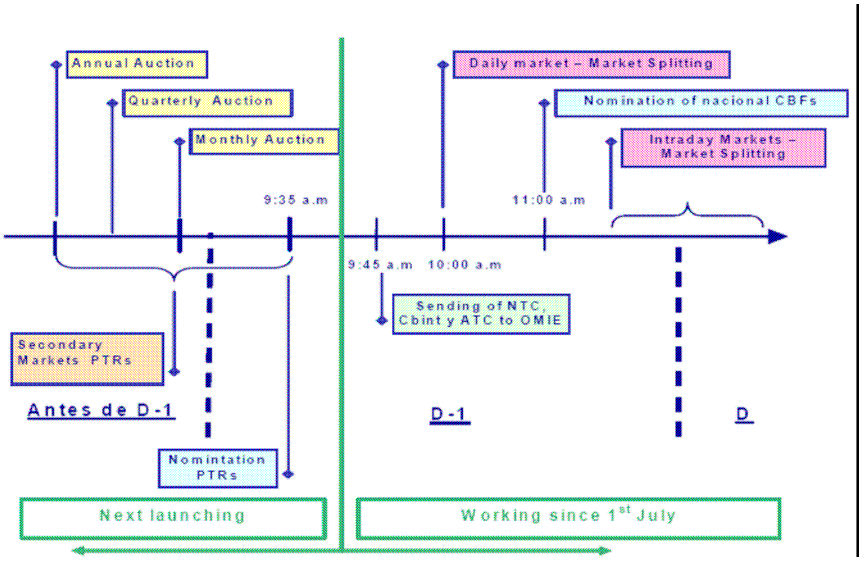


Fig. 3.9 MIBEL day-ahead and intra-day Structure

As of July 2009 a contract auction mechanism has been established, based on the difference in prices for each hour of the day-ahead market between the Spanish and the Portuguese price zones. This mechanism provides financial long-term hedging for cross-border trade; products covering yearly and half-yearly time horizons have already been implemented. Both energy and securities regulators are supervisory bodies to this process.

II- South Eastern European Countries (SEE):

The SEE countries have committed themselves (2002-2003) to develop a Regional Energy Market in the SEE region, based on the EU energy legislative framework, with the view that this market will be incorporated in the EU IEM. In 2005, a Cross-Border-

Trade mechanism is in place till a regional market is approved. Optimize energy market and infrastructure developments over the broader scale of an integrated single market (rather than at the level of each country). The structure is given in Figs. 3.10 and 3.11:

Energy Programme (CIEP), Netherlands Institute of International Relations. [Online] http://www.clingendael.nl/publications/2004/20041200_ciep_paper_dejong.pdf

The trading structure is a mixed pool and contract based market, two levels (regional and national)[7]:

- Bilateral contracts with physical delivery
  - Standardized type, basically non regulated, except if supplier is regulated
  - Ex-post control at national level (but harmonised) against excessive dominant positions
  - Submit balanced offers to Day Ahead - Subject to balancing arrangements
  - Preferably throughout the SEE region Transmission Quota Reservation
- Regional Day-Ahead market, operated by a Regional Market Operator RMO
  - Partial non mandatory pool Handles mostly regional trading flows
  - Liquidity supported by ad hoc measures (obligations for partial must-buy on regulated suppliers and partial must-offer on certain generation resources, like hydro)
- Real time dispatching and flows managed by the national TSOs and their cooperative regional organisation (SEETSO)
  - Simple accounting rules for balancing prices
  - Two level clearing: regional and national Two
  - TSOs contract for reserve energy and ancillary services

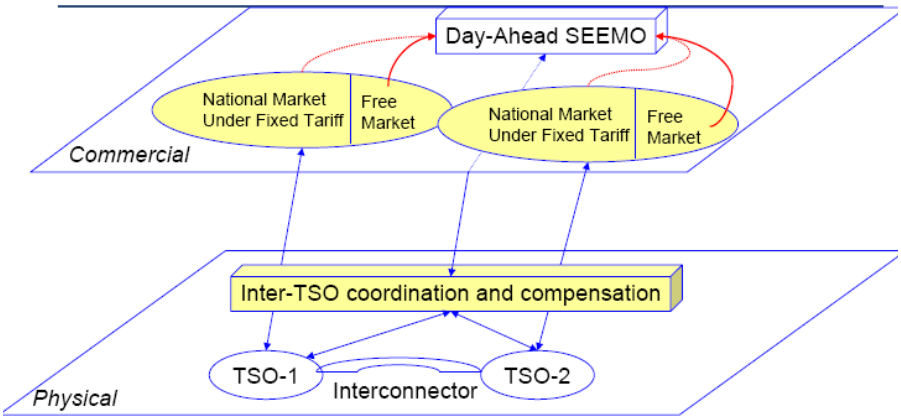


Fig. 3.10 Market Structure

[7] Dr. Michael Thomadakis, Greek Regulatory Authority for Energy, Head of Energy Planning & International Affairs Dept., "South East Europe Regional Electricity Market: Towards a Standard Market Design," 3rd ERRA Energy Regulation & Investment Conference, Budapest, May 17 18, 2004.

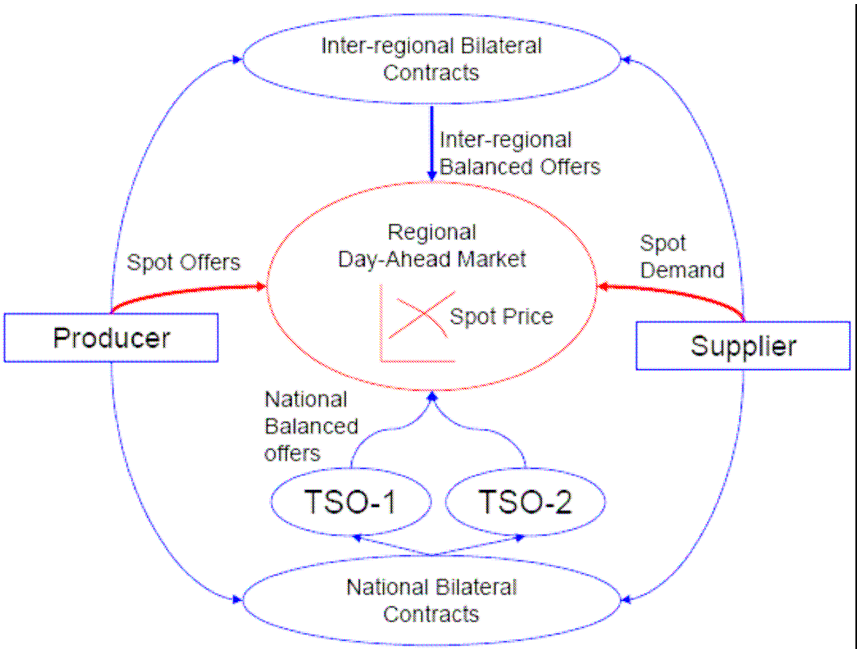


Fig. 3.11 Market Structure in a Single Price Zone

Algerian, Morocco and Tunisian gradual integration electricity markets in the internal market of EU.

Historical and descriptive

The progressive integration of the Algerian, Morocco and Tunisian electricity markets in the internal EU electricity market project is a follow-up to the Protocol Agreement signed by the three Maghreb countries and the EC in 2003.

The General objectives of the project are as follows:

- Harmonizing the legislative and regulatory framework as well as the industrial structure of the beneficiary countries to create a market of electricity

- Make them compatible, in a second time, with European standards in order to integrate this market in the EU one.

A convention and a contract of service have been set in place to achieve these objectives.

The service contract is for a period of 36 months from the date of its signature on April 23, 2007.

The object of the contract is the recruitment of the Project Management Unit, specific objectives specified in the terms of reference include:

- Supporting development of electricity markets,
- Building skills through the dissemination of technical knowledge,
- Ensure the institutional development and
- Support mechanisms for trade.

To achieve its objectives, 18 actions have been scheduled.

Supporting the development of electricity markets

- Actions 3, 4: sector reorganization and perspective of structuring a market of electricity in Morocco and Tunisia.
- Action 7: develop a strategic plan for the development of markets for electricity in Algeria.
- Action 13: Census list of infrastructure project.
- Action 14: Economic benefits of a strengthening of cooperation / Maghreb trade.
- Action 15 C: Integration of Renewable Energy in electrical systems of Algeria, Morocco and Tunisia.

Building skills through the dissemination of technical knowledge:

- Action 5: harmonization of methodologies of fixing of tariffs.
- Action 10: Audit demand forecasting methodologies.
- 15 A share: Pricing of the transport and distribution in Algeria.

Ensure institutional development:

- Action 11: legal assistance.
- Action 15 B: Extending legal assistance.
- Action 16: Organization of meetings of the bodies created by the 2003 Protocol.

Support mechanisms exchanges for trade.

- Action 6: Method of calculation of the transit tariffs.
- Action 8: Study on the links with other relevant projects in the recipient countries.
- Action 9: Grid codes and specifications.
- Action 12: Study of legislative and regulatory provisions in recipient countries and the EU Member States to develop exchanges of electricity.

N.B.: Actions: 1 and 2 are common to the four dimensions.

Organization and project management

The service contract is signed between the Ministry of energy and mines that represent the ministries in charge of energy of the 3 countries and the European Commission.

The most important decision-making bodies in the management of the project are as follows:

Steering Committee (SC): responsible at the strategic level, it is responsible for:

- Strategic orientation to the PMU
- The control of the overall implementation of the project
- The coordination different industries
- Document approval,
- Tracking the progress.

The project management unit PMU responsible for approval of plans of work and budget submitted by the CP...

The achievements of the project:

Education is one of the main components of the IMME project; four types of action have been decided and led to the training plan:

- Basic formations centred on the theoretical bases necessary for understanding and mastery of the concepts of electricity market liberalisation and regulation;
- Study travels or the dumping that allows beneficiaries to apprehend, in situation, the nature of the missions lead by the market actors and become familiar with their work tools and the conditions of implementation of these tools;
- Regional seminars to bring the same level of information the three beneficiary countries on concepts, the functioning of the market players and the reform process;
- National workshops focused on country-specific issues and defining new concepts in different local contexts.

A total of 23 operations were conducted in the field of training in 2008 and 2009; 11 are planned in 2010. The number of appearances in these operations for 2008 and 2009 stands at 944, including 508 for Algeria that its full operations, 262 for Morocco and 166 for Tunisia, countries for which multiple operations are planned in 2010.

On the 16 actions provided for in the contract, 8 have been finalised, 4 are underway, and 4 are not started yet.

Chapter 4

Benchmarking of the regulatory and market status/development

CHAPTER 4

BENCHMARKING FOR THE REGULATORY AND MARKETS STATUS/DEVELOPMENT IN MEMBER COUNTRIES.

This chapter summarizes the findings of the survey. As it was mentioned before, the survey covers the following categories:

Part A

Status of Regulatory Process and Market Implementation activities:

- Legislative and regulatory framework
- Financial viability of the industries
- 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

Part B

Basic information on:

- Generators
- Transmission systems
- Distribution systems
- Interconnection projects
- Energy export and import

Part C:

- Internal Structure of the Electricity Sector Organization:
- Priority of purpose for international trade
- Volume of Actual, Imports, and Exports in Total
- Base Load Imports and Capacity available for Potential Export:

Table 4.1 shows numbers of questions used to asses each indicator. The answer to these questions is either yes or no.

Table 4.1 Number of questions considered for each Indicator

Indicators	***Number of Questions***
Legislative and regulatory framework	***6***
Financial viability of the industries	***5***
Unbundling of the industries	***5***
Removing obstacles to competition	***2***
Market access	***4***
Market Arrangements	***4***
Implementation of national market	***4***
Implementation of national market	***4***
Regulation	***4***
Technical and commercial rules and agreements	***3***
Infrastructure requirements for market operation	***4***
Imports and exports	***3***

Table 4.2 shows the number of yes answers for each category It should be noted that for imports and exports the first two questions are exclusive. Therefore the weight of a yes to any of these two questions has a double weight.

Table 4.2 Benchmarks level

Number of questions used in Evaluation	***Benchmarking Category based on number of yes***			
	Fulfilled	***In progress***	***Starting phase***	***Not yet***
6	6	2-5	1	0
5	5	2-4	1	0
4	4	2-3	1	0
3	3	2	1	0
2	2	1		0

The countries that have sent an answer to the survey so far (June – 2010) are the following:

Countries		*Answer received*	*No answer*
1.	Albania		☒
2.	Algeria	✓	
3.	Bosnia-Herzegovina	✓	
4.	Croatia		☒
5.	Cyprus		☒
6.	Egypt	✓	
7.	France	✓	
8.	Fyrom		☒
9.	Greece	✓	
10.	Israel		☒
11.	Italy	✓	
12.	Jordan	✓	
13.	Lebanon		☒
14.	Libya		☒
15.	Malta	✓	
16.	Montenegro		☒
17.	Morocco		☒
18.	Palestinian Territory		☒
19.	Portugal	✓	
20.	Slovenia		☒
21.	Spain	✓	
22.	Syria		☒
23.	Tunisia		☒
24.	Turkey	✓	

Legislative and regulatory framework

Topic **country**	**Separation of policy and operation**	**Legislative basis for regulatory agency**	**Legislative basis for market mechanisms**	**Legislative basis for industrial restructuring**	**Provision for private participation**	**Competition rules**	**Benchmarking 2010**	**Benchmarking 2007**
Algeria	Y	Y	Y	Y	Y	Y	**Fulfiled**	**Fulfiled**
Bosnia	Y	Y	N	Y	N	Y	**In progress**	**In progress**
Greece	Y	Y	Y	Y	Y	Y	**Fulfiled**	✹
Egypt	Y	Y	N	Y	Y	N	**In progress**	**In progress**
France	Y	Y	Y	Y	Y	Y	**Fulfiled**	✹
Italy	Y	Y	Y	Y	Y	Y	**Fulfiled**	**Fulfiled**
Jordan	✹	✹	✹	✹	✹	✹	✹	**In Progress**
Malta	***N***	**Y**	***N***	***Y***	***Y***	***Y***	**In progress**	**Fulfiled**
Portugal	Y	Y	Y	Y	Y	Y	**Fulfilled**	**Fulfilled**
Turkey	Y	Y	Y	Y	Y	Y	**Fulfiled**	**Fulfilled**
Spain	Y	Y	Y	Y	Y	Y	**Fulfiled**	**Fulfiled**

✹ Information not received

Legend

Fulfilled	***In progress***	***Starting phase***	***Not yet***
6/6	***From 5/6 till 2/6***	***1/6***	***0/6***

Relevant Remarks:

France	The Law prescribes that generation, transmission and distribution companies must be separate legal entities. Public or private ownership is not regulated by Law
Malta	The Maltese electricity supply market is not open for competition. Malta has requested and obtained derogation from the requirement to open supply market as expressed in Directive 2003/54(Commission Decision 2006/859/EC). The same derogation has been included in the reviewed internal market Directive 2009/72/EC. The electricity generation market is however open for competition.
Portugal	**Separation of policy and operation**: Legislation that establishes the organization of the electric sector and its activities. Transmission activity has ownership, legal and account unbundling since 2000. Generation, distribution and supply activities have legal and account unbundling since 2006. **Legislative basis for regulatory agency**: 1997 legislation that establishes the statutes of the regulator **Legislative basis for market mechanisms**: Since 1995 very high, high and medium voltage consumers are eligible to participate in the bilateral market. In 2004 this right was extended to all consumers. 2006 legislation establishes the organization of the activities in an organized market environment. **Legislative basis for industrial restructuring**: 2006 legislation establishes the organization of the electric sector by means of an organized market, the organization and functions of the different activities and the procedures related to the licenses (generation, last resort supply and free supply) and concessions (transmission and distribution). **Provision for private participation**: All activities have private participation. Transmission has 51% of public participation and other activities are mainly private. Nevertheless transmission and distribution have public service obligations. **Competition rules**: ERSE must cooperate with national regulatory authority for competition, under the competition law, as well as under the obligations set in ERSE's statutes and electricity legal framework.1997 legislation that establishes the statutes of the regulator

Financial viability of the industries

Topic **Country**	**Cost-reflective tariffs**	**Elimination of cross subsidies**	**Transparent subsidies to targeted groups**	**Reduction of non-technical losses**	**Transitional commercial arrangements**	**Benchmarking 2010**	**Benchmarking 2007**
Algeria	Y	N	Y	N	N	**In progress**	**In progress**
Bosnia	Y	N	N	Y	N	**In progress**	**In progress**
*Greece	Y	N	N	Y	N	**In progress**	✹
Egypt	Y	N	N	Y	N	**In progress**	**In progress**
France	Y	Y	N	N	N	**In progress**	✹
Italy	Y	Y	N	Y	N	**In progress**	**Fulfilled**
Jordan	✹	✹	✹	✹	✹		**In Progress**
Malta	Y	***Y***	***Y***	***Y***	***Y***	**Fulfilled**	**Not Yet**
Portugal	Y	Y	N	Y	Y	**Fulfilled**	**Fulfilled**
Turkey	Y	Y	Y	Y	Y	**Fulfilled**	**In progress**
Spain	Y	Y	N	Y	N	**In progress**	**Fulfilled**

Legend

Fulfilled	***In progress***	***Starting phase***	***Not yet***
5/5	***From 4/5 till 2/5***	***1/5***	***0/5***

Relevant Remarks:

Bosnia	It is expected that cross subsidies will be eliminated to 2015
Greece	Tariffs refer to regulated tariffs, including transmission and distribution tariffs, PSO's, other market related tariffs
Portugal	**Elimination of cross subsidies**: Cross subsidies are eliminated by means of calculating tariffs in an additive way, that is, tariffs are calculated by adding access tariffs, market energy price and retail margin. **Transparent subsidies to targeted groups**: Tariff methodology does not foresees any kind of subsidies. **Reduction of non-technical losses** - Tariff methodology has a mechanism to incentive grid operators to reduce losses, independently of the type of losses: a premium or a penalty is established having in mind the difference from a target value established by ERSE for each year **Transitional commercial arrangements**: There is a mechanism to cover the costs arising from the end of the PPAs.

Unbundling of the industries

Topic **Country**	**Disaggregating of activities**	**Transmission network operations and market functions**	**Power Exchange**	**Balancing energy pricing**	**Ancillary services trade**	**Benchmarking 2010**	**Benchmarking 2007**
Algeria	Y	Y	N	N	N	**In progress**	**In progress**
Bosnia	Y	Y	N	N	N	**In progress**	**In progress**
Greece	Y	Y	Y	Y	Y	**Fulfilled**	✹
Egypt	Y	N	N	N	N	**Starting phase**	**Starting phase**
France	Y	Y	Y	Y	Y	**Fulfilled**	✹
Italy	Y	Y	Y	Y	Y	**Fulfilled**	**Fulfilled**
Jordan	N	Y	Y	Y	N	**In progress**	**In progress**
Malta	N	N	N	N	N	**Not Yet**	**Not Yet**
Portugal	Y	Y	Y	Y	Y	**Fulfilled**	**Fulfilled**
Turkey	Y	Y	Y	Y	Y	**Fulfilled**	**In progress**
Spain	Y	Y	Y	Y	Y	**Fulfilled**	**Fulfilled**

Legend

Fulfilled	***In progress***	***Starting phase***	***Not yet***
5/5	***From 4/5 till 2/5***	***1/5***	***0/5***

Relevant Remarks:

Bosnia	It is expected that regional balancing market will be established in South East Europe to 2015
Greece	Ancillary market is bundled with the wholesale market
Malta	Malta does not have a transmission system only a distribution system. Enemalta which is the local generation, distribution and supply company performs the functions of the DSO. Enemalta is required to achieve unbundling at accounts level only.
Portugal	**Disaggregating of activities** - Transmission activity has ownership unbundling since 2000. Generation, distribution and supply activities have legal unbundling. **Transmission network operations and market functions** - Regulations define the level of unbundling of TSO. Ownership unbundling of TSO from other activities. TSO is responsible for transmission, work operation, planning and investment, for system operation and for settlement activities, under accounting and organization unbundling rules set in regulations approved by ERSE. **Power Exchange** - From July 3rd 2006 Derivatives market (OMIP). From July 1st 2007 day ahead market (OMIE). These operators will be joined in one market operator OMI. **Balancing energy pricing and Ancillary services trade**: Market based mechanisms.
Turkey	Currently, Transmission network operations and market functions are lumped together. It is expected to be separated from one another, as a Transmission System operator (TSO) and Market Operator (MO).

Removing obstacles to competition

Topic **Country**	**Break-up of dominant positions**	**Network extension**	**Benchmarking 2010**	**Benchmarking 2007**
Algeria	N	Y	**Starting phase**	**Fufilled**
Bosnia	Y	Y	**Fullfilled**	**Staring Phase**
Greece	N	Y	**Starting phase**	✹
Egypt	N	Y	**In progress**	**In progress**
France	Y	**Y**	**Fulfilled**	✹
Italy	Y	**Y**	**Fulfilled**	**In progress**
Jordan	N	**Y**	**In progress**	**Fulfilled**
Malta	N	**N**	**Not Yet**	**Starting Phase**
Turkey	Y	**Y**	**Fulfilled**	**Fulfilled**
Portugal	Y	**Y**	**Fulfilled**	**Fulfilled**
Spain	Y	Y	**Fulfilled**	**Fulfilled**

Legend

Fulfilled	***Starting phase***	***Not yet***
2/2	***½***	***0/2***

Relevant Remarks

Bosnia	Power industry restructuring process should be finished to 2015. Now exist generation-supply incumbents
Portugal	Break-up of dominant positions - Long term power purchase agreements were eliminated for the incumbent; Energy bought by last resort supplier must be acquired under market mechanisms. VPP auctions are foreseen in the regulations and were applied in 2007 and 2008.
Malta	Enemalta is required to provide plans for extension of the distribution system to ensure security of supply

Market access

Topic **Country**	**Definition of eligible consumers**	**Definition of Use of System charges**	**Procedures for congestion management**	**Non-discriminatory operational rules**	**Benchmarking 2010**	**Benchmarking 2007**
Algeria	Y	Y	N	Y	**In progress**	**Fulfilled**
Bosnia	Y	Y	Y	Y	**Fulfilled**	**Fulfilled**
Greece	Y	Y	Y	Y	**Fulfilled**	✹
Egypt	Y	N	N	N	**Starting phase**	**Starting phase**
France	Y	Y	Y	Y	**Fulfilled**	✹
Italy	Y	Y	Y	Y	**Fulfilled**	**Fulfilled**
Jordan	Y	Y	Y	Y	**Fulfilled**	**Starting Phase**
Turkey	Y	Y	Y	Y	**Fulfilled.**	**Fulfilled.**
Malta	N	Y	N	*✹	**Starting Phase**	**Not yet**
Portugal	Y	Y	Y	Y	**Fulfilled**	**Fulfilled**
Spain	Y	Y	Y	Y	**Fulfilled**	**Fulfilled**

Legend

Fulfilled	***In progress***	***Starting phase***	***Not yet***
4/4	***From 3/4 till 2/4***	***1/4***	***0/4***

Relevant Remarks

Portugal	Definition of eligible consumers - All consumers are legally eligible since August 2004 and de facto eligible since September 2006. Definition of Use of System charges: The Tariff Code establishes a methodology for tariffs calculation based on the additivity of cost-reflective tariffs established for each activity, avoiding cross subsidies between activities and customers. Procedures for congestion management: Market splitting complemented with explicit auctions. Non-discriminatory operational rules: Separated transmission systems operators (REN+REE) and market operators (OMIP+OMIE). Balancing market based mechanisms approved by the regulator.
Malta	* The electricity supply market in Malta is not open for competition. Enemalta has the responsibility to ensure adequate network capacity for the meet the envisaged demand. Currently Enemalta is obliged to give priority to renewable energy generators as long as there is compliance with the network code. Currently there is only number of small non dispatch able auto-producers and as such Enemalta is responsible for the dispatch is own generation plant according to demand

Market Arrangements

Topic Country	Definition of market form	Establishment of market rules	Review and drafting of agreements	Settlement systems	Benchmarking 2010	Benchmarking 2007
Algeria	N	N	N	Y	**Not yet.**	**Not yet.**
Bosnia	N	N	N	N	**Not yet.**	**In Progress**
*Greece	Y	Y	Y	Y	**Fulfilled**	✹
Egypt	Y	N	N	N	**Starting phase.**	**Starting phase.**
France	Y	Y	Y	Y	**Fulfilled**	✹
Italy	Y	Y	Y	Y	**Fulfilled**	**Fulfilled**
Jordan	N	N	Y	N	**Starting Phase**	**In progress**
Malta	N	N	N	N	**Not Yet**	**Starting phase**
Portugal	Y	Y	Y	Y	**Fulfilled**	**Fulfilled**
Turkey	Y	Y	Y	Y	**Fulfilled.**	**Fulfilled.**
Spain	Y	Y	Y	Y	**Fulfilled**	**Fulfilled**

Legend

Fulfilled	*In progress*	*Starting phase*	*Not yet*
4/4	*From 3/4 till 2/4*	*1/4*	*0/4*

Relevant Remarks

Bosnia	It is expected that regional wholesale electricity market in South East Europe will be implemented to 2015
Greece	Review and drafting of agreements: Power Exchange Code is already in place, but the Distribution Network Code and the Energy Trade Code are still under public consultation
Portugal	**Definition of market form**; Establishment of market rules and Review and drafting of agreements - National legal framework sets all the necessary conditions for market design and major rules; Regulations approved by ERSE set all the remaining implementation rules and conditions. All relevant regulations available in ERSE website (www.erse.pt). **Settlement systems** - National legal framework sets all the necessary conditions for market design and major rules; Regulations approved by ERSE set all the remaining implementation rules and conditions. This rules and conditions are established by ERSE under a public consultation process with all stakeholders. All relevant regulations available in ERSE website (www.erse.pt).

Implementation of national market

Topic	**Official and political responsibility**	**Action plan**	**Programme management**	**First operation of the market**	**Benchmarking 2010**	**Benchmarking 2007**
Country						
Algeria	Y	N	N	N	**Starting phase**	**Not yet**
Bosnia	N	N	N	N	**Not Yet**	**In progress**
Greece	Y	Y	Y	Y	**Fulfilled**	✹
Egypt	Y	N	N	Y	**In progress**	**In progress**
*France	Y	Y	Y	Y	**fulfilled**	✹
Italy	Y	Y	Y	Y	**fulfilled**	**fulfilled**
Jordan	Y	Y	Y	Y	**fulfilled**	**Not yet**
Malta	N	N	N	N	**Not Yet**	**Not Yet**
Portugal	Y	Y	Y	Y	**fulfilled**	**Fulfilled**
Turkey	Y	Y	Y	Y	**Fulfilled**	**In progress**
Spain	Y	Y	Y	Y	**fulfilled**	**fulfilled**

Legend

Fulfilled	***In progress***	***Starting phase***	***Not yet***
4/4	***From 3/4 till 2/4***	***1/4***	***0/4***

Relevant Remarks

Bosnia	It is expected that regional wholesale electricity market in South East Europe will be implemented to 2015
France	The electricity and natural gas markets have been fully opened to competition within EU Member States since 1 July 2007
Portugal	**Official and political responsibility** - International agreement with Spain for MIBEL (Iberian Electricity Market) implementation and the National legal framework sets all the necessary conditions for national market. This agreement sets tasks to regulators and TSOs. MIBEL is working since 1 July 2007. Harmonization between Portugal and Spain in several ways is being implemented. **Action plan**; Programme management and First operation of the market - International agreement with Spain for MIBEL implementation and the National legal framework sets all the necessary conditions for national market. MIBEL is working since 1 July 2007.

Regulation

Topic	**Independence of regulator**	**Powers to perform his duties**	**Definition of regulatory principles**	**Regulatory capacities**	**Benchmarking 2010**	**Benchmarking 2007**
Country						
Algeria	**Y**	**Y**	**Y**	**Y**	**Fulfilled**	**Fulfilled**
Bosnia	**Y**	**Y**	**Y**	**Y**	**Fulfilled**	**Fulfilled**
Greece	**Y**	**Y**	**Y**	**Y**	**Fulfilled**	✹
Egypt	**Y**	**N**	**Y**	**N**	**In progress**	**In progress**
France	**Y**	**Y**	**Y**	**Y**	**Fulfilled**	✹
Italy	**Y**	**Y**	**Y**	**Y**	**Fulfilled**	**Fulfilled**
Jordan	**Y**	**Y**	**Y**	**Y**	**Fulfilled**	**Fulfilled**
Malta	**N**	**Y**	**Y**	**N**	**In progress**	**In progress**
Portugal	**Y**	**Y**	**Y**	**Y**	**Fulfilled**	**Fulfilled**
Turkey	**Y**	**Y**	**Y**	**Y**	**Fulfilled**	**Fulfilled**
Spain	**Y**	**Y**	**Y**	**Y**	**Fulfilled**	**Fulfilled**

Legend

Fulfilled	***In progress***	***Starting phase***	***Not yet***
4/4	***From 3/4 till 2/4***	***1/4***	***0/4***

Portugal

Independence of regulator: Regulator has its own funding by means of the electric tariffs, but the budget is approved by the Minister of **Economy**. The Government appoints the members of the Board. Regulatory decisions are independent and are not subjected to hierarquical appeal. Regulator has the power to set the Codes within the legislation established by the Government.

Powers to perform his duties: Regulator has the powers to require information but not the powers to enforce compliance by means of penalties or revocation of licences.

Definition of regulatory principles: In the legislation and codes.

Regulatory capacities: Staff with appropriate skills.

Technical and commercial rules and agreements

Topic **Country**	**Network Codes**	**Use of System agreements <u>for transmission network</u>**	**Connection charges and procedures**	**Benchmarking 2010**	**Benchmarking 2007**
Algeria	**Y**	**Y**	**Y**	**Fulfilled**	**Starting phase**
Bosnia	**Y**	**Y**	**Y**	**Fulfilled**	**Starting phase**
Greece	**Y**	**Y**	**Y**	**Fulfilled**	✹
Egypt	**Y**	**N**	**Y**	**In progress**	**In progress**
France	**Y**	**Y**	**Y**	**Fulfilled**	✹
Italy	**Y**	**Y**	**Y**	**Fulfilled**	**Fulfilled**
Jordan	**Y**	**Y**	**Y**	**Fulfilled**	**In progress**
Malta	**N**	**Y**	**N**	**Starting phase**	**Starting Phase**
Portugal	**Y**	**Y**	**Y**	**Fulfilled**	**Fulfilled**
Turkey	**Y**	**Y**	**Y**	**Fulfilled**	**Fulfilled**
Spain	**Y**	**Y**	**Y**	**Fulfilled**	**Fulfilled**

Legend

Fulfilled	***In progress***	***Starting phase***	***Not yet***
3/3	***2/3***	***1/3***	***0/3***

Relevant Remarks:

France	Transmission and distribution codes are prepared and implemented by TSOs/DSOs, taking into account TPA rules of non discriminatory access. Conditions of access to and use of public electricity and gas networks are designed and approved by the energy regulatory authority. In case of complaints from energy operators, the regulator can decide sanctions and penalties. Connections procedures and costs are specified directly by the regulator, including: availability of the technical documentation prepared by network operators; approval of procedures for the treatment of connection requests; approval of invoicing principles for the connection to distribution networks, with the possibility to oppose these principles; communication to stakeholders on all matters regarding the connection of users to electricity public networks. and approved through decrees and ministerial orders.
Greece	Transmission Code is in place, but the Distribution Code is in a draft form and still under public consultation
Italy	RD 1955/2000 (Use of System agreements for transmission network)
Malta	There is already a Network code for the distribution network. Malta does not have a transmission system. Conditions and procedures for connection to the distribution system are already in place by means of the Electricity Supply Regulations
Portugal	**Connection charges and procedure**s - Regulated universal prices and conditions for all the household and small and medium industrial customers (LV and MV installations). For the remaining cases (HV and VHV installations), connection charges are established by agreement between consumers and network operators, according to the main principles established in the regulations approved by ERSE.
Spain	RD 1955/2000 (Use of System agreements for transmission network)

Infrastructure requirements for market operation

Topic **Country**	**Specification of system metering needs**	**Specification of consumer metering needs**	**Specification of communication and IT requirements**	**Procurement**	**Benchmarking 2010**	**Benchmarking 2007**
Algeria	Y	Y	Y	Y	**Fulfilled**	**In progress**
Bosnia	Y	Y	Y	Y	**Fulfilled**	**Not Yet**
Greece	Y	Y	Y	Y	**Fulfilled**	✹
Egypt	N	N	N	N	**Not yet**	**Not yet**
*France	Y	Y	Y	Y	**Fulfilled**	✹
Italy	Y	Y	Y	Y	**Fulfilled**	**Fulfilled**
Jordan	✹	✹	✹	✹		**In progress**
Malta	***N***	***N***	***N***	***N***	**Not Yet**	**In progress**
Portugal	Y	Y	Y	Y	**Fulfilled**	**Fulfilled**
Turkey	Y	Y	Y	Y	**Fulfilled**	**In progress**
Spain	Y	Y	Y	Y	**Fulfilled**	**Fulfilled**

Legend

Fulfilled	***In progress***	***Starting phase***	***Not yet***
4/4	***From 3/4 till 2/4***	***1/4***	***0/4***

Relevant Remarks

France	An electrical “smart meter” project is currently under experiment in France until 2012 (ca. 1% of electricity consumers) and shall be extended to all consumption sites by 2014-2017. Procurement are currently ongoing at European level as regards projects for new IT and infrastructure solutions (“smart grids")
Portugal	**Specification of system metering needs**; Specification of consumer metering needs and Specification of communication and IT requirements – Metering regulations are approved by ERSE. The general principles are established in the Commercial Relations Code. The detailed rules are established in an autonomous document (Metering Code). This document was approved by ERSE following consultations namely with network operators. Document is available in ERSE website (www.erse.pt). **Procurement -** Procurement and financing are responsibilities of network operators according to law conditions.

Imports and exports

Topic	**Interim arrangements for use of interconnections**	**Final arrangements for use of interconnections**	**Charging arrangements**	**Benchmarking 2010**	**Benchmarking 2007**
Country					
Algeria	N	✸	✸	**Not yet**	**Not yet**
Bosnia	Y	Y	Y	**Fulfilled**	**Fulfilled**
Greece	N	Y	N	***Starting phase***	✸
Egypt	N	N	N	**Not yet**	**Not yet**
France	✸	✸	✸	✸	✸
Italy	Y	Y	Y	**Fulfilled**	**Fulfilled**
Jordan	Y	Y	Y	**Fulfilled**	**In progress**
Malta	N	N	N	**Not Yet**	**Not Yet**
Portugal	Y	Y	Y	**Fulfilled**	**Fulfilled**
Turkey	Y	Y	Y	**Fulfilled**	**Fulfilled**
Spain	Y	Y	Y	**Fulfilled**	**In progress**

Legend

Fulfilled	***In progress***	***Starting phase***	***Not yet***
3/3	***2/3***	***1/3***	***0/3***

Relevant Remarks

France	The European Commission Regulation laying down guidelines relating to the inter-transmission system operator compensation mechanism and a common regulatory approach to transmission charging is under examination by European institutions. The electricity Cross-Border Committee of the Council gave a positive opinion on this Regulation on 24 March 2010, and the formal adoption procedure will commence when translation has been completed
Portugal	Starting 1.July 2007, it is in place a common congestion management mechanism for the PT-ES border, in the context of MIBEL, based on market splitting complemented with explicit auctions.
Malta	No interconnection with other countries exists at the moment and it is not envisaged to open the market after the interconnection with Sicily takes place. The more of operation of the interconnection is still to be established

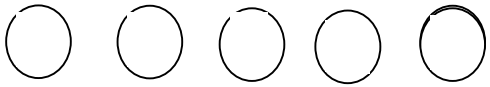
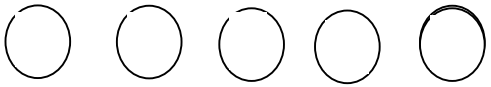
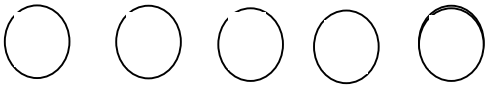
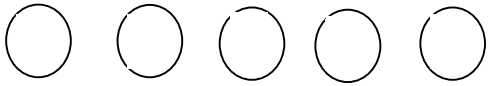
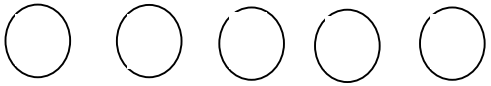
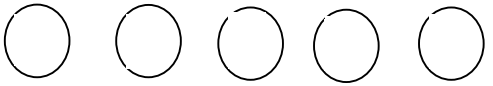
MARKET STRUCTURE

Internal Structure of the Electricity Sector Organization:

Country	Time Period Under Investigation		
	Present (2010)	**2015**	**2020**
Algeria	unbundled	unbundled	New market
Bosnia	unbundled	New Market	New Market
Egypt	unbundled	unbundled	New Market
France	New Market	New Market	New Market
Greece	Single Buyer Model	Single Buyer Model	Single Buyer Model
Italy	New Market	New Market	New Market
Jordan	-	-	-
Malta	Fully Vertically Unbundled	Fully Vertically Unbundled	Fully Vertically Unbundled
Portugal	New Market	New Market	New Market
Spain	New Market	New Market	New Market
Turkey	New Market	New Market	New Market

Priority of purpose for international trade:

Country	Present (2010)	2015	2020
Algeria			
Bosnia			
Greece			
Egypt			
France			
Italy			
Portugal			

Turkey			
Spain			

Transmission Rights:

Propositions	Algeria	Bosnia	Greece	Egypt	Italy	Portugal	Spain	Turkey
Interconnection TLs owned by an independent regional TSO, jointly owned by participants.		1	1		1	1	1	1
National links in network owned and operated by National TSO, bound by an open access agreement.	2	3	3	1	3	3	3	3
Central dispatch of an interconnection network, with national dispatchers taking dispatch instructions as a priority.	3	3	1	3	1	1	1	3
National dispatch with advice from a coordination center relating to the Regional Power Pool entry and exit points		2	1		3	1	3	2

Centrally managed short term market pow1er exchange.		1	1		1	3	2	3
Centrally managed Ballancing Market.		3	1		1	1	2	3
Regional Regulator coordinating the enabling of national regulation and then enforcing it.		1	1		1	1	1	1
Regional Regulator providing arbitration services for international trades.		1	1		1	1	1	1
Regulation managed by national regulators with an association to debate the Regional Power Pool issues.		2	3		3	3	3	3
Transmission wheeling tariff unrelated to internal Transmission Use of System (TUOS) tariff and set by regional regulator.		3	3		3	1	3	1

Chapter 5
Summary and Conclusions

CHPTTER 5

CONCLUSION

Based on the reply of only eleven countries, results have shown the following:

A. Priority of Purpose Of International Trade:

"**Security of Supply**" has the first priority among all countries, while the "**Quality of Supply"** has the least, except for France which gives the first priority to "**Efficient Long Term Investment Planning**".
Chart (5.1)shows different priorities according to each country.

B. Transmission Rights:
Also, among all transmission rights, that "**central dispatch of an interconnection network, with national dispatchers taking dispatch as instructions as a priority**" has the highest priority.
Chart (5.2)shows different priorities according to each country.

C. Regulatory Status and Market Implementation:

Table (5.1) shows the progress among member countries with respect to year 2007 benchmarking process**.**

Chart (5.1)

Priority of Purpose of International Trade

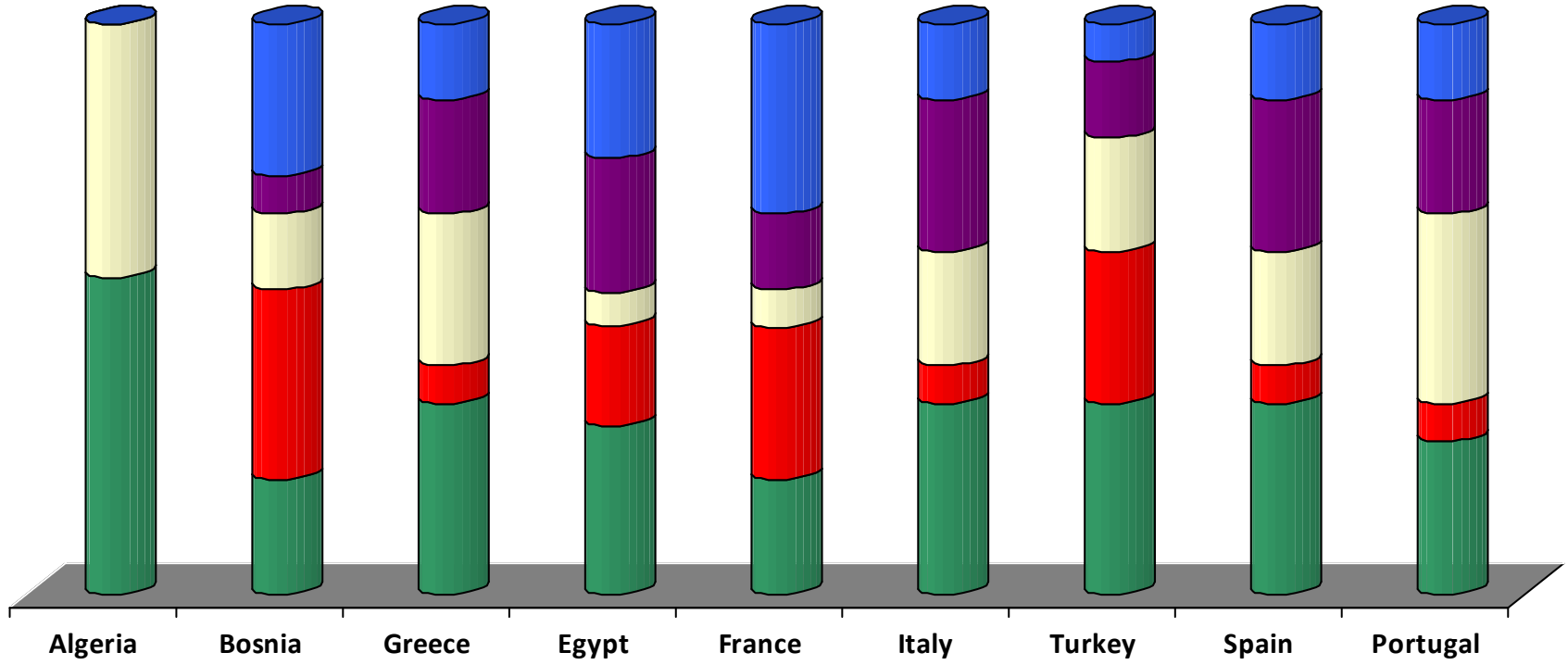
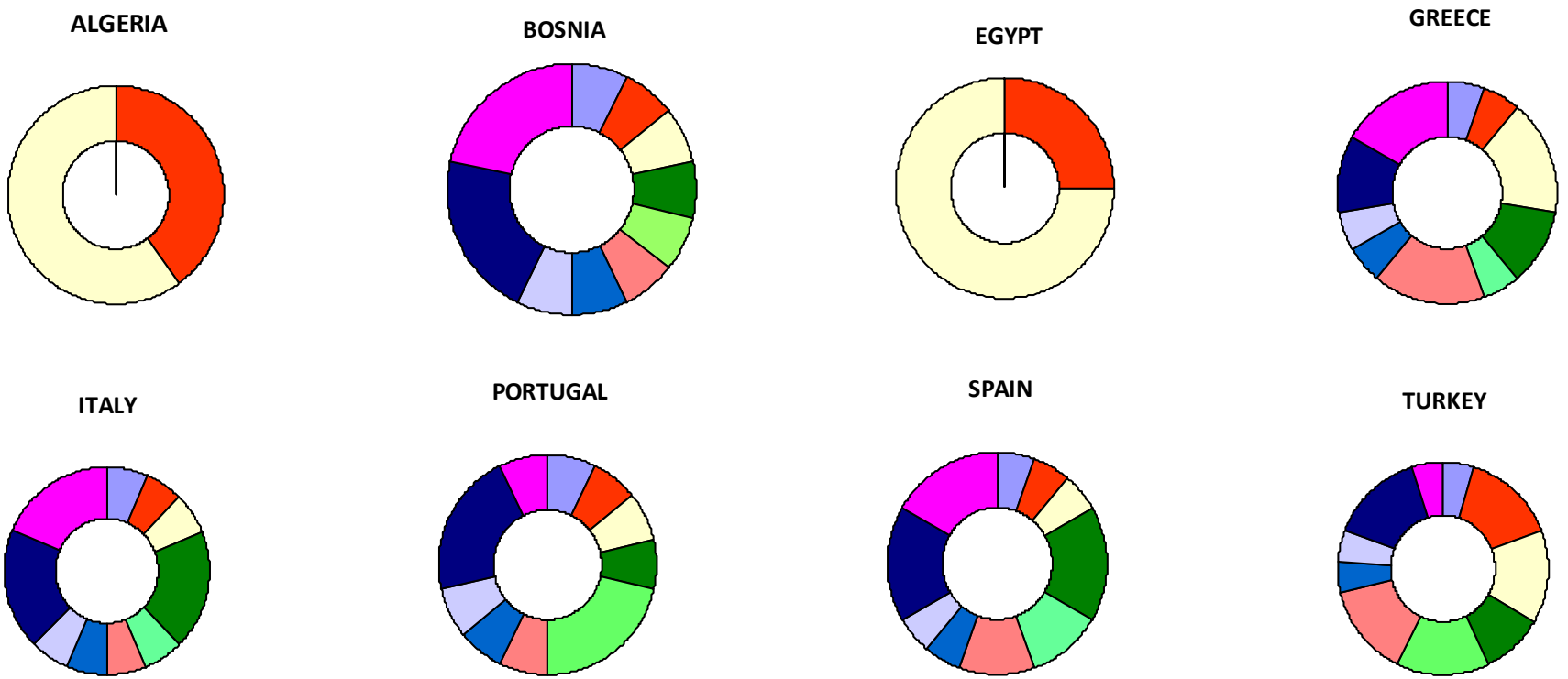


Chart (5.2)

Transmission Rights



- 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 (TUOS) tariff and set by regional regulator.

Table (5.1)

Regulatory Status and Market Implementation Progress

Country	Algeria		Bosnia		Greece		Egypt		Italy	
Year	**07**	**10**	**07**	**10**	**07**	**10**	**07**	**10**	**07**	**10**
Legislative and regulatory framework	Fulfilled	Fulfilled	In progress	In progress	-	Fulfilled	In progress	In progress	Fulfilled	Fulfilled
Financial viability of the industries	In progress	In progress	In progress	In progress	-	In progress	In progress	In progress	Fulfilled	In progress
Unbundling of the industries	In progress	In progress	In progress	In progress	-	Fulfilled	Starting phase.	Starting phase	Fulfilled	Fulfilled
Removing obstacles to competition	Fulfilled	Starting phase	Starting Phase	Fulfilled	-	Starting phase	Starting phase	Starting phase	In progress	Fulfilled
Market access	Fulfilled	In progress	Fulfilled	Fulfilled	-	Fulfilled	Starting phase	Starting phase	Fulfilled	Fulfilled
Market Arrangements	Not yet.	Starting phase	In progress	Not Yet	-	Fulfilled	Starting phase	Starting phase	Fulfilled	Fulfilled
Implementation of national market	Not yet.	Starting phase	In progress	Not Yet	-		In progress.	In progress	Fulfilled	Fulfilled
Regulation	Fulfilled	Fulfilled	Fulfilled	Fulfilled	-	Fulfilled	In progress	In progress	Fulfilled	Fulfilled
Technical and commercial rules and agreements	Starting phase.	In progress	Starting Phase	Fulfilled	-		In progress.	In progress	Fulfilled	Fulfilled
Infrastructure requirements for market operation	In progress.	Fulfilled	Not Yet	Fulfilled	-	Fulfilled	Not yet.	Not yet.	Fulfilled	Fulfilled
Imports and exports	Not yet.	Not yet.	Fulfilled	Fulfilled	-	In progress	Not yet	Not yet.	Fulfilled	Fulfilled

Country	Jordan		Portugal		Malta		Spain		Turkey	
Year	**07**	**10**	**07**	**10**	**07**	**10**	**07**	**10**	**07**	**10**
Legislative and regulatory framework	In Progress	-	Fulfilled	Fulfilled	Fulfilled	In progres	Fulfilled	Fulfilled	Fulfilled	Fulfilled
Financial viability of the industries	In Progress	-	Fulfilled	In Progress	Fulfilled	Not Yet	Fulfilled	In progress	In progress	Fulfilled
Unbundling of the industries	In Progress	In Progress	Fulfilled	Fulfilled	Not yet.	Not yet.	Fulfilled	Fulfilled	In progress	Fulfilled
Removing obstacles to competition	Fulfilled	In Progress	Fulfilled	Fulfilled	Starting phase	Not yet.	Fulfilled	Fulfilled	Fulfilled	Fulfilled
Market access	Starting Phase	Fulfilled	Fulfilled	Fulfilled	Not yet	Starting phase	Fulfilled	Fulfilled	Fulfilled	Fulfilled
Market Arrangements	In progress	Starting Phase	Fulfilled	Fulfilled	Starting phase	Not yet.	Fulfilled	Fulfilled	Fulfilled	Fulfilled
Implementation of national market	Not Yet	Fulfilled	Fulfilled	Fulfilled	Not yet.	Not yet.	Fulfilled	Fulfilled	In progress	Fulfilled
Regulation	Fulfilled	Fulfilled	Fulfilled	Fulfilled	In progress	In progres	Fulfilled	Fulfilled	Fulfilled	Fulfilled
Technical and commercial rules and agreements	In progress	Fulfilled	Fulfilled	Fulfilled	Starting phase	Starting phase	Fulfilled	Fulfilled	Fulfilled	Fulfilled
Infrastructure requirements for market operation	In progress	-	Fulfilled	Fulfilled	In progress	Not yet	Fulfilled	Fulfilled	In progress	Fulfilled
Imports and exports	In progress	Fulfilled	Fulfilled	Fulfilled	Not yet	Not yet	Fulfilled	Fulfilled	Fulfilled	Fulfilled

Appendix A
Action Plan

b. AD HOC GROUP ON ELECTRICITY (ELE AG)

The objective of ELE Ad hoc Group is to promote the integration of member countries electricity markets. Starting from the assessment of the current status and expected evolution of MEDREG electricity markets, the ELE AG will identify the basic requirements to harmonize and improve regulation in the MEDREG countries. Better regulation is needed to develop an integrated, competitive and functioning electricity market in the region. To this aim the ELE AG will examine and, in case, will propose common positions on the following subjects:

- present and future interconnections infrastructure needs (for the establishment of an integrated electricity market) from the technical, economic, and financial perspectives;
- future of Smart Grids in MEDREG countries;
- unbundling of sector activities;
- operational issues concerning cross border exchange and congestion management practices;
- market design;
- transparency of market information and services;
- non discriminatory TPA to infrastructure and services;
- tariff methodologies;
- _price regulation.

The aim of the ELE AG is to establish an investor friendly environment in MEDREG countries in the field of electricity generation, transmission, distribution and trade as well as to harmonize the legal and technical framework. Moreover, it will:
monitor electricity exchange activities among member countries;
propose unified/general rules/guidelines for electricity exchanges among member countries;

- investigate the possibility of establishing a reliability council[2];
- carry out work needed towards the eventual development of an electricity master plan within MEDREG member countries; this should be connected with work performed by other projects and entities, institutional or otherwise, in relation to the Mediterranean Electricity Ring (MEDRING) and other interconnections projects;
- establish a recommended implementation plan to implement the recommended cross border trade guidelines;
- establish a benchmarking process for both the internal market organization and cross border practices (including MEDRING implementation status);
- initiate a training program for MEDREG members.

Expected Output:
_ A master plan for energy and interconnection expansion that reflects the approach of Regulators, as agreed among MEDREG members;
_ Report on the present and future needs on interconnections infrastructures investments necessary to integrate the Mediterranean electricity market;
_ Report on the Smart Grids in MEDREG countries;
_ Proposals on common rules /guidelines for electricity exchanges among MEDREG member countries;
_ a benchmarking report for internal markets and cross border trade;
_ a functional training program.

***Training needs*:**
In order to better achieve the goals set up above is necessary to study in depth:

- Non discriminatory TPA to electricity infrastructure;
- Development of new electricity infrastructure and interconnection capacity among countries;
- Electricity Markets
    - Wholesale market and power exchange
    - Retail Market
    - Balancing markets
- Use of regulated tariffs for end consumers during transition towards market opening;
- Experience with market reform, while fading out regulated prices for the end-consumers;
- Market monitoring and surveillance;
- Security of supply in electricity generation;
- Impact of market design on generation adequacy;
- Experience with market reforms as a means to stimulate investment in electricity;
- Quality of supply and the protection of energy consumers, commercials and technical quality of service obligations, continuity of supply and safety in liberalized markets in electricity.

Appendix B

Survey Form

Part (A)

Legislative and regulatory framework

Definitions:

- **Separation of policy and operation**: Existence of comprehensive statement of government energy policy that supports market liberalisation and provides for autonomy in the operation of commercial enterprises.
- **Legislative basis for regulatory agency**: Primary legislation that establishes a regulatory agency.
- **Legislative basis for market mechanisms**: Primary legislation that permits market mechanisms to be implemented.
- **Legislative basis for industrial restructuring**: The law that defines the necessary market functions, the licensing of those functions and prescribes how existing entities are to be restructured to perform those functions.
- **Provision for private participation**: Market restructuring can occur within a wide range of public and private ownership, but competition will not exist without significant private participation. The law allows for effective private ownership of assets and management of activities particularly in production and supply.
- **Competition rules:** The rules to ensure fair competition and avoid market abuse

Topic	Separation of policy and operation	Legislative basis for regulatory agency	Legislative basis for market mechanisms	Legislative basis for industrial restructuring	Provision for private participation	Competition rules
Jan. 2010	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯
2015	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯

Remarks

(a) Financial viability of the industries

Definitions:

- **Cost-reflective tariffs**: Tariffs that recover the costs of the industry taken as a whole with adequate provision for new investment.
- **Elimination of cross subsidies**: Cross-subsidies lead to higher risks of inadequate revenues for market participants.
- **Transparent subsidies to targeted groups**: e.g., Life-line tariffs with transparent funding from the government budget.
- **Reduction of non-technical losses**: Efforts to reduce non technical losses including government support for companies to collect revenues from delinquent customers or to reduce theft.
- **Transitional commercial arrangements**: Arrangements needed to be made for stranded assets or to recover rents.

Topic	Cost-reflective tariffs	Elimination of cross subsidies	Transparent subsidies to targeted groups	Reduction of non-technical losses	Transitional commercial arrangements
Jan. 2010	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯
2015	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯
Remarks					

- If No please include the expected date for fulfillment with your comments if possible

(b) Unbundling of the industries

Definitions:

- **Disaggregating of activities**: unbundling of the industries into generation, transmission and distribution.
- **Transmission network operations and market functions**: Transmission network functions are the transmission network asset management and operating the integrated power system. In a wholesale market environment, one further function is needed to operate the market. Those functions can be either lumped together or separated from one another. The decision is based on the local environment .e,g :,ISO, TSO
- **Power Exchange**: Liberalized markets where electricity is treated as a commodity allow financial trade in electricity, the establishment of a market place for this trade is a natural step.
- **Balancing energy pricing**: Balancing energy may be traded at regulated prices or at a spot price set through a bidding mechanism.
- **Ancillary services trade**: Ancillary services are a must for the secure and stable operation of power systems. Different legislative domains specify those services and their respective markets.

Topic	Disaggregating of activities	Transmission network operations and market functions	Power Exchange	Balancing energy pricing	Ancillary services trade
Jan. 2010	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯
2015	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯
Remarks					

(c) Removing obstacles to competition
Definitions:

- **Break up of dominant positions**: Indications of the manner in which dominant positions will be diminished.
- **Electricity network extension**: The transmission system owner should be obliged to provide a transmission system expansion plan with an indication of how congestion is to be relieved and adequate capacity to support new entrants is to be provided

Topic	Break-up of dominant positions		Network extension	
Jan. 2010	Yes ◯	No ◯	Yes ◯	No ◯
2015	Yes ◯	No ◯	Yes ◯	No ◯
Remark				

(d) Market access
Definitions:

- **Definition of eligible consumers**: The Law provision for the definition of consumers that may participate in a competitive market (eligible consumers). Precise definition would normally be the responsibility of the regulator under guidance from government.
- **Definition of Use of System** (UOS) charges: The defined mechanism for the determination of cost-reflective, non-discriminatory UOS charges initiated either by the regulator or by the transmission system owner.
- **Procedures for congestion management**: The defined mechanism for non-discriminatory access to networks (charging principles, the allocation of transmission rights and methods of congestion management) initiated either by the regulator or preferably by the transmission system owner subject to regulatory approval.
- **Non-discriminatory operational rules**: The defined mechanism for non-discriminatory operation of systems including dispatch of generating plant and balancing

Topic	Definition of eligible consumers	Definition of Use of System charges	Procedures for congestion management	Non-discriminatory operational rules
Jan. 2010	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯
2015	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯
Remarks				

(e) Market Arrangements
Definitions:

- **Definition of market form**: A clear decision by government concerning the market form to be adopted and clear specification of responsibilities for design and implementation.
- **Establishment of market rules**: A clear and operational specification of rules for primary exchanges of electricity, ancillary services and balancing markets. These should normally be founded in consultation with industry and the regulator.
- **Review and drafting of agreements**: The codes and agreements to implement the market need to be drafted; the exact form of the agreements will depend upon the form of market that is selected
- **Specification and implementation of settlement systems**: A clear and operational specification of financial settlement systems based on consultation with industry and the regulator.

Topic	Definition of market form	Establishment of market rules	Review and drafting of agreements	Settlement systems
Jan. 2010	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯
2015	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯
Remarks				

Implementation of national market

Definitions:

- **Official and political responsibility** :A clear overall official and political responsibility and accountability
- **Action plan**: A clear and operational action plans with schedules and responsibilities known to participants
- **Programme management** : Adequate and effective programme management arrangements and implementation
- **First operation of the market** :An agreed date for first operation of the market

Topic	Official and political responsibility	Action plan	Programme management	First operation of the market
Jan. 2010	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯
2015	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯
Remarks				

(f) Regulation

Definitions:

- **Independence of regulator**: Independence includes own funding and appropriate appointment procedures. It also means that regulatory decisions should not be capable of reversal by the Ministry.
- **Powers to perform his duties**: The adequate powers possessed by the regulator to make necessary determinations, powers to require the information on which to base determinations and powers to enforce compliance with determinations e.g. penalties, revocation of licences.
- **Definition of regulatory principles**: The regulator should operate within a clearly defined framework of duties and responsibilities, including reporting and accountability. The regulator should define procedures for working and principles upon which decisions shall be made.
- **Regulatory capacities**: The regulator should have sufficient staff with appropriate skills.

Topic	Independence of regulator	Powers to perform his duties	Definition of regulatory principles	Regulatory capacities
Jan. 2010	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯
2015	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯
Remarks				

(g) Technical and commercial rules and agreements

Definitions:

- **Network Codes**: Transmission and distribution codes need to be prepared and published
- **Use of System agreements**: Should be prepared and published
- **Connection charges and procedures**: Agreements should be prepared and published for connections to the transmission and distribution systems

Topic	Network Codes	Use of System agreements for transmission network	Connection charges and procedures
Jan. 2010	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯
2015	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯
Remarks			

(h) Infrastructure requirements for market operation

Definitions:

- **Specification of system metering needs**: The metering of exchanges between system-entities should be reviewed, deficiencies identified and remedies prescribed.
- **Specification of consumer metering needs**: The metering of consumers should be reviewed for consistency with eligibility and market arrangements, deficiencies identified and remedies prescribed.
- **Specification of communication and IT requirements**: The communication and IT infrastructure should be reviewed for consistency with eligibility and market arrangements, deficiencies identified and remedies prescribed.
- **Procurement**: Responsibilities for procurement need to be defined and finance arranged; includes procurement and commissioning of the IT

Topic	Specification of system metering needs	Specification of consumer metering needs	Specification of communication and IT requirements	Procurement
Jan. 2010	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯
2015	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯
Remarks				

Imports and exports

Definitions:

- **Institutional arrangements for use of interconnections**: National rules on imports and exports and on the use of interconnections with neighbouring systems may need to be adjusted to allow economic trading.
- **Charging arrangements**: European experience has shown that it is difficult to implement rational solutions because of existing capacity entitlements and the issue has not been finally resolved. It is a topic which will require detailed examination among MPs at sub-regional and regional level.

Topic	Interim arrangements for use of interconnections	Final arrangements for use of interconnections	Charging arrangements
Jan. 2010	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯
2015	Yes ◯ No ◯	Yes ◯ No ◯	Yes ◯ No ◯
	Remarks		

Part (B)

Generators

Description		Jan. 2010	2015
Generated (MW) relevant to Peak Load			
Installed Capacity (MW)	Thermal		
	Hydro		
	Nuclear		
	Wind		
	Others		
	Total		
Generated Energy (MWh)	Thermal		
	Hydro		
	Nuclear		
	Wind		
	Others		
	Total		

Transmission Network

Description		**Jan. 2010**		**2015**	
Peak Load (MW)					
Transformers Capacities (MVA)	500 kV				
	220 kV				
	132 kV				
	66 kV				
	Others				
Lengths of Transmission Networks (km)		**O.H.T.L.**	**U.G.C**	**O.H.T.L.**	**U.G.C**
	500 kV				
	220 kV				
	132 kV				
	66 kV				
	Others				
Purchased Energy (MWh)	500 kV				
	220 kV				
	132 kV				
	66 kV				
	Others				
Sold Energy (MWh)	500 kV				
	220 kV				
	132 kV				
	66 kV				
	Others				

Number of Customers	500 kV		
	220 kV		
	132 kV		
	66 kV		
	Others		

O.H.T.L. Over Head Transmission Line ***U.G.C. Under Ground Cable***

Distribution Network

Description		Jan. 2010		2015	
Peak Load (MW)					
Distribution Transformers Capacities (MVA)	**22 kV**				
	11 kV				
	Others				
Length of Distribution Lines & Cables (km)		**O.H.T.L.**	**U.G.C**	**O.H.T.L.**	**U.G.C**
	22 kV				
	11 kV				
	Others				
Purchased Energy (MWh)	**22 kV**				
	11 kV				
	Others				
Sold Energy (MWh)	**Residential**				
	Industrial				
	Commercial				
	Others				
Number of Customers	**Residential**				
	Industrial				
	Commercial				
	Others				

O.H.T.L. Over Head Transmission Line ***U.G.C. Under Ground Cable***

Interconnection

Cross-Border-Trade (Congestion Management) Methods:

- **No Congestion.**
- **Limited Access.**
- **Implicit Auction**:
  Explicit auction is when the transmission capacity on an interconnector is auctioned to the market separately and independently from the marketplaces where electricity is auctioned. The capacity is normally auctioned in portions through annual, monthly and daily auctions. Since the two commodities transmission capacity and electricity are traded at two separate auctions, there is a lack of information about the prices of the other commodity. This lack of information can result in an inefficient utilization of interconnectors, i.e. less social welfare, less price convergence and more frequent adverse flows*.
- **Explicit Auction**:
  With implicit auction the day-ahead transmission capacity is used to integrate the spot markets in the different bidding areas in order to maximize the overall social welfare in both (or more) markets. The flow on an interconnector is found based on market data from the marketplace/s in the connected markets. Thus the auctioning of transmission capacity is included (implicitly) in the auctions of electricity in the market. In implicit auctions the transmission capacity between bidding areas (price areas/control areas) is made available to the spot price mechanism in addition to bid/offers per area, thus the resulting prices per area reflect both the cost of energy in each internal bidding area (price area) and the cost of congestion. Implicit auctions ensure that electricity flows from the surplus areas (low price areas) towards the deficit areas (high price areas) thus also leading to price convergence.
  Implicit auction signifies the concept used for both 'market coupling' and 'market splitting'. There is not necessarily any difference in the calculation algorithms or principals used for market coupling and market splitting. What differentiates market coupling from market splitting is how the algorithm is operated and owned, and which results from the central calculation the local markets use subsequently*.
- **Others.**

**** Online: http://www.nordpoolspot.com/PowerMaket/The-Nordic-model-for-a-liberalised-power-market/Implicit-auction/***

Interconnection	Cross-Border-Trade (Congestion Management) Method	Jan. 2010				2015			
Country (1)		Voltage (kV)	Length (km)	Capacity (MVA)	Type	Voltage (kV)	Length (km)	Capacity (MVA)	Type
		AC ◯ DC ◯				AC ◯ DC ◯			
Country(2)		Voltage (kV)	Length (km)	Capacity (MVA)		Voltage (kV)	Length (km)	Capacity (MVA)	
		AC ◯ DC ◯				AC ◯ DC ◯			
Country(3)		Voltage (kV)	Length (km)	Capacity (MVA)		Voltage (kV)	Length (km)	Capacity (MVA)	
		AC ◯ DC ◯				AC ◯ DC ◯			

Country(4)		Voltage (kV)	Length (km)	Capacity (MVA)		Voltage (kV)	Length (km)	Capacity (MVA)	
		AC DC ◯ ◯				AC DC ◯ ◯			

- ***Please specify all connection lines separated by backslash***
- ***Please indicate voltage type by checking the relevant circle***
- ***Please provide the interconnection type(single or double circuit, overhead line or submarine cable)***

Market Information

Description	Jan. 2010	2015
Energy Produced by IPPs (MWh)		
Energy Produced by Embedded Generation (MWh)		
Energy Sold in Liberalized Market (MWh)		
Energy Sold in Regulated Market (MWh)		

Part (C)

Q1. Internal Structure of the Electricity Sector Organization:

The internal structure of the electricity sector can be one of the following four categories:

- Fully vertically integrated. ……
  - State open structure with/without IPPs selling into the organization on long term.
  - Power Purchase Agreements (PPAs) are applicable.

- Unbundled……
  - Generation (State and private owned), Transmission (Monopoly TSO), and Distribution (Local monopoly state or private-owned) unbundling.
  - Large industrial customers can directly contract with Generators to supply part/all of their demand.
  - No implementation of time value of electricity.
  - Regulated tariffs with no choice of the supplier for retail customers.

- Pool/Single Buyer Wholesale Market……
  - As discussed in Unbundled Structure, but supplier offering production the central buyer which is responsible for dispatch of least cost generation.
  - Electricity purchase by the hour or half hour.
  - Regulated tariffs are permitted at the domestic level.
  - PPAs for large industrial customers with balancing prices set at pool clearing prices or similar as agreed.

- New Market……
  - It is based on bilateral Contracts between buyers and sellers.
  - Short term or spot market for day ahead trades are managed by through a Power Exchange.
  - A Balancing Market is carried out to enable TSO to manage constructional imbalance.
  - A market for ancillary services is applicable.

Please choose the closest structure and fill its number in the corresponding time period under investigation and the market start-up date and market operator name if applicable:

Country	**Market Start-up Date**	**Market Operator Name**	**Time Period Under Investigation**	
			Jan. 2010	2015
			Remarks:	

Q2. Priority of purpose for international trade:

Regardless of the market structure, interconnecting regional systems have various positive impacts such as:

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

Please order the above mentioned positive impacts based on your electric system's welfare (not as applied to the whole market):

Country	Jan. 2010	2015
	◯ ◯ ◯ ◯ ◯	◯ ◯ ◯ ◯ ◯

Q3. Volume of Actual, Imports, and Exports in Total:

Please express the total energy volume that you would expect to import in total assuming no technical constraint in interconnections:

Note: Import (%) is calculated as a percentage of the total demand; and Export (%) is calculated as a percentage of the total generation.

Country	**Time Period Under Investigation**					
	Jan. 2010			2015		
	Actual (MWh)	Import (%)	Export (%)	Estimated (MWh)	Import	Export
					Increasing ◯	Increasing ◯
					The Same ◯	The Same ◯
					Decreasing ◯	Decreasing ◯
	Remarks:					

Q4. Base Load Imports and Capacity available for Potential Export:

Please express your prediction of the amount of imported power to be spent for as base load and the amount of spare capacity to export at base load duration assuming no technical constraint in interconnections:

Note: Import (%) is calculated as a percentage of the total demand; and Export (%) is calculated as a percentage of the total generation.

Country	**Time Period Under Investigation**					
	Jan. 2010			2015		
	Actual Base Load (MW)	Imported at Base Load (%)	Available to Export (%)	Estimated Base Load (MW)	Imported Power at Base Load	Spare Capacity Available to Export
					Increasing ○	Increasing ○
					The Same ○	The Same ○
					Decreasing ○	Decreasing ○
	Remarks:					

Q5. Peak Load Imports and Capacity available for Potential Export:

Please express your prediction of the amount of imported power to be spent for as peak load and the amount of spare capacity to export at peak load duration assuming no technical constraint in interconnections:

Country	Jan. 2010			2015		
	Actual Peak Load (MW)	Imported at Peak Load (%)	Available to Export (%)	Estimated Peak Load (MW)	Imported Power at Peak Load	Spare Capacity Available to Export at Peak Load
					Increasing ◯	Increasing ◯
					The Same ◯	The Same ◯
					Decreasing ◯	Decreasing ◯
	Remarks:					

Q6. Ancillary Services:

Would you consider contracting for reserves and other ancillary services from within the pool?

Please answer with Yes or No:

Country	**Service**	Jan. 2010				2015			
	Spinning reserve	Yes	◯	No	◯	Yes	◯	No	◯
	Hot start	Yes	◯	No	◯	Yes	◯	No	◯
	Reactive power	Yes	◯	No	◯	Yes	◯	No	◯
	Black start	Yes	◯	No	◯	Yes	◯	No	◯

Q7. Power Pool Form:

Four main types of power pools are available based on a given level of integration as follows:

- **Interconnection:**
  - The integration of interconnected power systems are synchronized with each other (no particular coordination or joint optimization of their respective system).
  - Trade is made under long-term power exchange agreements, and additional energy sales only happen in emergency cases.
  - Cost savings are mostly the result of economies of scale in power generation: large projects can sell their output to more consumers, and therefore be more easily viable.
  - Prices are set through negotiations between regulatory authorities.

- **Loose Pool**
  - They are more integrated because they coordinate dispatch between power systems.
  - Short-term exchange is applicable.
  - Reserve (capacity margins) can be shared, resulting in additional savings.

- **Tight Pool**
  - All power plants are dispatched from a centralized location, according to least production cost principles, under transmission capacity constraints.
  - The dispatching approach can minimize short-run generation costs and therefore be the source of additional cost savings.

- **New Pool**
  - The spot market replaces all formal and explicit optimization techniques.
  - Competitive markets are responsible for the dispatch, which should be optimal in the absence of market failures.

Please answer with Yes or No to identify your preferable power pool form:

Country	**Service**	Jan. 2010				2015			
	Interconnection	Yes	◯	No	◯	Yes	◯	No	◯
	Loose Pool	Yes	◯	No	◯	Yes	◯	No	◯
	Tight Pool	Yes	◯	No	◯	Yes	◯	No	◯
	New Pool	Yes	◯	No	◯	Yes	◯	No	◯

Q8. Transmission Rights:

Open access to transmission services is an essential component of a power pool with several ways to implement a system's requirements.

Please indicate your degree of comfort with the following propositions as follows:

Low …… ◯

Medium …… ◯

High …… ◯

Please fill the corresponding number of you comfort level in the corresponding time period under investigation:

Country	**Propositions**	**Time Period Under Investigation**	
		Jan. 2010	2015
	Interconnection TLs owned by an independent regional TSO, jointly owned by participants.	◯	◯
		Remarks:	
	National links in network owned and operated by National TSO, bound by an open access agreement.	◯	◯
		Remarks:	

	Propositions	Time Period Under Investigation	
		Jan. 2010	2015
	Central dispatch of an interconnection network, with national dispatchers taking dispatch instructions as a priority.	◯	◯
		Remarks:	
	National dispatch with advice from a coordination center relating to the Regional Power Pool entry and exit points.	◯	◯
		Remarks:	
	Centrally managed short term market power exchange.	◯	◯
		Remarks:	
	Centrally managed Ballancing Market.	◯	◯
		Remarks:	

	Propositions	Time Period Under Investigation	
		Jan. 2010	2015
	Regional Regulator coordinating the enabling of national regulation and then enforcing it.	◯	◯
		Remarks:	
	Regional Regulator providing arbitration services for international trades.	◯	◯
		Remarks:	
	Regulation managed by national regulators with an association to debate the Regional Power Pool issues.	◯	◯
		Remarks:	
	Transmission wheeling tariff unrelated to internal Transmission Use of System (TUOS) tariff and set by regional regulator.	◯	◯
		Remarks:	

Q9. Regional Electricity Market Structure:

Please specify the structure of the regional market you are involved in if applicable:

(e.g. Spain-Portugal, Iberian Market- MIBEL, regional market start-up date 2007, Name of the Main Market Operator responsible of the process is the Spain Market Operator- OMIL)

Country	Market Name	Regional Market Start-up Date	Name of the Main Market Operator responsible of the process
	Remarks:		