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European, CIS and Mediterranean Interconnection: State of Play 2006

3rd SYSTINT Report

Joint EURELECTRIC-UCTE WG SYSTINT

(with contribution of WG SYSTMED and other experts)

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The **Union of the Electricity Industry–EURELECTRIC** is the sector association representing the common interests of the electricity industry at pan-European level, plus its affiliates and associates on several other continents.

In line with its mission, EURELECTRIC seeks to contribute to the competitiveness of the electricity industry, to provide effective representation for the industry in public affairs, and to promote the role of electricity both in the advancement of society and in helping provide solutions to the challenges of sustainable development.

EURELECTRIC's formal opinions, policy positions and reports are formulated in Working Groups, composed of experts from the electricity industry, supervised by five Committees. This "structure of expertise" ensures that EURELECTRIC's published documents are based on high-quality input with up-to-date information.

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Transparency, ethics, accountability

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UCTE

What is UCTE?

The Union for the Co-ordination of Transmission of Electricity (UCTE) co-ordinates the interests of transmission system operators in 23 European countries. Their common objective is to guarantee the security of operation of the interconnected power system. 50 years of joint activities laid the basis for a leading position in the world, which the UCTE holds in the quality of synchronous operation of interconnected power systems. Through the networks of the UCTE 450 million people are supplied with electric energy and annual electricity consumption totals approx. 2300 TWh. Close co-operation of member companies is imperative to make the best possible use of benefits offered by interconnected operation. For this reason, the UCTE has developed a number of rules and recommendations that constitute the basis for the smooth operation of the power system. Only the consistent maintenance of the high demands on quality will permit in the future to set standards in terms of security and reliability as in the past.

Key figures

33	Transmission System Operators (TSO)
23	European Countries
450	million Customers served by the represented power systems
587 GW	Installed capacity in 2005
2600 TWh	Electricity consumption in 2005
265 TWh	Sum of electricity exchange between member TSOs
200.000 km	Length of high-voltage transmission lines managed by the TSOs

Principles

– UCTE is convinced that the reliability of the biggest electric European synchronous interconnected area and the development of stable conditions for flourishing electricity markets in this area are inseparable and mutually interdependent issues.
– UCTE manages the security of the UCTE system, which is the ability of the system to withstand major or sudden disturbances, such as the loss of production units, grid elements, but also accidents or attacks.
– UCTE is monitoring the adequacy of the UCTE system, which is the structural ability of the system to balance actual power and energy demand.
– Each member TSO in UCTE is responsible for the quality of its own transmission system services, and together, all UCTE members will keep up the technical basis for a sound market development.
– UCTE ensures the quality of international transmission services, and also an early alert in case of declining generation and/or transmission capacities that might lead to sudden restrictions or adverse impacts on competitive electricity markets.

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Introduction

The year 2006 brought energy back into the political agenda. The March European Commission Green Paper on an Energy policy for Europe clearly identified a number of pressing challenges and launched a wide discussion on possible approaches and concrete measures.

The role of the grid as the essential facilitator of the power flows was – also in this context – strongly recognised. Further political discussion on what should be the vision for internal and external expansions of the grid, including the issue of accelerating constructions of the transmission lines of European interest will continue throughout 2007 and beyond.

EURELECTRIC – the Union of the Electricity Industry jointly with **UCTE the Union for the Coordination of Transmission Electricity** wishes to contribute to this debate with a factual report on interconnections development, entitled ***European, CIS and Mediterranean Interconnection: State of Play 2006.***

The report in your hands is already the 3rd edited version of a regular report prepared by the joint EURELECTRIC-UCTE working group SYSTINT with contributions from SYSTMED[*] and other experts. It provides an up-to-date snapshot of development of interconnections and electricity markets across the European and Eurasian continents and in the Mediterranean basin. With 51 country reports, it aims to serve as an information aid to all parties in the wider European space involved with the challenges of interconnections development.

The first chapter of the report begins with a short introduction on the history of interconnections and explains the main factors that led to the current framework for interconnection development. The main part of this chapter focuses on an overview of the current status of the interconnected electric system, providing information on the following blocks of power systems: UCTE, NORDEL, United Kingdom, Interconnected/Unified Power Systems of CIS and Baltic States, Turkey, South-Eastern and South-Western Mediterranean blocks; plus Mediterranean Isolated Systems. Individual contributions from countries covered by these blocks are presented in the Annex 1. The driving forces underpinning ongoing *development* of interconnection and the current and potential new studies and projects themselves are presented in the second chapter of the report. Overall conclusions and recommendations are summarised in the third and final chapter.

The SYSTINT working group - the author of the report - was set up in 1990, jointly with the former ***Union for the Co-ordination of Production and Transmission of Electricity (UCPTE)*** to study the possibility of interconnecting the Western and Central European systems. Today, this working group operates within the framework of the Memorandum of Understanding between EURELECTRIC and UCTE, signed in October 2000.

In line with its mission, EURELECTRIC focuses on the electricity industry as a whole, including the value chain from generation through transmission and distribution to supply to final customers. However, EURELECTRIC represents the transmission network users' point of view in matters related to the functioning of the EU electricity market, while UCTE is responsible for the co-ordination of technical and operational matters, especially system security and adequacy, of the synchronously interconnected system. In order to ensure co-ordination with other relevant associations and activities, SYSTINT liaises with NORDEL and the SYSTMED working group.

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[*] *The SYSTMED Working Group was formally set up in 1993 by UNIPEDE (now EURELECTRIC), in agreement with MEDELEC, the "Liaison Committee of Electricians around the Mediterranean Basin", composed of the following 5 Electricity Industry Associations: EURELECTRIC, UCTE, COMELEC, UPDEA (Africa), AUPTDE (Arabian countries).*

1. THE INTERCONNECTED ELECTRIC SYSTEMS: PRESENT STATUS

1.1 The Long Process of Developing Interconnected Electric Systems

For ***the continental part of Europe***, the development of cross-border lines started in 1920, mainly as a way of taking advantage of the Swiss hydropower. Surprisingly, cross-border interconnections took place before the national interconnections since in most European countries the national networks were not yet interconnected, and the process of interconnection slowed down and was restricted to radial operation of power plants from one country to another.

After the Second World War, the process of constructing cross-border lines restarted, resulting in the creation of three main systems by 1958. These systems comprised the following groups of countries:

- France, Spain and Portugal;
- Netherlands, Belgium, Germany, Austria and former Czechoslovakia; and
- Italy;

plus a part of Switzerland which was divided between these three blocks.

The systems were isolated from each other, with exchanges restricted to radial operation using the 220 kV lines.

In 1958, synchronous operation of the two first blocks was achieved with a common point in Switzerland and moved towards full synchronous operation in the early 1960s. Former Yugoslavia joined in 1977, followed by Greece (with Albania) in 1985. In order to assist and promote the process of integration, the ***Union for the Co-ordination of Production and Transmission of Electricity (UCPTE)*** was founded in 1951. In 1999, UCPTE changed its name into ***UCTE*** which is now ***the Organisation of Transmission System Operators.***

Northern European countries started the process of integrating their national systems later. The first noticeable tie lines were put into operation at the beginning of the 1960s, but developed strongly under the aegis of ***the Organisation for Nordic power co-operation (NORDEL).*** Several undersea cables (direct current lines) interconnect the Nordic system with neighbouring countries (Germany, Poland and the Baltic States) as well as a powerful back-to-back station – the UPS of Russia. Another project to interconnect the Netherlands and Norway via submarine line is well advanced.

The current UCTE system comprises the transmission systems of 23 European countries. Through the networks of the UCTE, about 450 million people are supplied with electric energy, with an annual electricity consumption totalling approximately 2600 TWh. Thirty-five transmission system operators (TSO) have agreed upon a strong common regime of frequency control in order to maintain a stable 50-Hz frequency, which is quickly restored even in the case of a loss of generating capacity of 3000 MW.

With the permanent interconnection of ***the CENTREL system*** (organisation for the synchronous interconnection of the electric power system of the Czech Republic, Slovakia, Poland and Hungary) to the UCTE system in 1995, some 60 GW were added to the 400 GW of UCTE. Apart from many other preparatory measures, the UCTE "catalogue of measures", often referred to as "Maßnahmenkatalog", required remedies (e.g. power system stabilisers (PSS)) against inter-area oscillations within the enlarged system (the longest distance covered is about 3000 km from Portugal to the eastern boarder of Poland). For a long time, the continental part of Denmark has been running its power system synchronously with UCTE.

The grids of South-East Europe have been part of the UCTE synchronous system since 1974. As a consequence of war damages in some areas of ex-Yugoslavia, the greater part of the Balkan Peninsula (including the Greek system) was disconnected from the central UCTE system in 1991. After 13 years of separation, the UCTE 1 & UCTE 2 zones were reconnected again in October 2004. Following a one-month successful test phase, a gradual commercial exchange between the former zones started on 1 November

2004. Romania and Bulgaria were permanently synchronously connected to the former UCTE 2 zone in summer 2003. In the same year, they became new members of UCTE. This important physical reconnection performed in 2004 *(Figure 1)* will allow gradual reintegration of the electricity markets of the former 2nd UCTE synchronous zone – Bulgaria, Romania, Serbia, Montenegro, the Former Yugoslav Republic of Macedonia, Albania, Bosnia-Herzegovina and Greece - into the European Union's internal electricity market.

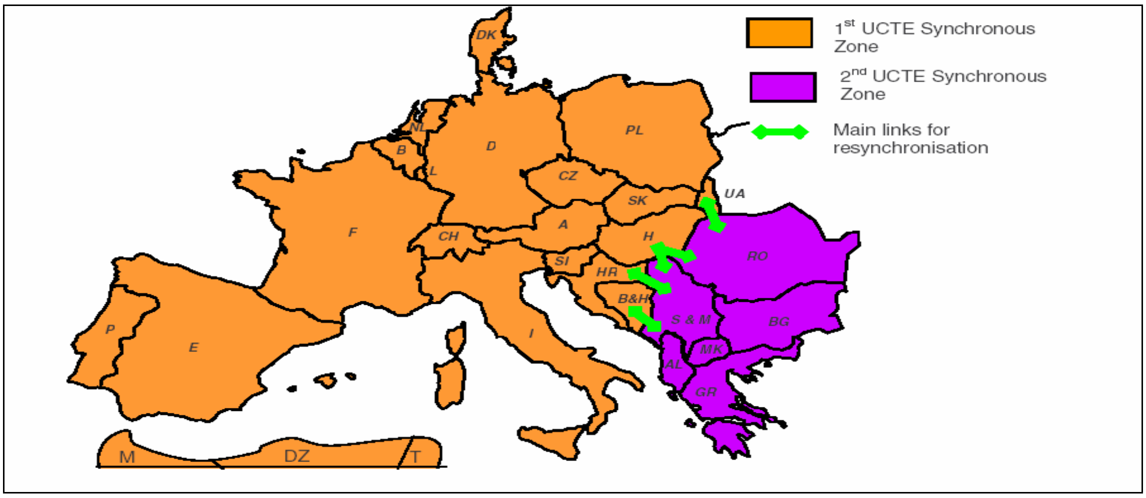


Figure 1: *The reconnection of UCTE1 & UCTE2 zones in 2004*

Following the synchronous connection of CENTREL with UCTE in October 1995, the ***Western power system of Ukraine*** (so called "Burshtyn island") has been running a permanent operation with the UCTE system since 2003, after a trial year of synchronous operation.

In addition, there already exist some AC (alternating current) interconnections ***beyond the border of the UCTE system.*** In 1997, an AC submarine cable was put into operation to connect Spain with Morocco across the Strait of Gibraltar. As there are further interconnections between Morocco, Algeria and Tunisia, this part of Africa is now synchronously connected to the UCTE system. This large synchronous zone operates at the same frequency and is often referred to as ***TESIS*** (Trans-European Synchronously Interconnected System).

Even within the UCTE system, there are some ***smaller networks*** (the islands of Sardinia and Corsica) that are connected to the main system via DC submarine links to continental Italy. Between Italy and Greece, a DC (Direct Current) cable link across the Adriatic Sea supports the interconnection between these two countries' power systems (which started commercial operation in 2002).

While the UCTE system is mainly based on thermal production capacities (51% conventional, 35% nuclear out of 587 GW installed capacity), the five Nordic countries - Norway, Sweden, Finland, Denmark, and Iceland - rely mainly on hydro production (61% hydro out of 89 GW installed capacity).
The Nordic TSOs co-operate within NORDEL, an organisation similar to UCTE. The NORDEL system is connected to the UCTE system (including the continental part of Denmark) via powerful DC submarine cables. DC back-to-back converters (1400 MW) also exist between Finland and Russia.

Since 1986, ***the British system,*** comprising the supply systems of England, Wales and Scotland, has been interconnected with France via a 2 000 MW DC submarine cable link (greatly reinforcing the former connection of 160 MW dating from the 1960s). The Republic of Ireland operates an isolated system, with a weak connection only to Northern Ireland. Northern Ireland is now interconnected with Scotland via a 500 MW HVDC "Moyle" link.

1.2 The Main Driving Forces behind the Formation of the Present Interconnected Electric System

The formation of the present UCTE system results from a series of successive interconnections of national systems. This has been realised through a step-by-step process, where the procedures, tests and studies were standardised and where the new connecting countries adopted the UCTE standards.

In the past, the expansion of the system has been realised to satisfy the need for security and reliability of the system and to allow commercial exchanges between vertically integrated utilities.

This process has been very successful, leading to the creation of one of the biggest synchronous systems in the world with a high level of security and reliability.

The system has reached such a size and has developed such detailed common standards that no essential improvement of the whole UCTE system can be expected from the interconnection of new systems. However, new geographical extensions of the synchronous areas will be considered and investigated for the benefit of electricity market participants. For many countries, the synchronous interconnection of their electricity systems to the UCTE area represents significant economic and technical advantages. The same is true for peripheral countries of the UCTE. UCTE will pursue its efforts to develop the synchronous area, while observing objective criteria and procedures in order to maintain the whole system on a high level of reliability and stability.

Investigation on the possible interconnection of power systems of countries located on the Southern and Eastern Mediterranean Sea, who are not UCTE members and from which Morocco, Algeria and Tunisia are synchronously connected to UCTE, is a much more recent and still on-going process. This project was motivated by two goals, on one hand increasing security and reliability and on the other facilitating commercial trading of electricity.

The situation in the Mediterranean basin is similar to the one years ago in Europe, when interconnections were weak (or not existing at all). The gains in reliability that can be obtained through new interconnection links are quite important in the early phase, but later on, when internal links are enhanced, the additional gains are becoming progressively less important. Another push for interconnections relates to the possibility of developing systematic electricity exchanges in the presence of differences in the generation costs.

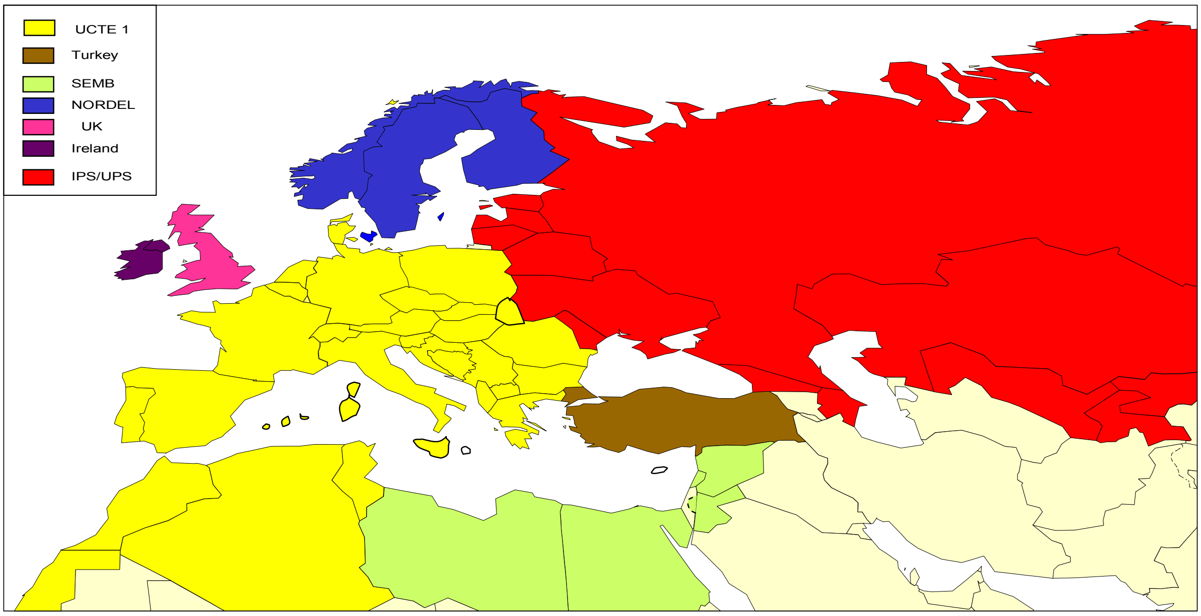
Many of the South Eastern Mediterranean Countries (SEMC) - by interconnecting among themselves - are seeking to achieve that first advantage. They are however now also looking to the second challenge - the possibility to export electricity from countries rich in domestic fuel (oil and natural gas) to countries (including European ones) with a higher fuel cost. For this purpose, new links are being studied which, by using Direct Current technology, can cross the sea and thus reduce transportation distances.

1.3 The Main Blocks: Present Status

The present European electric power system comprises a variety of regional, national and supranational supply systems. Some of these systems are operated synchronously under the same frequency control regime, and are interconnected by a great number of AC links, thus forming in reality a single, densely meshed, system. Other systems are interconnected by one or more powerful DC interconnectors, leading to manageable structures. Some others have to be operated as isolated systems, reflecting the geographical borders of Europe.

The following main blocks as depicted in *Figure 2* are described in the next chapters:

- ***European mainland synchronous power system (UCTE system),***
- ***Power system of the Nordic countries (NORDEL),***
- ***Power system of the United Kingdom (UKTSOA),***
- ***Power system of Ireland & North Ireland (ATSOI)***
- ***Unified and interconnected power systems of the Commonwealth of Independent States and Baltic States (IPS/UPS)***
- ***Power system of Turkey,***
- ***South-Eastern Mediterranean Block***
- ***South-Western Mediterranean Block and***
- ***Mediterranean Isolated Systems.***



Figu re 2: *The synchronous zones in 2006*

1.3.1 European Mainland Synchronous Power System - UCTE Block

The Union for the Co-ordination of Transmission of Electricity (UCTE) coordinates the operation and development of the electricity transmission grid from Portugal to Poland and from the Netherlands to Romania and Greece. UCTE, the association of transmission system operators in continental Europe in 23 countries, provides a reliable market base to all participants of the Internal Electricity Market and beyond.

The UCTE area now comprises the following countries: Portugal, Spain, France, Belgium, Luxemburg, Netherlands, Switzerland, part of Denmark, Germany, Italy, Austria, Czech Republic, Slovenia, Poland, Slovakia, Hungary, Croatia, Bosnia and Herzegovina, Albania, Serbia, Montenegro, Former Yugoslav Republic of Macedonia, Greece, Romania, Bulgaria and the western power system of Ukraine. The three Maghreb countries (Morocco, Algeria and Tunisia) are also synchronously interconnected to this system.

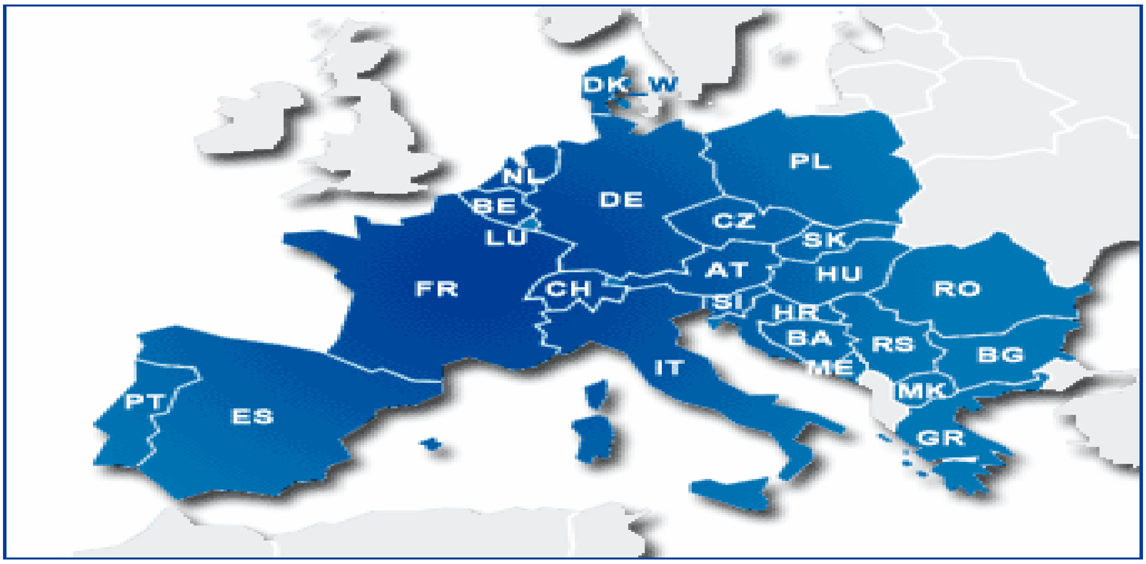


Figure 3: *European countries represented in UCTE in 2006*

There are now new challenges TSOs have to face since the start of the liberalisation process of the electricity sector in Europe. Grids must play a decisive role in coping with the dramatically growing cross-border flows for commercial reasons and also with the substantial amount of wind energy fed into grids without simultaneous reinforcement of the transmission infrastructure. UCTE's utmost priority is to ensure first of all of the compliance by all TSOs with the technical standards and requirements as defined in the UCTE Operation Handbook. Beyond this and as an outlook towards the horizon of 2010, UCTE is to master the upcoming challenges essentially in two areas:

- *System operation challenges and*
- *System development (internal/external)*

In the context of ***the system operation challenges***, UCTE advocates the following approach:

- Following recent developments, it appears that *the regional markets* within UCTE perimeter are likely to be the building blocks of any broader European market integration that will necessarily encompass non-EU countries. The UCTE main focus is standardising power system security standards as much as possible within each European system.
- To promote the reliable and efficient operation of the interconnected power systems via its Security Package. This contains: the Operation Handbook, the Multilateral Agreement (MLA) and the Compliance Monitoring and Enforcement Process.
- UCTE in close cooperation with European Transmission Systems Operators ETSO is already actively contributing to the formulation of the European Commission programme on critical infrastructure protection.

- UCTE is part of the advisory board of the Energy Technology Platform launched by the European Commission in order to enhance the research and development activities relevant to the TSO business.

Challenges of system development – from the UCTE perspective, there are no geographical limits to the development of the synchronously interconnected UCTE system. However, such extensions have to be realised in a legal framework that is compatible with the MLA in which the UCTE standards are embedded. This shall ensure that system security is not jeopardised. However "technical" limits could arise if:

- Incidental wide area oscillations became structural and/or
- No agreement with parties requesting the extension can be reached about the costs for additional security devices/measures.

Basic data of the UCTE power system

The following *Table 1* summarises basic data on countries belonging to the UCTE zone.

Countries	Installed Capacity (GW)	Peak Load* GW	Consumption TWh/year
Albania	1.63	1.20	4.33
Austria	18.30	10.521	63.174
Belgium	15.80	13.059	87.169
Bosnia Herzegovina	4.00	1.821	11.191
Bulgaria	13.18	6.222	36.083
Croatia	3.70	2.810	16.557
Czech Republic	16.20	9.576	62.693
Denmark (West)	7.60	6.10	35.60
France	114.30	82.319	482.400
Germany	111.20	82.527	556.371
Greece	11.80	9.140	52.876
Hungary	8.00	6.146	39.314
Italy	78.30	54.115	330.441
Luxembourg	1.70	0.942	6.237
Macedonia, FYR	1.30	1.450	78.074
Montenegro	0.87	0.78	4.6
Netherlands	20.60	16.858	114.658
Poland	32.077	21.578	130.612
Portugal	11.60	8.669	49.863
Romania	17.077	7.974	51.889
Serbia	8.39	6.44	38.11
Slovakia	8.00	4.323	26.283
Slovenia	2.80	2.074	12.767
Spain	58.80	37.92	252.764
Switzerland	17.30	9.724	63.047
Ukraine (West)	2.40	0.85	4.10
TOTAL	**587.01**	**405.138**	**2 611.203**

** Peak Load 3rd Wednesday of each country*

Table 1: *National electricity consumption and maximum load in 2005 (Source: UCTE Statistics 2005)*

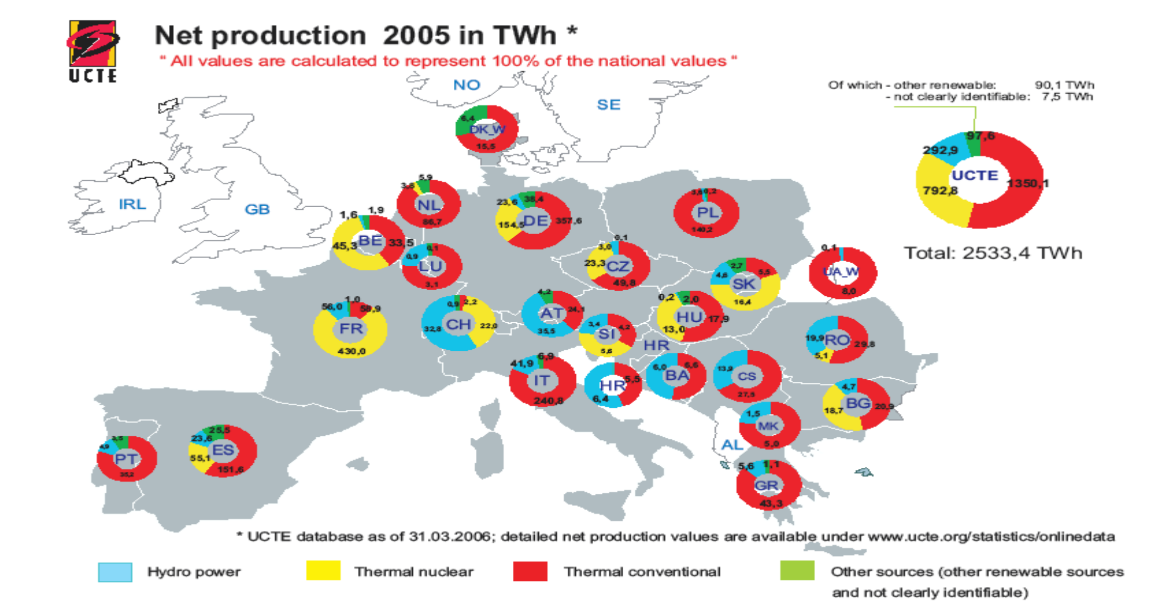


Figure 4: *UCTE Block – net production in 2005 (Source: UCTE Statistics 2005)*

The total length and voltage of EHV lines in the UCTE system are shown in *Table 2.*

Countries	**Voltage Level**	**Lines (km)**
Albania	400 kV	n.a.
	220 kV	n.a.
Austria*	400 kV	2 474
	220 kV	3 765
Belgium	400 kV	1 324
	220 kV	400
Bosnia Herzegovina	400 kV	766
	220 kV	1507
Bulgaria	400 kV	n.a.
	220 kV	n.a.
Croatia**	400 kV	1 159
	220 kV	1 145
Czech Republic	400 kV	3 421
	220 kV	1 922
Denmark (West)	400 kV	833
	220 kV	39
France	400 kV	21 008
	220 kV	26 319
Germany	400 kV	19 400
	220 kV	16 300
Greece	400 kV	4 156
	220 kV	11 029
Hungary	400 kV	2 364
	220 kV	1 188
Italy	400 kV	10 528
	220 kV	11 387

Countries	**Voltage Level**	**Lines (km)**
Luxembourg	400 kV	0
	220 kV	236
Macedonia	400 kV	419
	220 kV	103
Montenegro	400 kV	225
	200 kV	402
Netherlands	400 kV	2 003
	220 kV	683
Poland	400 kV	4 919
	220 kV	7 908
Portugal	400 kV	1 501
	220 kV	2 854
Romania	400 kV	4 795
	220 kV	3 945
Serbia	400 kV	1 594
	220 kV	2 170
Slovakia	400 kV	1 753
	220 kV	962
Slovenia**	400 kV	510
	220 kV	328
Spain	400 kV	16 951
	220 kV	16 244
Switzerland	400 kV	1 780
	220 kV	4 956
TOTAL	**400 kV**	**103 883**
	225 kV	**115 792**

** year 2000, ** year 2004*

Table 2: *Inventory of transmission network installations as of 31 December 2005 (Source: UCTE Statistics 2005)*

Market aspects of the UCTE zone are discussed under *Chapter 2.1.3 "The EU internal energy market and its main features"*

1.3.2 The Power System of Nordic Countries

Nordel is a body for co-operation between the transmission system operators (TSOs) in the Nordic countries (Denmark, Finland, Iceland, Norway and Sweden), whose primary objective is to create the conditions for, and to develop further, an efficient and harmonised Nordic electricity market.
Nordel was established in 1963 as the collaboration organisation of the major Nordic electricity companies. The principles and rules for operating the pan-Nordic electricity system and coordinated development of transmission links between countries have constituted key issues for Nordel. Iceland is not physically connected to the other Nordic countries, but still participates in Nordel collaboration. As early as the 1960s, an important issue for Nordel was establishing trading principles that would lead to the Nordic power plants being utilised cost-effectively. The important factors underlying this positive trend include an extensive system operation agreement, a Nordic regulating power, a joint power exchange for spot trading, an extensive exchange of information, a good collaboration during operational events, and a coordinated development of the national grid.

Nordel shares the EU vision of a single European electricity market. The path to achieving this is via continued cross-border collaboration.

Nordel's current tasks fall mainly into the following categories:

- system development and rules for network dimensioning
- system operation, operational security, reliability of supply and exchange of information
- principles of transmission pricing and pricing of ancillary services
- international co-operation
- maintaining and developing contacts with organisations and regulatory authorities in the power sector, particularly in the Nordic countries and Europe
- preparing and disseminating neutral information about the Nordic electricity system and market

Most of Nordel's work is carried out by committees and working groups (e.g. Nordel's Operations Committee, Planning Committee and Market Committee). Collaboration is ongoing between Nordel's Operations Committee and its sister organisation UCTE and there is agreement that the future holds many challenges.

Nordel also serves as a forum for contact and co-operation between the TSOs and representatives of the market players in the Nordic countries. Besides Nordel, the following bodies and structures exist:

- The Nordic Council of Ministers;
- Cooperation forum of Nordic energy regulators - NordReg;
- Cooperation forum of electric power industry - Nordenergy;
- The Nordic power market place - NoordPool.

The Nordic TSOs have been working together closely in order to increase the efficiency and improve the functioning of the Nordic electricity market since the deregulation of the market. The harmonisation that has been accomplished proved to be beneficial both from the Nordic point of view and from the national perspective. In recognition of this achievement, the Nordic Energy Ministers continue calling for further harmonisation of the Nordic market and implementation of new solutions and changes in the existing rules and practices. Thus, they fully supported conclusions and recommendations for further integration and harmonisation of the Nordic electricity market as presented in the 2005 report *"Enhancing Efficient Functioning of the Nordic Electricity Market"*. Further progress is expected to be achieved in the following issues: i) system responsibility and the role of the TSOs; ii) transmission capacity management; iii) planning and financing of Nordic grid investments; iv) balance management; v) procurement and coordination of operational reserves; and vi) peak production capability and peak load.

Basic data electric power 2005

	Denmark	**Finland**	**Iceland**	**Norway**	**Sweden**	**Nordel**
Installed capacity MW	12 677	16 617	1 507	28 793	33 212	92 806

Generation GWh/a	34 353	67 862	8 679	137 948	154 729	403 571
Consumption GWh/a	35 728	85 006	8 679	125 908	147 332	402 653
Export GWh/a	11 623	1 525	0	15 692	21 972	13 727
Import GWh/a	12 998	18 669	0	3 652	14 575	14 645
Net imports GWh/a	1 375	17 144	0	-12 040	-7 397	-918

***Table 3**:* *Basic data of Nordic power system*

Basic data Nordic high voltage network 2005

S6 Existing interconnections between the Nordel countries

Countries/Stations	Rated voltage/kV	Transmission capacity as per design rules[2] MW		Total length of line km	Of which cable km
Denmark West - Norway		**From Denmark**	**To Denmark**		
Tjele-Kristiansand	250/350=	1,000	1,000	240/pol	127/pol
Denmark East - Sweden		**From Sweden**	**To Sweden**		
Teglstrupgård - Mörarp 1 and 2	132~			23	10
Gørløsegård - Söderåsen	400~	1,350	1,750	70	8
Hovegård - Söderåsen	400~			91	8
Hasle (Bornholm) - Borrby	60~	60	60	48	43
Denmark West - Sweden					
Vester Hassing - Göteborg	250=	290	270	176	88
Vester Hassing - Lindome	285=	380	360	149	87
Finland - Norway		**From Finland**	**To Finland**		
Ivalo - Varangerbotn	220~	100	100	228	-
Finland - Sweden		**From Sweden**	**To Sweden**		
Ossauskoski - Kalix	220~			93	-
Petäjäskoski - Letsi	400~	1,600[4]	1,200[4]	230	-
Keminmaa - Svartbyn	400~			134	-
Rauma - Forsmark	400=	550	550	235	200
Tingsbacka (Åland) - Senneby	110~	80	80	81	60
Norway - Sweden		**From Sweden**	**To Sweden**		
Sildvik - Tornehamn	132~			39	-
Ofoten - Ritsem	400~	1,000[4]	1,300[3,4]	58	-
Røssåga - Ajaure	220~			117	-
Nea - Järpströmmen	275~			100	-
Linnvasselv, transformator	220/66~	50	50	.	-
Lutufallet - Höljes	132~	40	20	18	-
Eidskog - Charlottenberg	132~	100	100	13	-
Hasle - Borgvik	400~	2,150[4]	2,150[4,5]	106	-
Halden - Skogssäter	400~			135	-

[1] Maximum permissible transmission.
[2] In certain situations, the transmission capacity can be lower than the limit given here.
[3] Thermal limit. Stability problems and generation in nearby power plants may lower the limit.
[4] The transmission capacity can in certain situations be lower, owing to bottlenecks in the Norwegian and Swedish network.
[5] Requires a network protection system during operation (generated tripping).

S7 Existing interconnections between the Nordel countries and other countries

Countries/Stations	Rated voltage/kV	Transmission capacity/MW		Total length of line/km	Of which cable/km
Denmark West - Germany		**From Nordel**	**To Nordel**		
Kassø - Audorf	2 x 400~	1,200	800[3]	107	-
Kassø - Flensburg	220~			40	-
Ensted - Flensburg	220~			34	-
Ensted - Flensburg	150~	150	150	26	5
Denmark East - Germany					
Bjæverskov - Rostock	400=	600	600	166	166
Finland - Russia		**From Nordel**	**To Nordel**		
Imatra - GES 10	110~	-	100	20	-
Yllikkälä - Viborg [2]	2 x 400~	-	1,400	2 x 67	-
Kymi - Viborg [2]	400~			132	
Nellimö - Kaitakoski	110~	-	60	50	-
Norway - Russia		**From Nordel**	**To Nordel**		
Kirkenes - Boris Gleb	154~	50	50	10	-
Sweden - Germany		**From Nordel**	**To Nordel**		
Västra Kärrstorp - Herrenwyk	450=	600[1]	600[1]	269	257
Sweden - Poland		**From Nordel**	**To Nordel**		
Stärnö - Slupsk	450=	600	600	256	256

[1] The transmission capacity is currently limited to 460 MW from Nordel and 390 MW to Nordel due to limitation in the German network.
[2] Back to Back HVDC (+85 kV =) in Viborg and synchronous operation of NWPP power plant.
[3] The transmission capacity to the north is limited to 800 MW due to internal restrictions in Denmark West.

* Corrigendum: 'Starno – Słupsk' should read 'Total length of line/km' (254 km) and 'of which cable/km' (254 km)

The Nordic power market place (Nord Pool)

The Nord Pool Group[1] comprises the parent company, Nord Pool ASA, and the wholly owned subsidiary Nord Pool Clearing ASA and Nord Pool Consulting. The ownership of Nord Pool Spot is shared by the Nordic transmission system operators (TSOs) and Nord Pool ASA.

The physical Nordic power market – Elspot and Elbas

The Elspot market was established in 1993 as a market place for physical trading of power in Norway, which was the first country in the world to deregulate the market for power trading. In 1996 Sweden followed with their deregulation and the exchange area was extended to include both Norway and Sweden. Finland followed in 1998 and Denmark with Jutland in 1999 and Zealand in 2000. Elspot has proven to be a success among four countries. Elspot is operated by Nord Pool Spot AS. On Elspot, hourly power contracts are traded daily for physical delivery in the next day's 24-hour period. Elspot's price mechanism is used to regulate the flow of power where there are capacity restrictions in the Norwegian grid and between the various countries. Thus, Elspot may be viewed as a combined energy and capacity market. Price calculation is based on the balance between bids and offers from all market participants. This trading method is referred to as equilibrium point trading, auction trading, or simultaneous price setting.

Nord Pool Finland Oy opened the Elbas market on 1 March 1999. Elbas is the organised balance adjustment market for Sweden and Finland. Elbas also includes Western Denmark from mid-August 2004. It is planned to introduce Elbas market in Western Denmark and Norway. The Kontek link between Eastern Denmark and Germany will soon open for Elbas intraday market.

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[1] *More information available: http://www.nordpool.com/*

On Elbas, continuous adjustment trading in hourly contracts can be performed until one hour before the delivery hour. The trading horizon is at the longest to the end of the next day. Contracts for the following day are opened for trading daily after the day-ahead Elspot prices have been set.

The financial market

In developing Nord Pool's financial market, the power exchange places great emphasis on satisfying demanding customer groups with sophisticated needs for administration and risk management. At the same time, Nord Pool must meet the needs of customers wishing to use traditional routines and operational systems for their trading. Thus Nord Pool offers a number of Financial Power Contracts that can be used profitably by a variety of customer groups.

Trade may be conducted via Nord Pool's electronic trading system or by bidding via telephone. Settlement and delivery are carried out as financial price-hedging settlements without any physical delivery of electricity.

Nord Pool clearing

Nord Pool Clearing ASA (NPC) is a licensed and regulated clearinghouse and a wholly owned subsidiary to Nord Pool ASA. Through NPC, members are offered clearing of contracts traded over the Nordic Power Exchange and financial contracts traded in the OTC market.

NPC acts as a clearing counter party for derivative contracts and offers complete solutions for clearing of current products traded on and outside the Nordic Power Exchange. For financial electricity contracts, this means that standard contracts are evaluated together and the clearing member is given one net position in each contract series. This net position is the foundation for calculating the daily margin call and settlement.

1.3.3 The Power System of the United Kingdom (UKTSOA)

Liberalisation of the UK electricity industry[2], which began in 1990, has created a competitive market in which suppliers can sell electricity nationwide and all consumers can choose their supplier. Privatisation was carried out in stages beginning with England and Wales, then Scotland and lastly in Northern Ireland. This has resulted in three separate electricity markets for the three regions: England and Wales; Scotland; and Northern Ireland. The systems are fully interconnected, facilitating the flow of electricity between the regions.

England and Wales

In England and Wales transmission has been completely separated from supply and generation. National Grid is the transmission network owner and system operator. It has a duty to develop and maintain an efficient, co-coordinated and economic transmission system and facilitate competition in supply and generation. National Grid also ensures that the system is balanced at all times. Distribution is legally separated from supply and generation.

There are 38 major players in the generation market. Under the ***British Electricity Trading and Transmission Arrangements (BETTA) formerly NETA,*** bulk electricity in England, Wales and Scotland is traded between generators and suppliers through bilateral contracts and on power exchanges. A small volume of energy is traded through the Balancing Mechanism, through which National Grid balances output with demand. Generation is in effect self-despatching.

Any company holding a supply licence can sell electricity, however distribution and transmission companies may not hold supply licences. Suppliers may supply customers nationwide using the transmission and distribution networks.

2 *Full features of the UK electric system are described in the country file in the report annexes*

There are 12 licensed Distribution Network Operators in England and Wales, and two in Scotland. The 14 distribution systems are run as separate monopoly businesses.

Scotland

Scottish Power and Scottish and Southern Electricity cover the full range of electricity provision from generation, transmission and distribution through to supply. Each activity is undertaken by individual companies within the vertically integrated organisations. However, from April 2005, the role of Transmission System Operator was transferred to National Grid under the BETTA arrangements.

Northern Ireland

Northern Ireland Electricity (NIE) is the regulated provider of transmission, distribution and procurer of energy for Northern Ireland. There are only 3 main generators.

Currently NIE plc comprises:
- the Power Procurement Business (administers the remaining long term-power purchase contracts that were put in place at privatisation to support the trade sale of the power stations)
- the Supply Business (which performs the public electricity supplier role)
- the Transmission and Distribution Business (ownership of the transmission and distribution assets and distribution system operation)

The Transmission System Operation Business is conducted through a separate legal entity called SONI Limited - a wholly owned subsidiary of NIE plc.

All four businesses are regulated under NIE's Transmission and Public Electricity Supply Licence Document.

1.3.4 Interconnected/Unified Power Systems of the Commonwealth of Independent States and Baltic States

The Interconnected/Unified power systems (IPS/UPS) have a long history dating from the beginning of the last century (1920s) - when the Moscow and Petrograd (now St. Petersburg) power systems (PSs) were created and synchronised at 110 kV. In 1926 the first central dispatching service (CDS) in the Moscow and Petrograd PSs was established, followed in 1940 by the UDS of the Upper Volga PSs (Nizhny Novgorod, Ivanovo and Yaroslavl) and the Dispatching Centre of the South.

In 1956, the first transmission double circuit line 400 kV Kuibyshev (Samara) - Moscow was commissioned to allow joining the PSs of Centre and Middle Volga areas for parallel operation. This event marked the launch of further integration of PSs and creation of the interconnected power system (IPS) of the European part of the USSR with UDC put in operation in 1957. In this period, two of the biggest Hydro Power Plants (HPPs) (2300 and 2500 MW) were built on the Volga River (in Samara and Volgograd).

At the end of the 1950s to the beginning of the 1960s, the UDCs of other regions, notably the North-West, Middle Volga, Northern Caucasus, Siberia and Central Asia were established. This development required the establishment of the supreme level of hierarchy of dispatching management. Thus, in 1969, the Central Dispatching Office (CDO) of the interconnected power system of USSR became operational.

In 1972, the IPS of Kazakhstan (without the Alma-Ata and South-Kazakhstan PSs which were part of the IPS of Central Asia) joined the UPS of USSR. In 1978, with the commissioning of the 500 kV transmissions line Siberia – Kazakhstan – Urals the IPS of Siberia joined for parallel operation.

This remarkable development, which resulted in the establishment of the UPS of the USSR, covered the period of 1956-1978. The year 1956 was marked by the actual formation of the IPS and switching to parallel operation of the IPS of Centre and the IPS of Middle Volga. This was followed by:
- the IPS of Urals in 1958;

- the IPS of the South (Ukraine, Moldova) in 1962;
- the IPS of the North-West in 1966;
- the IPS of the Northern Caucasus in 1969 and concluded by joining
- the IPS of Kazakhstan and the IPS of Siberia in 1978.

The early 1960s were characterised by the launch of large-scale construction of transmission lines between PSs of the COMECON partners. In 1962, the Central Dispatching Office of the Interconnected Power Systems (the CDO-IPS) was established in Prague. In the period 1962-1987, the following overhead transmission lines (OHL) 400-750 kV *(see Table 4)* were put into operation and served to synchronise the PSs of Hungary, GDR, Poland and Czechoslovakia as well as Romania and Bulgaria.

Lvov Section:	OHL 750 kV Ukraine – Hungary (1978) OHL 750 kV Ukraine – Poland (1985) OHL 400 kV Ukraine – Slovakia (1964) OHL 400 kV Ukraine – Hungary (1977) OHL 400 kV Ukraine – Romania (1977) 2 OHL 220 kV Ukraine – Hungary (1962) 1 OHL 220 kV Ukraine – Poland (1967)
Moldavian Section:	OHL 750 kV Ukraine – Romania (1986) OHL 750 kV Romania – Bulgaria (1987) OHLOHL 400 kV Moldova – Bulgaria (1972)

Table 4: *Transmission lines to allow synchronous operation of the Central and South European Countries with USSR*

During this period, the electricity was exported from the UPS to Mongolia, Finland, Turkey and Afghanistan via OHL 110-220 kV operating in island mode.

The UPS of the USSR was connected to NORDEL via a HVDC back-to-back in the Vyborg area. Presently, three OHL 400kV exist between Russia and NORDEL. Two of them originate from the Vyborg back-to-back station, the third one is used for the island operation of the north-west combined cycle power plant (CCPP - 3*150 MW) to the Nordel PSs. In addition, several OHL 110-150 kV are working in island mode.

The main features of the 1970s and 1980s were the increase of capacity coming from nuclear power plants built up predominantly in the European part of Russia, the growth of generating capacities and the increase of voltage levels of transmission lines. In 1980, the biggest generating unit (1200 MW) was put in operation on the Kostroma Thermal Power Plant (TPP).

In the following next twenty years the additional HPPs were commissioned:
- in the 1970s – Bratsk (4100 MW) and Krasnoyarsk HPP(5000 MW);
- in the 1980s– Sajano-Shushenskaja HPP 6400 MW (10*640 MW).

At the same time, more than two dozens of powerful TPPs were put into operation. Among them: Kostroma (3600 MW) in the Centre, Refta (3800 MW) and Perm (2400 MW) in the Urals, Surgut-2 (4800 MW) in Tyumen, and Zaporozhye (3600 MW) in Ukraine. Their generating units were 300-500-800 MW, and besides them several nuclear power plants were built with generating units of 1000 MW, including Leningrad, Kursk, Balakovo (4*1000 MW each) in Russia, Zaporozhye (6*1000 MW) in Ukraine, and Ignalina (2*1500 MW) in Lithuania.

The total capacity of all power stations of the country in 1987 was 334.5 GW with an annual production of 1665 TWh. At the end of the 1980s, the Ultra high voltage OHL 1150 kV Barnaul - Ekibastuz - Kokchetav - Kustanai - Chelyabinsk was built.

The last decade of the 20th century was characterised by a reduction of electricity consumption due to the economic slow-down caused by the sector restructuring. Lack of investments delayed commissioning of new generating capacities and construction of new transmission lines and substations. During this period the power systems pool of the COMECON members broke up, the neighbouring PSs, except the IPS of Belarus and the IPS of the Baltic States, were separated from the UPS at various times.

Since the year 2000, the PSs of the UPS of the former USSR have been reunited (except the PS of Armenia) and now also include in parallel operation the Central Asia IPS (without the PS of Turkmenistan which, like the PS of Armenia functions in parallel with the PS of Iran).

The decrease in consumption in the beginning of the new century was replaced by economic growth observed in all CIS countries. *Figure 5* shows the curve of electricity consumption in the period of 1990-2005 for the UPS of Russia. The rate of growth of power consumption was about 4 % in recent years.

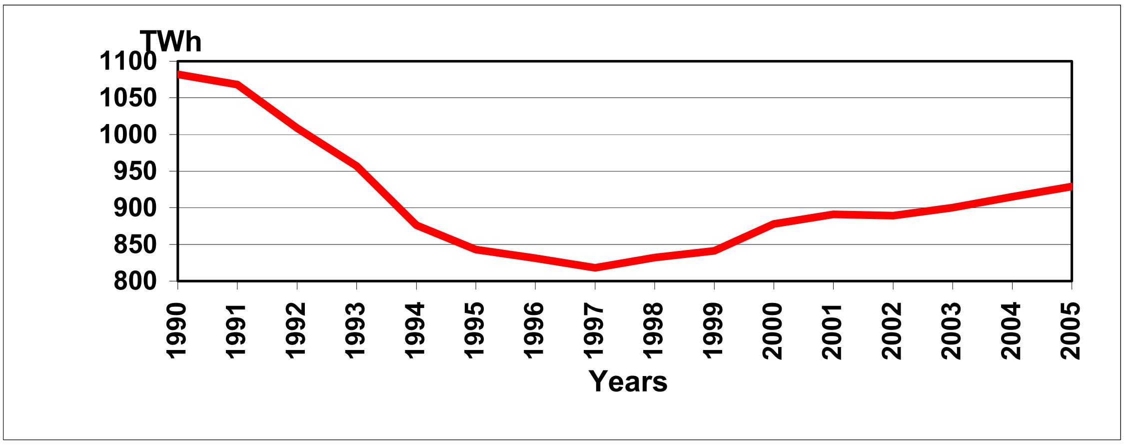

***Figure 5**:* *UPS of Russia Consumption in 1990-2005*

Interconnected power systems of Baltic States

After the collapse of the Soviet Union, the power system of the three Baltic states was coordinated by DC Baltija (the Baltic Dispatching Centre), which was founded in 1991 with the participation of Lietuvos Energija AS, Latvenergo and Eesti Energia AS. The TSOs of all three Baltic States decided at the beginning of 2006 to end the operation of this company by 30 November 2006. The future coordination will be performed by splitting the main functions between all three TSOs.

The current total installed capacity of the Baltic IPS is 9925,89 MW and includes a wide spectrum of generation types: nuclear power plant (Ignalina nuclear power plant (NPP)), CHPs, thermal, hydro and pumped storage power plants. Hence, electricity is generated from many fuel types, including oil shale, gas, oil, peat, water and nuclear. In January 2005, the annual peak demand of the Baltic IPS was 4 504 MW and comprised 1 664 MW (net) in Lithuania, 1 333 MW (net) in Estonia and 1 272 MW (gross) in Latvia.

The transmission network of the Baltic IPS consists mainly of 330 kV transmission lines which in January 2004 had a total length of 4 210.2 kilometres. The regional operational control allows taking into account the generation structure of each country to deal efficiently with demand or generation deviations from planned values.

The Ignalina NPP currently generates energy from one 1300 MW RBMK type reactor. The first reactor was shut down at the end of 2004 and the second reactor will be shut down in 2009 as it was agreed by the Lithuanian government during the EU accession period.

The pre-feasibility study to build new nuclear power plant in Ignalina was in place by 2006 and was performed by Eesti Energia, Latvenergo and Lietuvos energija. Results of the studies were positive and were handed to the Lithuanian government for review and final decision.

On 30 March 2006 the BALTSO organisation was established among all three Baltic TSOs. The organisation is non-profit and the main aim is to coordinate cooperation between Baltic TSOs.

IPS/UPS synchronous zone structure

IPS/UPS synchronous zone currently includes all the power systems of the following CIS and Baltic countries: Russia, Ukraine, Moldova, Belarus, Georgia, Azerbaijan, Kazakhstan, Uzbekistan, Tajikistan Kirghizia, Lithuania, Latvia, Estonia, plus Mongolia (14 countries in total). The IPS of the East (Russia) operates separately from the UPS of Russia and does not appear in the synchronous zone.

The Armenian and Turkmenian PSs operate in parallel with the PS of Iran and form another synchronous zone.

National PSs and connections between them are shown on the common block diagram of the synchronous zone *(Figure 6)*. The two 330 kV lines between Ukraine and Belarus which had been disconnected for more than 15 years were reconnected on 1 January 2006. The UPS of Russia is represented by its interconnected power systems (IPS) that correspond to the control areas of the 2nd level in the UPS.

The following blocks consisting of PSs of various countries may be considered evident in the IPS/UPS:

- the IPS of the Baltic States: the PSs of Baltic States (Estonia, Latvia, Lithuania), with the dispatching centre in Riga, responsible for planning and regulation of power balance of the whole block, coordinating of repairs and operative switching with neighbours, etc;
- the block of the PS of Ukraine and Moldova;
- the block of the IPS of Central Asia, with an International Dispatching Centre in Tashkent, providing operative management of the UPS;
- the UPS of Kazakhstan with the IPS of Central Asia; as the IPS of Central Asia within the limits of the synchronous zone borders only on the UPS of Kazakhstan, then the UPS of Kazakhstan with the IPS of Central Asia form a second level block in which the CDO of the UPS of Kazakhstan regulates the balance in relation to another part of synchronous zone (in this case, to the UPS of Russia only).

The rest of PSs of the IPS/UPS represent independent blocks.

At present, each of the blocks regulates the active power balance with frequency deviation correction (or without it). The UPS of Russia carries out the static frequency control, under the law $\Delta f=0$.

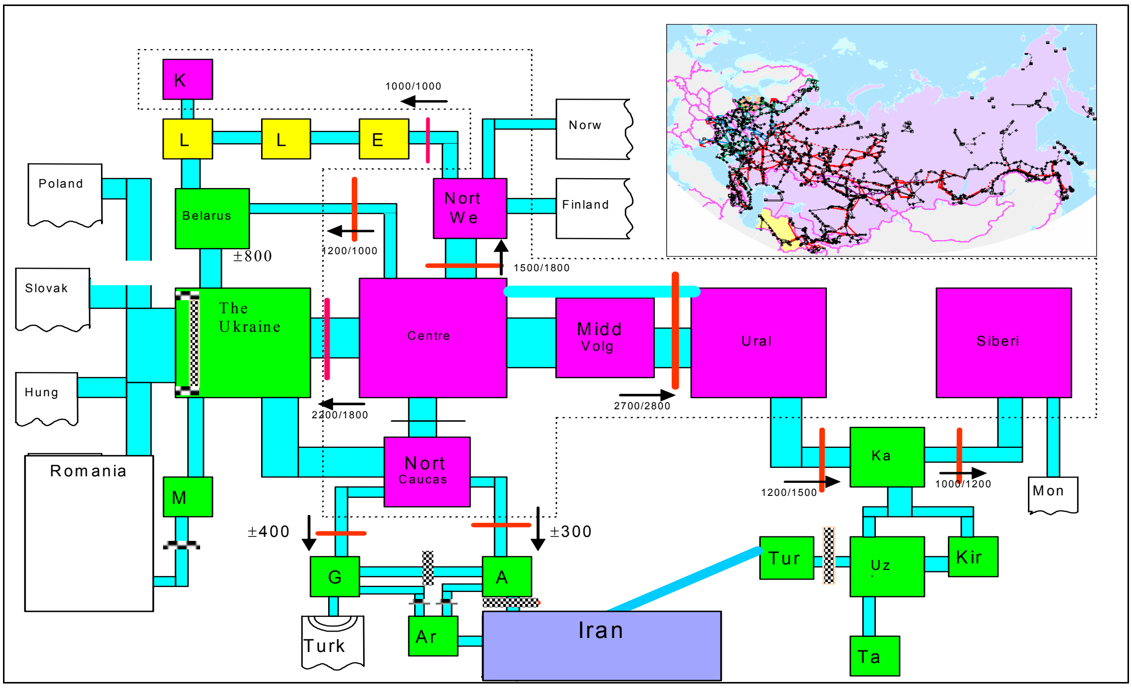

Figure 6: *UPS/IPS structure and permissible changes*

The electrical links 220-750 kV between main blocks of IPS/UPS power system are given in *the following Table 5.*

	FROM	TO	Operating Voltage (kV)	Thermal Rating, A (for t=25^{o} C)
Russia - Ukraine	Volgograd (RU)	Donbass (UA)	±400 (HVDC line)	2000 (± 180 MW)
	Kursk NPP (RU)	Severoukrainskaya (UA)	750	2000
	Novovoronezh (RU)	Donbass (UA)	500	2000
	Kursk NPP (RU)	Sumy Severnaya (UA)	330	1420
	Kursk NPP (RU)	Shostka (UA)	330	1650
	Valuiki (RU)	Zmiev TPP (UA)	330	1420
	Belgorod (RU)	Zmiev TPP (UA)	330	1650
	Shebekino (RU)	Losevo (UA)	330	1650
	Pryidonsk (RU)	Velikotsk (UA)	220	710
	Shakhty (RU)	Pobeda (UA)	500	2000
	Novocherkassk TPP (RU)	Uzhnaya (UA)	330	1650
	Nesvetai TPP (RU)	Pobeda (UA)	220	710
	Syisoevo (RU)	Lugansk TPP (UA)	220	825
	Taganrog 15 (RU)	Amvrosievka (UA)	220	710
	Syisoevo (RU)	Velikotsk (UA)	220	710
Russia - Belarus	Smolensk NPP (RU)	Belorusskaya (BY)	750	2000
	Talashkino (RU)	Vitebsk (BY)	330	1420
	Roslavl (RU)	Krichev (BY)	330	1650
	Novosokolniki (RU)	Polotsk (BY)	330	1420
Russia - Georgia	Tsentralnaya (RU)	Inguri HPP (GE)	500	2000
	Psou (RU)	Bziby (GE)	220	825
Russia - Azerbaijan	Derbent (RU)	Iashma (AZ)	330	1420
Russia - Kazakhstan	Balakovo NPP (RU)	Stepnaya (KZ)	500 (operates at 220)	2000
	Chelyabinsk (RU)	Kustanay(KZ)	1150 (operates at 500)	2000
	Troitsk TPP (RU)	Sokol (KZ)	500	2000
	Irikla TPP (RU)	Dzhetygara (KZ)	500	2000
	Kurgan (RU)	Avrora (KZ)	500	2000
	Barnaul (RU)	Ekibastuz (KZ)	1150 (operates at 500)	2000
	Rubtsovsk (RU)	Ermak TPP (KZ)	500	2000
	Rubtsovsk (RU)	Ust-Kamenogorsk (KZ)	500	2000
	Omsk (RU)	Ekibastuz TPP (KZ)	500	2000
	Irtysh (RU)	Ermak TPP (KZ)	500	2000
	Omsk (RU)	Avrora (KZ)	500	2000
Russia - Estonia	Pskov (RU)	Tartu (EE)	330	1420
	Leningrad (RU)	Baltija TPP (EE)	330	700*2
	Kingisepp (RU)	Estonia TPP(EE)	330	2000
Russia – Latvia	Pskov (RU)	Rezekne (LV)	330	1210
Russia - Lithuania	Sovetsk (RU, Kaliningrad)	Jurbarkas (LT)	330	1380
	Sovetsk (RU)	Kruonio PSHP (LT)	330	1380
	Sovetsk (RU)	Klaipeda (LT)	330	1350
Russia - Finland	Vyiborg (RU)	Ullikkialia (FI)	400	1650*2 (two circuits)
	Vyiborg (RU)	Kymi (FI)	400	1650
Ukraine - Belarus	Chernobyl (UA)	Mozyr (BY)	330	1650
	Chernigov (UA)	Gomel (BY)	330	1380
Ukraine - Moldova	Usatovo	Moldavian GRES	AC Single, 330	1251.8
	Katovska	Moldavian GRES	AC Single, 330	1051.7
	Novoodeska	Moldavian GRES	AC Single, 330	1051.7
	Artsyz	Moldavian GRES	AC Single, 330	1051.7

	FROM	TO	Operating Voltage (kV)	Thermal Rating, A (for t=25° C)
	Kotovska	Rybnitsa no.1	AC Single, 330	1051.7
	Kotovska	Rybnitsa no.2	AC Single, 330	1051.7
	Dnistrovska HPP	Beltsy	AC Single, 330	1143.2
Belarus - Lithuania	Byelorusskaya (BY)	Ignalina NPP (LT)	750 (operates at 330)	1420
	Molodechno (BY)	Vilnus (LT)	330	1380
	Polotsk (BY)	Ignalina NPP (LT)	330	1890
	Smorgon (BY)	Ignalina NPP (LT)	330	1420
	Grodno (BY)	Alytus (LT)	330	1380

***Table 5**:* *Existing Interconnection Lines between IPS/UPS Blocks (only 220 kV and more)*

The structure of the interface between the synchronous zones of the IPS/UPS and the UCTE is shown in *Figure 7*, where dark blue colour lines are for 750 kV, red – for 400 kV, green for 220 kV. Lines are numbered with Roman figures.

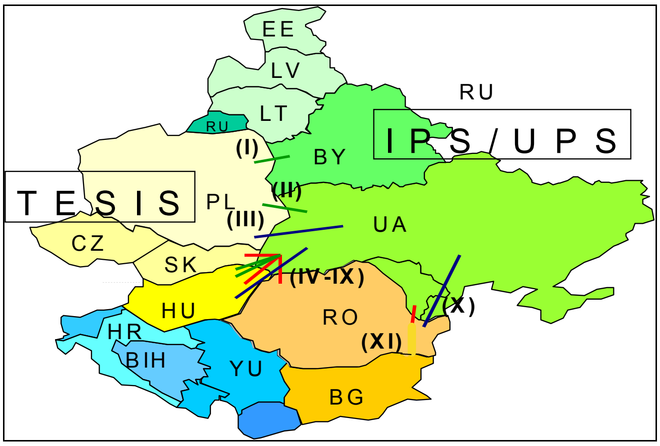

Figure 7: *IPS/UPS – UCTE interface.*

Installed capacity and balances

The installed capacity of the whole IPS/UPS is more than 330 GW. Some key data (installed capacity, maximum load as well as the annual electric power consumption in 2004 of the countries–participants of the synchronous zone) are in *Table 6*.

Country	Installed Capacity (MW)	Maximum Load (MW)	Consumption (TWh)
Azerbaijan	5 683	3 950	20.20
Belarus	7 847	5 720	33.00
Georgia	4 388	1 609	8.12
Kazakhstan	18 596	9 432	58.00
Kyrgyzstan	3 747	2 933	11.10
Moldova	2 984	1 147	5.40
Estonia	3025	1307	7.00
Latvia	2054	1282	6.00
Lithuania	4958[1]	1916	8.00
Russia	208 500	142 000	877.90
Tajikistan	4 422	2 854	16.10
Uzbekistan	11 558	7 925	49.20
Ukraine	52 860	29 311	170.60

[1] *One single unit at Ignalina NPP is taken into account*

Table 6: *Basic data of the UPS/IPS system*

Structure of the main network

Two scales of nominal voltages are used in the synchronous zone: 750-330-110 kV and 1150-500-220-110 kV.

Characteristics of these networks are given in *Table 7* for different countries. In the western countries of the zone (Ukraine, Belarus, the Baltic states), and also in the western part of the UPS of Russia the scale 750-110 kV is applied while in the eastern part of Russia, Kazakhstan and Central Asia it is the scale 1150-500-220 kV. Both scales are used in Eastern Ukraine, Central Russia, North Caucasus, Azerbaijan, Georgia. The main network of 220-750 kV carries out the functions of transporting electricity and the 220 kV network in a number of regions serves also for distribution purposes. The network 6-10-20-35 kV including the 110 kV serves for electricity distribution.

Country	Voltage Level	Lines (km)
Azerbaijan	110-220-330-500	6349.00
Belarus	0.38-750	263 509.00
Georgia	110-220-330-500	9199.00
Kazakhstan	220-500-1150[1] 0.4-1150	23247.00 464 132.00
Kyrgyzstan	110-220-500 0.4-500	6388 540.40 66 165.00
Moldova	110-330-400 0.4-400	391.00 63 397.40
Estonia	110-330	5193.00
Latvia	110-330	4535.00
Lithuania	110-330	6658.00
Russia	110-154-220-330-400-500-750-1150[1]	449348.00
Tajikistan	110-500	4 371.00
Uzbekistan	0.4-500	23 000.00
Ukraine	220-750 0,4-750	≈22 000.00 >1 000 000.00

[1] All 1150 kV lines operate now under 500 kV

Table 7: *Transmission facilities in UPS/IPS system*

Coordination bodies

The cooperation of electric power industry of the CIS countries is coordinated by **the Electric Power Council of CIS (CIS EPC)** and **the Executive Committee** established in 1992. Within this framework, the ***Commission on Operative-Technological Coordination of parallel operation of PSs of the CIS and Baltic countries (KOTK***) is responsible for proposing recommendations on principles of technical operation of PSs and developing corresponding documents.

A similar body (Council) is in place for Central Asian IPS and Kazakhstan's UPS coordination, where water use has a crucial importance. Another coordinating body – the *Technical Committee of electric ring BRELL* (Belarus – Russia – Estonia – Latvia – Lithuania), includes representatives of these countries.

1.3.5 The Power System of Turkey

The Turkish block includes the system of Turkey without its small isolated part in the southern region supplied by Iran. The Turkish power system is currently not prepared for synchronous operations with other countries, but there are many interconnections such as those to Azerbaijan, Armenia, Bulgaria, Georgia, Iran, Iraq and Syria. Two 400 kV interconnection lines exist between the Turkey and Bulgaria, and one 400 kV line between southern Turkey and the northern part of Syria. However, these lines are not currently used.

Turkey's rapid growth in electricity demand, which has led to almost a doubling of installed generating capacity over the past decade, is expected to continue in the foreseeable future. This could lead to building a total installed generating capacity of as much as 65 GW by 2010. The electricity sector is undergoing an enormous restructuring process, in order to meet the requirements of EU membership. At the same time, Turkey is in the process of becoming a UCTE member and is assessing the possibility for its synchronous interconnection to the UCTE zone[3] . With a view to covering the future peak demand of electricity, synchronous operation of the Turkish and UCTE system would be helpful from a system adequacy point of view.

3 *The Turkish power system is described in the country file in the report annexes*

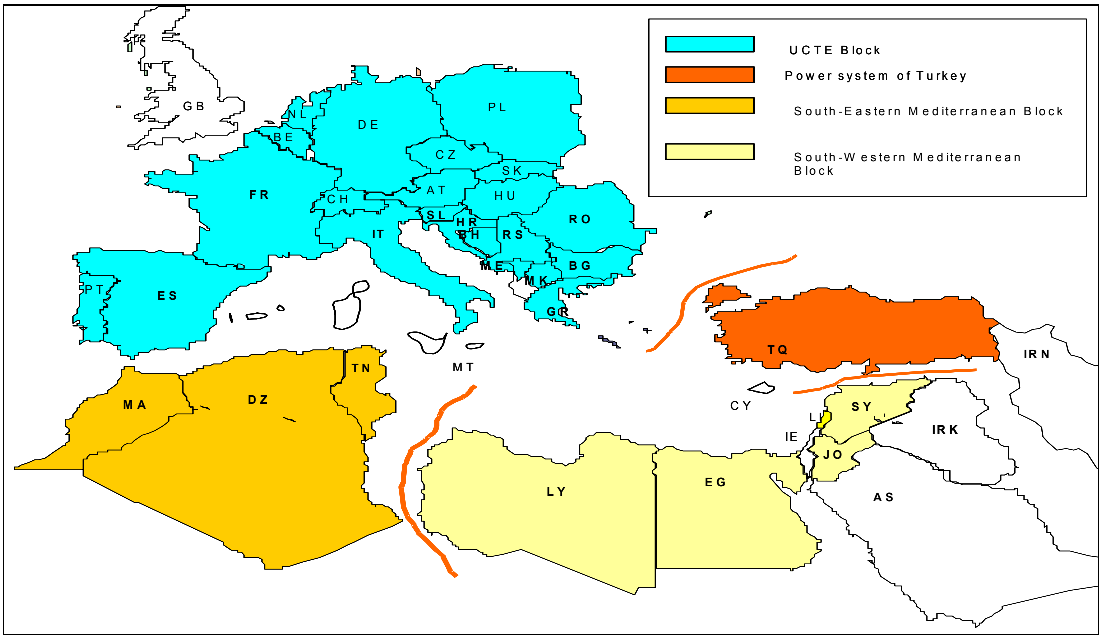

Figure 8: *Turkey and electrical interconnections in North Africa*

1.3.6 South-Eastern Mediterranean Block

The south-eastern Mediterranean block (SEMB) includes the electric systems of five countries (Libya, Egypt, Jordan, Syria and Lebanon) that are synchronously interconnected. The block has a total installed capacity of 35.3 GW. In 2005, the electricity demand was of roughly 142.6 TWh and the peak load was about 29.2 GW. The total length of electrical lines is of about 79 088 km. *Table 10* indicates the voltage level of these lines (from 60 to 500kV).

Libya was connected to Egypt in 1998 through a double circuit 220 kV overhead line. Egypt was connected in 1999 to Jordan, via a 13 km 400kV submarine cable of 600MW capacity from Aqaba (Jordan) to Taba (Egypt). The Jordanian system was connected in 2001 to Syria through a 217 km single circuit of 400kV overhead line from Amman North (in Jordan) to Der Ali (in South Syria).

In the west, work is in progress to interconnect Syria with Lebanon through a 400 kV overhead line from Damas (Syria) to Kesara (Lebanon). It is expected that this interconnection would be put into operation in the near future. In the north, a 400kV line exists towards Turkey, but at present it is not operated.

The existing interconnections in the Mashreq block are part of the EIJLLST interconnection project (between the following seven countries: Egypt, Iraq, Jordan, Lebanon, Libya and Turkey).

Turkey has chosen to be connected to UCTE *(see more about the ongoing study, under 2.2.1).*

Countries	Installed Capacity(GW)	Peak Load (GW)	Consumption TWh/year
Libya	5.125	3.857	18.893
Egypt	18.827	15.678	85.781
Jordan	2.019	1.751	8.698
Syria	7.058	6.008	23.511
Lebanon	2.312	1.920	5.697
TOTAL	**35.341**	**29.214**	**142.58**

Table 8: *SEMB - Installed capacity, peak and annual consumption in 2005 (Source: AUPTDE Statistical Bulletin 2005)*

Countries	Thermal	Hydro	RES	Others	Total
Libya	22.450	0.00	0.00	0.00	**22.450**
Egypt	74.863	12.644	0.523	13.269	**101.299**
Jordan	9.589	0.057	0.003	0.005	**9.654**
Syria	31.4898	3.445	0.0002	0.00	**34.935**
Lebanon	9.079	1.046	0.00	0.00	**10.125**
TOTAL	**147.4708**	**17.192**	**0.5262**	**13.274**	**178.463**

Table 9: *SEMB – Generated Energy (TWh/year) by sources in 2005 (Source: AUPTDE Statistical Bulletin 2005)*

Countries	Voltage Level (kV)	Lines (km)
Libya	400 – 500	-
	220 – 230	13 119
	60 – 150	13 434
Egypt	400 – 500	2 295
	220 – 230	13 920
	60 – 150	18 715
Jordan	400 – 500	871
	220 – 230	17
	60 – 150	2 529

Countries	Voltage Level (kV)	Lines (km)
Syria	400 – 500	760
	220 – 230	5 046
	60 – 150	6 746
Lebanon	400 – 500	21
	220 – 230	350
	60 – 150	1 265
TOTAL	**400 – 500**	**3 947**
	220 – 230	**32 452**
	60 – 150	**42 689**

Table 10: *SEMB -Transmission facilities in 2005 (Source: AUPTDE Statistical Bulletin 2005)*

1.3.7 South-Western Mediterranean Block

This block includes three countries: Morocco, Algeria and Tunisia.

In the late 1980s, the idea of a submarine connection between Spain and Morocco emerged and both DC and AC techniques were analysed. The decision was taken in favour of an AC undersea interconnection, which was put into operation in October 1997. This submarine interconnection synchronously connects the South-Western Mediterranean Block (SWMB) to Spain and UCTE. The second step in this interconnection was achieved in July 2006, with the operation of another undersea connection in parallel with the exiting one. Then, the Spain-Morocco interconnection was composed of seven undersea cables (three per circuit and one spare) and the corresponding reactors for reactive power compensation. These developments will allow reaching an ATC of 800 MW.

The SWMB has a total installed capacity of 15.9 GW. In 2005, the electricity demand was about 55.6 TWh and the peak load was roughly 11.6 GW.

Today, the electric systems of the three Maghreb countries are interconnected with six existing lines: two between Morocco and Algeria (both 225 kV lines) and four between Algeria and Tunisia (two at 90kV, one at 150kV, one at 220kV). An additional 400kV double circuit line between Morocco and Algeria will be in place in the first quarter of 2007. A new line between Algeria and Tunisia will also be initially operated at 225 kV though being aimed at becoming a 400 kV line.

The total transmission length of the present network amounts to about 39 284 km (from 500kV to 60 kV). The voltage and total length of lines in this system is shown in *Table 13*.

Countries	Installed Capacity(GW)	Peak Load GW	Consumption TWh/year
Morocco	5.237	3.520	17.630
Algeria	7.492	5.921	27.631
Tunisia	3.234	2.172	10.374
TOTAL	**15.963**	**11.613**	**55.635**

Table 11: *SWMB- Installed capacity, peak and annual consumption in 2005 (Source: AUPTDE Statistical Bulletin 2005)*

Countries	Thermal	Hydro	RES	Others	Total
Tunisia	11.485	0.155	0.42	0.955	**13.015**
Algeria	32.971	0.555	0.00	0.00	**33.526**
Morocco	17.54	1.412	0.206	0.00	**19.158**
TOTAL	**61.996**	**2.122**	**0.626**	**0.955**	**65.699**

Table 12: *SWMB - Generated Energy (TWh/year) by sources in 2005 (Source: AUPTDE Statistical Bulletin 2005)*

Countries	Voltage Level (kV)	Lines (km)
Morocco	400 – 500	727
	220 – 230	6 959
	60 – 150	10 146
Algeria	400 – 500	117
	220 – 230	9092
	60 – 150	7 259

Countries	Voltage Level (kV)	Lines (km)
Tunisia*	400 – 500	-
	220 – 230	2 431
	60 – 150	2 553
TOTAL	**400 – 500**	**844**
	220 – 230	**18 482**
	60 – 150	**19 958**

** Figures of 2004*

Table 13: *SWMB - Transmission facilities in 2005(Source: AUPTDE Statistical Bulletin 2005)*

1.3.8 The Mediterranean Isolated Systems: Israel, Cyprus and Malta

The electrical systems of Israel, Cyprus and Malta constitute “electrical islands” not interconnected to any other electrical networks of the Mediterranean Basin.

This situation is however meant to change in the case of Israel, which could become part of the Mediterranean Ring when two lines Israel-Gaza and Gaza-Egypt would possibly be erected in some years. The Israel Electric Corporation (IEC) has an order from the Palestinian National Authority to build a 161 kV double circuit line to the Gaza strip. This project is at present still in the design phase but was identified as of importance to the Palestinian Authority by Energy Ministers of Israel, the Palestinian Authority, France and the European Commission.

The situation in Malta may also change as there are plans for a submarine interconnection with the electrical grid in Sicily. This is expected to be implemented by 2010-12, and will effectively result in Malta losing its present ‘isolated system’ status. As a small island state Malta has experienced a growth in electricity demand of over 50% since 1990. The main problems faced by Malta are the limited land space available for development of power generating plant, the lack of local fuels and the lack of economies of scale. This generally implies a higher unit cost of generation and greater problems in meeting the emissions limits in environmental legislation. At present the generating plant is a mix of conventional HFO (1%S) fired steam plant and gas turbine plant fired using gas oil (0.2%S), including an 110MW CCGT plant.

There are plans to construct a large (circa 70-100MW) offshore wind farm although the completion date for this project which will be implemented in phases is not expected to be before 2015.

For the time being, there is no plan to connect the electrical system of Cyprus with any other neighbouring electrical system by means of a submarine connection, due to the peculiarities of the topography of the probable crossings (nature of the sea bed, depth etc.).

The Electricity Authority of Cyprus in its effort to reduce its dependency on oil for power generation and its associated negative impact on the environment has already installed and commissioned one 130MW combined cycle generator (diesel/natural gas) and plans to have energised by 2009 three such generators of total capacity equal to 504MW. Generators will operate on diesel until the Government of Cyprus has built the necessary LNG terminals to receive natural gas from abroad.

1.3.9 Summary of Existing Interconnections in the Mediterranean Region

The effort for the construction of new power plants that is necessary to keep the adequate reliability indexes and security margins in the Mediterranean national systems can be mitigated by suitably exploiting electrical interconnections between countries[4] and by reinforcing them to allow bigger power and energy exchange.

At the end of 1997, the grids of ***Spain and Morocco*** were interconnected by a single 400 kV circuit in alternative current including some 27 km of submarine cable line links the substations of Tarifa in Spain and Ferdioua in Morocco. The thermal limit of this interconnection is 730MW. In 2005, the transfer of energy was 898 GWh from Spain to Morocco, and 110 GWh from Morocco to Spain, and in 2006 those transfers were 1999 GWh and 27 GWh, respectively. In July 2006 a second submarine link was put in operation, having the same characteristics as the existing one. Despite the interconnection capacity, the current interchange capacity between both systems is currently around 400 MW.

Morocco and Algeria are interconnected by two single 225 kV circuits, both commissioned in 1998. The links are rated for 640 Amp. The commercial capacity between the countries is about 240 MW. In 2005, Morocco exported 105 GWh to Algeria, and Algeria exported 136 GWh to Morocco. A new 400kV double circuit line was constructed in 2003 and initially operated at 225 kV before being operated to its maximum (400 kV).

Tunisia is nowadays interconnected with Algeria through 4 lines: one at 225 kV, another one at 150 kV and two at 90 kV. In 2005, the commercial capacity between these two countries was 258 MW, allowing a transfer of 139 GWh from Algeria to Tunisia and of 150 GWh from Tunisia to Algeria. A fifth 400kV line, to be initially operated at 225 kV, was completed recently to reinforce interconnection between these two countries**.**

Tunisia and Libya could in the future possibly be synchronously interconnected by two links: a double circuit 225 kV line between the substations of Medenine in Tunisia and Abou Kammech in Libya and a single 225 kV circuit between Tataouine in Tunisia and ElRouis in Libya. These lines have been constructed (2003), but their operation has not yet begun. A request to close these two lines, which would extend the main UCTE synchronous area to Libya, Egypt, Jordan, Lebanon and Syria, was presented to UCTE. A UCTE study is therefore ongoing and a synchronisation test was carried out in November 2005. Results were however unsuccessful *(for more, see under 2.2.1).*

Libya and Egypt are interconnected by a double 225 kV circuit linking the substations of Toubruk in Libya and Saloum in Egypt. The link was commissioned in 1998 and the commercial capacity between the countries is of 600 MW. Currently however, due to technical limitations, the maximum exchangeable power is of 180 MW. In 2005, Libya exported 105 GWh to Egypt, and Egypt exported 151 GWh to Libya. A second line of 1000 MW is projected between Tobruk (Libya) and Aldbaah (Egypt) and would be in operation by 2010-2015.

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[4] *All the existing interconnection lines among the Mediterranean countries (European side and South and East Mediterranean side) are reported in the country annexes*

Egypt and Jordan have been interconnected since 1997 by a single 400 kV circuit with a capacity of 550 MW between Taba (Egypt) and Aqaba (Jordan). This capacity is expected to be increased to 1100 MW by 2010. In 2005, Egypt exported about 741 GWh to Jordan.

Jordan and Syria have been connected since 2001 through a single 400 kV circuit between Amman North (Jordan) and Der Ali (Syria) with a capacity of 800 MVA. In 2005, Syria exported about 241 GWh to Jordan.

Lebanon and Syria are connected through a 225 kV line that was commissioned in 1972. In 2003, the commercial capacity between the two countries was about 200 MW, which allowed the Lebanese system to import 455 GWh from Syria. A new 44 km line at 400 KV is being commissioned.

Syria and Turkey erected a 400 kV line in 2003. Its operation however will probably be initiated only after the connection of Turkey to UCTE.

Between ***Turkey and Bulgaria*** there are currently two 400 kV circuits linking respectively Babaeski s/s and Hamitabat s/s in Turkey to the Maritsa East power plant in Bulgaria, without interconnection to the Bulgarian Grid (pocket operation).

In March 2002, Turkey and Greece signed a Memorandum of Understanding for the construction of a 400 kV line between Babaeski in Turkey and Filippi in Greece. The line is under construction to be commissioned in 2008.

The following *Table 14* summarises the main characteristics of interconnections in the Mediterranean region.

Country	(from Substation)	to Country	(to Substation)	Type AC/DC	Voltage [kV]	Thermal limit (A) winter	year operation
Algeria	Ghazaouet	Morocco	Oujda	AC	225	640	1988
Algeria	Tlemcen	Morocco	Oujda	AC	225	640	1988
Algeria	Djebel Onk	Tunisia	Metlaoui	AC	150	510	1984
Algeria	El Aouinet	Tunisia	Tajerouine	AC	225	640	1984
Algeria	El Aouinet	Tunisia	Tajerouine	AC	90	380	1952
Algeria	El Kala	Tunisia	Fernana	AC	90	510	1956
Morocco	Oujda	Algeria	Ghazaouet	AC	225	640	1988
Morocco	Oujda	Algeria	Tlemcen	AC	225	640	1988
Morocco	Mellousa	Spain	Tarifa	AC	400	730 MW	1996
Tunisia	Fernana	Algeria	El Kala	AC	90	510	1956
Tunisia	Metlaoui	Algeria	Djebel Onk	AC	150	510	1984
Tunisia	Tajerouine	Algeria	El Aouinet	AC	225	640	1984
Tunisia	Tajerouine	Algeria	El Aouinet	AC	90	380	1952
Tunisia	Medenine	Libya	Abukamash	AC	220	2x620	2003
Tunisia	Tataouine	Libya	Rowis	AC	220	620	2003
Libya	Tobruk	Egypt	Saloum	AC	220	2x630	1998
Libya	Abukamash	Tunisia	Medenine	AC	220	2x620	2003
Libya	Rowis	Tunisia	Tataouine	AC	630	620	2003
Egypt	Taba	Jordan	Aqaba	AC	400	1270	1997
Egypt	Saloum	Libya	Tobruk	AC	220	2x630	1998
Jordan	Aqaba	Egypt	Taba	AC	400	1270	1997
Jordan	Irbed	Syria	Cheikmiskin	AC	230	770	1980
Jordan	Amman North	Syria	Der Ali	AC	400	1450	2001
Lebanon	Deir Nebouh	Syria	Tartus	AC	230	770	1972
Syria	Cheikmiskin	Jordan	Irbed	AC	230	770	1980
Syria	Der Ali	Jordan	Amman North	AC	400	1450	2001
Syria	Tartus	Lebanon	Deir Nebouh	AC	230	770	1972
Syria	Aleppo	Turkey	Birecik	AC	400	n.a.	Not in oper.
Turkey	Babaeski	Bulgaria	Maritsa East	AC	400	500 MW	n.a.
Turkey	Hamitabat	Bulgaria	Maritsa East (III)	AC	400	2000 MW	2002
Turkey	Hopa	Georgia	Batum	AC	220	300 MW	
Turkey	Kars	Armenia	Leninakan	AC	220	300 MW	
Turkey	PS3	Iraq	Zakho	AC	400	500 MW	
Turkey	Igdir	Nahcievan	Babek	AC	400	100 MW	
Turkey	Dogubeyazit	Iran	Bazargan	AC	154	100 MW	
Turkey	Baskale	Iran	Khoy	AC	154	200 MW	
Greece	Arachthos	Italy	Galatina	DC	400	500 MW	end 2001
Greece	Kardia	Albania	Elbasan	AC	400	600 MW	
Greece	Thessaloniki	Macedonia	Negotino	AC	400	1400 MW	

Table 14: *Existing interconnections in the S&EMCs (Source: OME, Electricity interconnections in the Mediterranean countries, October 2006)*

2. THE INTERCONNECTED ELECTRIC SYSTEMS: DEVELOPMENTS

2.1 The Driving Forces for Further Development of Interconnected Electric Systems

Section 1.2 presented the dynamics that led to the current interconnection situation in the EU, UCTE and other regions. These, essentially related to reasons of security of supply, are now changing and shifting to more commercial and political ones. Yet, such politically driven extensions of the synchronous zone should not endanger the reliability and security of the systems. A good balance should thus be sought.

2.1.1 The Need to Increase the Reliability and Security of Systems

The operational activities of transmission system operators in 23 European countries are coordinated by UCTE. Their common objective is the security of operation of the interconnected power system. Close co-operation of member companies is required to make the best possible use of benefits offered by interconnected operation. Over the years, UCTE has been developing a number of technical and organisational rules and recommendations that constitute a common reference for smooth operation of the power system. These rules and recommendations are now integrated into one single Security Package composed of three complementary pillars:

- *The Operation Handbook,*
- *The Multilateral Agreement and*
- *The Compliance Monitoring and Enforcement Process*.

The Operation Handbook (OH)

The development of the Operation Handbook started before the corresponding mandate was given by the EU Regulatory Forum in Florence in 2001. The support of the Operation Handbook to security of supply is explicitly recognised in the Directive 2005/89/EC concerning measures to safeguard security of electricity supply and infrastructure investment.

The Operation Handbook divides the operational issues into separate policies which comprise the relevant rules. The following policies are covered:

- *Load-Frequency Control and Performance;*
- *Scheduling and Accounting;*
- *Operational Security;*
- *Coordinated Operational Planning;*
- *Emergency Operations;*
- *Communication Infrastructure;*
- *Data Exchanges;*
- *Operational Training*.

The Multilateral Agreement (MLA)

The Multilateral Agreement is the legal instrument, which makes technical standards of the Operation Handbook binding among TSOs. It primarily defines the procedure of handling alleged infringements of standards of the Operation Handbook. All UCTE members signed the MLA which came into force on 1 July 2005. Today, signing of the MLA is a prerequisite for UCTE membership. As such, the agreement goes beyond the borders of the European Union granting to each UCTE member equal rights and obligations in the context of operational security regardless of whether the TSO is operating in an EU Member State or not.

The Compliance Monitoring and Enforcement Process (CMEP)

The introduction of the Operation Handbook standards sets out a procedure to monitor the compliance with the standards. This was a starting point to launch a new Compliance Monitoring and Enforcement Process.

This process is based on the assumption that UCTE, on behalf its members, will coordinate the efforts of individual TSOs to monitor the compliance with the OH standards. The first trial period covering the first three policies was carried out over the year 2006. The results will form the basis for future modifications of the process itself as well as the contents of the Operation Handbook.

2.1.2 The Request from New Countries to Be Connected to the UCTE System

In parallel to the reinforcement of the internal network, UCTE is dealing with several requests for the expansion of its synchronously interconnected area to neighbouring countries.

The following studies are being currently carried out by UCTE *(see Chapter 2.2.1):*
- *The synchronous interconnection of Turkey with UCTE*
- *The interconnection between Tunisia and Libya*
- *The IPS/UPS study; and*
- *A possible study on connecting power systems of Moldova/Ukraine to UCTE*

2.1.3 The EU Internal Energy Market and its Main Features

Energy Policy

The 21st century is characterised by a new energy era. The dispute over the price of gas supply between Ukraine and Russia triggered a discussion over the security of supply and Europe's ability to face new energy challenges. Thus, the year of 2006 brought energy back to the political agenda with demands for a new energy policy for Europe. To reflect on this the European Commission published in March 2006 a Green Paper outlining an approach to achieve the aim of sustainable, secure and affordable energy supplies. The paper outlines six priority areas for actions:
- *Internal Energy Market;*
- *Solidarity and internal supply security;*
- *Sustainable and diverse energy mix;*
- *Climate change;*
- *Research and development, innovation and technology;*
- *Coherent external energy policy*.

The paper calls for a "single European grid"; a "European grid code" to be worked out by a "European Centre of Energy Networks".

In a response to the discussion launched by the Green Paper, the Commission tabled on 10 January 2007 ***a comprehensive package of measures to establish a new Energy Policy for Europe*** to combat climate change and boost the EU's energy security and competitiveness. To achieve this objective, the Commission proposes to focus on a number of energy related measures: improving energy efficiency, raising the share of renewable energy in the energy mix, as well as new measures to ensure that the benefits of the internal energy market reach everyone, reinforcing solidarity among Member States, with a more long term vision for energy technology development, a renewed focus on nuclear safety and security, and determined efforts for the EU to "speak with one voice" with its international partners, including energy producers, energy importers and developing countries.

The Energy Package includes:
- A report on the implementation by the Member States of the internal gas and electricity markets as well as the results of an enquiry of the state of competition in these sectors;
- A Plan for Priority Interconnections in the electricity and gas networks of the Member States so that a European grid becomes a reality;
- Proposals to promote sustainable power generation from fossil fuels;
- A roadmap and other initiatives to promote renewables, notably biofuels for transport;
- An analysis of the situation of nuclear energy in Europe;
- A work sheet for a future European Energy Strategic Technology Plan.

The Energy Efficiency Action Plan which the Commission adopted on in October 2006 also forms part of the Action Plan. The Commission asked the European Council to endorse its proposals at its Spring Summit on 8-9 March 2007.

EU Internal Electricity Market

The process of liberalisation has progressed, but is still ongoing and swift progress is needed towards a fully competitive pan-European electricity market. The Commission in its regular progress report concluded that with the adoption of the 2nd Electricity and Gas Directives the basic framework for the development of a real internal market is in place but that further progress is needed to ensure effective implementation in all Member States. However, the Commission does not exclude new EU legislation for the electricity sector, but proposed some possible options for the further development of markets on 10 January 2007, as a part of the Energy Package.

Fundamentally, the construction of the EU internal market requires that strong focus be put on ensuring sufficient harmonisation of the existing markets. An acceleration of the move from national structures to a pan-European market is needed. In this respect, all key players support ERGEG's regional initiative aimed at progressing on regional market integration but it is essential that an ambitious agenda and timetable for this integration be set and that the European Commission gets more involved in order to provide a real European perspective to the process.

To ensure a real regional/ European development of the market and of the grid, further cooperation of TSOs (and Regulators) is fundamentally needed. It should be essential to ensure that these act as one and that effective regional grid planning processes be developed everywhere in the EU. Further progress towards more cooperation between TSOs and a more regional mindset in the development of the grid is foreseen in the course of 2007.

EU Energy Infrastructures

The creation and completion of a truly European internal market requires sufficient gas and electricity cross-border transmission capacity. In this context, the ***Trans-European Energy Network (TEN-E) Guidelines*** are an important policy instrument with the objective to boost and accelerate the implementation and construction of connections and to increase the incentives for private investors. They also contribute to reinforcing the security of energy supply by better linking the national markets and by strengthening relations with third countries in the energy sector. For this purpose, the missing links in the transmission infrastructure have been identified and ranked according to their impact on cross-border trade and associated inter-regional exchanges.

The revised Trans-European Energy Network Guidelines adopted by Council in July 2006 focus on full integration of the new Member States into the network and present 42 projects of European interest.
The guidelines specify the following 9 axes for priority electricity networks projects:

- ***France - Belgium - Netherlands - Germany****:* electricity network reinforcement in order to resolve congestion in electricity flow through the Benelux States;
- ***Borders of Italy with France, Austria, Slovenia and Switzerland*****:** increasing electricity interconnection capacities;
- ***France - Spain - Portugal****:* increasing electricity interconnection capacities between these countries and for the Iberian peninsula and grid development in island regions;
- ***Greece - Balkan countries - UCTE System*****:** development of electricity infrastructure to connect Greece to the UCTE System and to enable the South-Eastern Europe electricity market;
- ***United Kingdom - Continental Europe and Northern Europe:*** establishing/increasing electricity interconnection capacities and possible integration of offshore wind energy;
- ***Ireland - United Kingdom****:* increasing electricity interconnection capacities and possible integration of offshore wind energy;
- ***Denmark – Germany – Baltic Ring*** *(including Norway – Sweden – Finland – Denmark – Germany – Poland – Baltic States – Russia):* increasing electricity interconnection capacities and possible integration of offshore wind energy;

- ***Germany – Poland – Czech Republic – Slovakia – Austria – Hungary – Slovenia**:* increasing electricity interconnection capacities;
- ***Mediterranean Member States – Mediterranean Electricity Ring***: increasing electricity interconnection capacities between Mediterranean Member States and Morocco – Algeria – Tunisia - Libya – Egypt – Near-East Countries – Turkey.

The notion of Projects of European Interest *(see also Chapter 2.3.2)* is thus reintroduced to designate projects which are of a cross-border nature or have significant impact on cross-border transmission capacity. They will top the list of projects vying for co-financing not only through the TEN-E budget but also from other sources of EU funding such as the European Investment Bank. An implementation timetable will be agreed between the Member States and the Commission. In addition, the revised TEN-E provides a framework for increased coordination, exchange of information and the possibility of appointing a European Coordinator. The Commission does not intend to appoint a single European coordinator working on all European interest projects. Instead, it has indicated that there are likely to be several European coordinators on a case-by-case basis.

As a part of the Energy Package published on 10 January 2007, the Commission included a Plan for Priority Interconnections.

Challenges of Wind Energy

Renewable energy sources (RES) play an increasingly important role within the European electricity system. Regarding the future growth in Europe's RES capacities the major contribution will come from new wind power. Fast capacity growth, limited predictability and the geographical concentration in coastal and remote areas constitute an enormous challenge to the successful integration of wind power into the European electricity system. In order to cope with this challenge, UCTE proposes a number of actions and investigations that need to be taken by legislators, regulators, grid operators and grid users aiming at establishing a harmonised set of rules for the integration of wind power.

2.1.4 On-going Political Processes and External Relations

External Energy Policy

The European Commission adopted on 13 May 2003 **a Communication which aims to strengthen energy co-operation with neighbouring countries**. The paper stresses that the progressive creation of a real European electricity and gas market, including potentially more than 35 countries should be a clear medium-term objective of the European Union. This objective to establish a much wider electricity market with non-EU countries could become a considerable driver for the construction of further interconnections between the EU and its neighbouring countries.

The need for a coherent external energy policy has been highlighted in the recent Green Paper on EU Energy Policy. In response the Commission and High Representative prepared in June 2006 a common paper on *"An external policy to serve Europe's energy interests",* which constitutes a solid basis for the external policy. Building on this paper, in October 2006, the Commission adopted a more extensive concept paper *"External Energy Relations – from principles to action"*. It is becoming clear that the goal of Europe's external energy policies must be to ensure a secure and affordable supply of primary energy for Europe. A more coordinated approach to external policies, with energy issues properly integrated is also widely stressed. External aspects play an important role in the Commission's January proposal for an Energy Policy for Europe, which will be further discussed in 2007.

EU-Russia Energy Dialogue

As regards Russia, concrete discussions have now begun to identify issues that need to be addressed so as to achieve substantive equivalence in market opening. The interconnection of the Russian and continental EU electricity grid has been recognised as one of the projects of "common interest" at the EU-Russia Summit of October 2001. However, in order for integrated markets to function in an acceptable, efficient and secure manner, a level playing field must be ensured. This requires that all parts of such a wider market are organised on the basis of equivalent rules with respect to the degree of market opening and other important market rules, such as regulation of network access and unbundling. Furthermore, environmental protection and safety standards for electricity production must be comparable, including the level of nuclear safety. In the framework of the EU-Russia energy dialogue, the four Thematic Groups (Trade, Infrastructure, Investments and Energy Efficiency) were created with the view to increasing business involvement and providing practical proposals for next actions. Recommendations for further work as proposed in the groups' final reports were adopted by the Permanent Partnership Council on energy convened in December 2006. They agreed on closer cooperation on comparing energy strategies, forecasting scenarios, implementation energy efficiency action plans and further exchange of information. A reference was made to the joint EURELECTRIC-CIS EPC Roadmaps towards compatible electricity markets in the EU and CIS regions. In the next phase a number of thematic groups would be reduced to three, focusing on energy efficiency, market developments and energy strategies. Meanwhile, the first-ever meeting of the EU-Russia Permanent Partnership Council on environment took place in October 2006 and launched the EU-Russia Energy Dialogue on Environment, climate change, biodiversity and environment and economic development. Seven new joint working groups focusing on specific issues are being established.

The creation of the South-East Europe Regional Energy Market

The Commission's intention to extend the EU energy regulatory framework has been successfully accomplished in the Energy Community Treaty signed between the EU and nine partners from South-East Europe. The legally binding Treaty in force from 1 July 2006 requires application of the EU rulebook in the field of energy, environment (plus a specific chapter on RES) and competition. It sets a later market-opening deadline than for EU states – January 2008 instead of July 2004 for industrial and commercial customers, and January 2015 instead of July 2007 for all customers. It also requires the reduction in the sulphur content of certain liquid fuels by 31 December 2011 and the limitation of emissions of certain pollutants into the air from large combustion plants by 31 December 2017. Meanwhile, to ensure that countries are effectively moving towards these objectives, national electricity roadmaps and action plans were prepared and adopted by the Ministerial meeting in October 2006. In addition, Turkey, Norway, Ukraine and Moldova were also admitted as observers to the Treaty.

Mediterranean Region: Revision of the EU TENs Guidelines and Proposals of the Euro-Mediterranean Energy Partnership

The rate of energy exchange among South and East Mediterranean countries is quite low in comparison with that of UCTE countries but it is assumed that the strengthening of interconnections would lead to production savings due to the shifting of load demand curves and to the difference in primary energy costs. Plans thus exist for increasing the level of interconnection between Southern and Eastern Mediterranean systems but also for the construction of new links towards Europe *(see below, section 2.2.5).*

Electrical interconnections	Exports	Imports	Total
Portugal-Spain	2806	9477	12283
France-Spain	7284	749	8033
France-Italy	14493	702	15195
Italy-Greece	268	711	979
Italy-Slovenia	2	7931	7933
Slovenia-Croatia	1076	7944	9020
Croatia-BiH	1340	2735	4075
BiH-Serbia & M.	893	911	1804
Serbia& M.-Macedonia	1990	1	1991
Greece-Macedonia	71	796	867
Greece-Albania	1056	15	1071
Albania-Serbia&M.	711	193	904
Spain-Morocco	898	111	1009
Algeria-Spain			0
Algeria-Morocco	74	47	121
Algeria-Tunisia	58	150	208
Tunisia-Libya		0	0
Egypt-Libya	196	105	301
Egypt-Jordan	741	3	744
Syria-Jordan	241	2	243
Syria-Lebanon	455		455
Israel-PNA	1665		1665
TOTAL intra-Mediterranean	**36318**	**32583**	**68901**

Table 15: *Electricity Exchanges between Mediterranean Countries in 2005 (GWh). (Source: UCTE 2005; EURELECTRIC Oct 2005; AUPTDE 2005; Comelec; Companies & OME)*

In September 2006, the EU adopted a Decision on trans-European energy networks (TENs decision), which defines as priority projects for electricity networks the increase of interconnection capacities between France – Spain – Morocco – Algeria – Tunisia – Libya – Egypt – near Eastern countries – Turkey – Greece and Italy (the *Mediterranean Electricity Ring* project). In addition to this, the decision also mentions the construction of an interconnection of European interest between Tunisia and Italy. With this decision, it is expected that the infrastructure financing by the EU and the EBRD on those lines will be strongly increased.

In the framework of the Euro-Mediterranean Energy Partnership, a number of energy cooperation priorities were proposed by the Euro-Med Energy Forum (i.e. governments' Directors General) for 2007-2010. Concerning electricity interconnection development, the priorities still have to be endorsed by Energy Ministers in a Euro-Mediterranean ministerial conference some time in 2007. Interestingly, the Forum recommends that concrete solutions to enhance financing opportunities for energy projects of common interest in the Euro-Mediterranean region be developed. They suggest to ensure better use of the existing financing instruments and to create additional financing instruments if appropriate. A donors' working group could for example be envisaged to facilitate the coordination of financing sources and ensure their complementarities. This proposal (together with the exact list of projects of common interest) will have to be adopted by the Euro-Mediterranean ministerial conference in 2007.

2.2 On-going Projects and Studies

2.2.1 UCTE On-going Studies

UCTE studies and monitors the development of the UCTE synchronous area. At present, UCTE faces important challenges concerning the eastward development of the EU power system. UCTE has already successfully interconnected the CENTREL countries, Romania and Bulgaria, Western Ukraine and re-connected the South-East Europe in 2004. The Maghreb has been interconnected since 1999.

Other systems are presently requesting to synchronously interconnect their systems with the UCTE grid: IPS/UPS, Turkey, Ukraine/Moldova and investigations also continue to link Tunisia and Libya.

Such extensions of the UCTE system might be achieved via adoption and where necessary adaptation of technical standards as required by the UCTE Operation Handbook. Although in case of IPS/UPS, UCTE has expressed the readiness to determine a minimum set of mutual requirements maintaining the present reliability and security level and does not consider a possible UCTE-IPS/UPS interconnection as a UCTE extension, but as a joint synchronous operation of two very large power systems. UCTE is also very concerned about "limits" (technical, legal, efficiency and manageability of coordination tasks etc.) to the enlargement of the EU power system which could for example double in size alone in case of an interconnection with the IPS/UPS systems. Presently running projects and studies will detect security risks for a non-interrupted electricity supply and define and safeguard additional reliability measures and procedures. UCTE believes that new entrants who are opting for a full integration will have to fully respect its binding security rules. UCTE as technical association of TSOs does perform on request investigations about possible interconnections and measures to be taken by the requested parties. However, UCTE cannot take on its own final decisions for extension of the synchronous area. Besides the UCTE assessment of the technical feasibility, European and national authorities along with stakeholders will have to contribute to a final decision – with additional investigations concerning the reciprocity of market conditions and environmental standards.

Electrical Integration of Turkey

The connection of the Turkish Power System with the former UCPTE (presently UCTE) power system has been on Turkey's agenda since the 1970s.

In the 1980s, the international scenario for the synchronous interconnection of Turkey with its neighbouring countries differed from the present option. This was due to the fact that two bordering countries - Bulgaria (north-west) and Georgia (north-east) were part of the CMEA (USSR and Eastern European Countries) 50Hz power pools. Hence, Turkey was surrounded by the two synchronous zones. Two tie lines were built:

- 400kV single circuit line in 1975 between the Babaeski substation (Turkey) and the Maritsa-3 substation (Bulgaria);
- 220kV single line in 1970 between Hopa (Turkey) and Batumi (Georgia).

However, given Turkey's priority of synchronous connection with the Western Europe power pool, the two tie lines with Bulgaria and Georgia have been used for many years only for energy exchanges on islanded loads or directed generation.

Due to the international situation in the 1970s and 1980s, the interconnection of Turkey with the UCPTE power pool was only possible via Greece. This was analysed in a relevant study adopted in 1989. Consequently, the following links were proposed: two 400kV single circuit triplet bundle cardinal conductor lines, from the Hamitabat 1200MW gas fired thermal power plant (Turkey) to Thessaloniki (Greece). An intermediate substation was planned at Philippi (Greece). Initially only one of the two 400kV circuits was proposed for the implementation. And another substation at Kehros (Greece) between Philippi (Greece) and Turkish border is about to be connected. A Construction Agreement was signed on in May 2003 for the construction of Babaeski–Filippi 400 kV tie line between Greece and Turkey, which is expected to be completed in 2007.

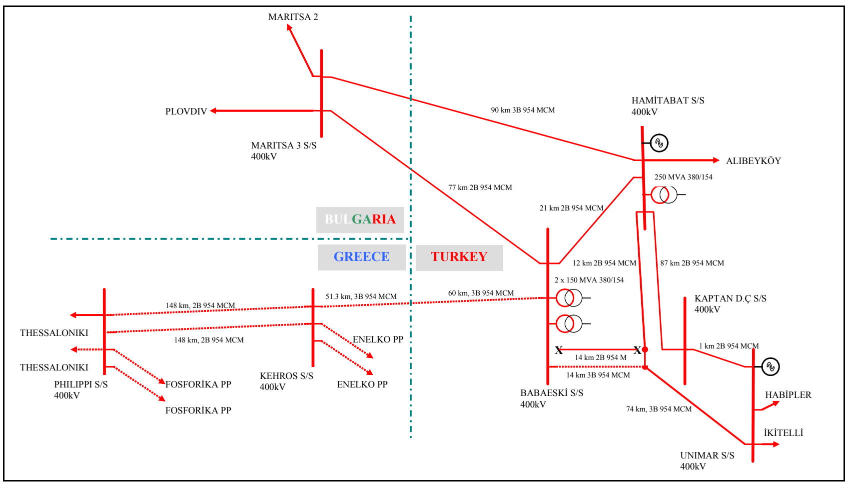

Figure 9: *Planned single-line diagram for the connection of Turkish Power System with UCTE*

Since the early 1990s, preliminary studies have been performed for various interconnection options between the networks of Greece, Turkey and Bulgaria. Recent studies from 2000-2001 confirmed that the considered synchronous connection is feasible and viable.

In early 2000, TEAS applied for UCTE membership. In parallel, UCTE confirmed to study possibilities for the synchronous interconnection of the Turkish Power System to UCTE and the subgroup on Turkey was set up.

Prior to any decision, UCTE asked to perform Static and Stability Studies assessing the possible impacts of the new extension of the regional and UCTE systems. This is essential to ensure the continuity of the smooth functioning of the entire UCTE System.

The following results of the studies are envisaged:

- Conditions for system stability of the entire UCTE system in the event of contingencies determined.
- Power exchange capacity between the Turkish Power System and the UCTE Power System determined.
- Any technical risks and possible counter-measures identified (if necessary).
- UCTE capability of monitoring the Turkish Power System, as required by the UCTE procedures.

The work on studies was launched in November 2005. Final results of this 18 month study-project are expected in the 1st half of 2007.

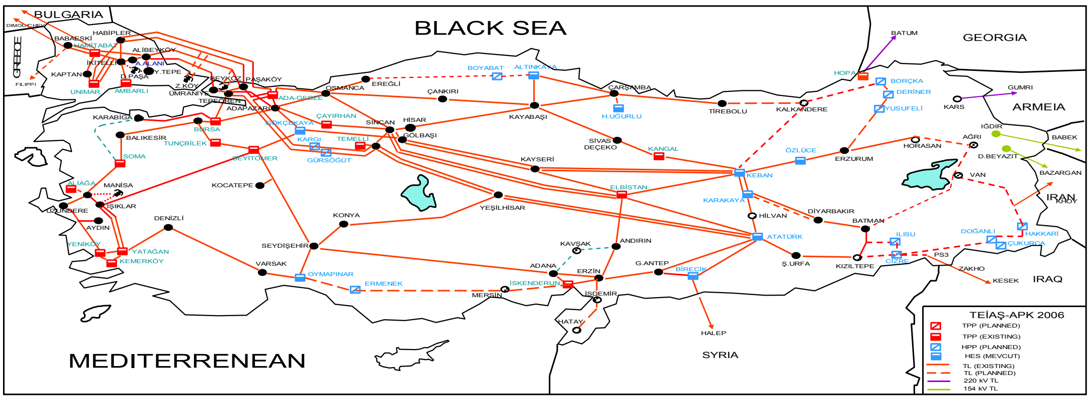

Figure 10: *400kV Turkish Power System*

The latest considered scenario will enable the connection of Turkey to the UCTE grid via three single-circuit 400kV lines (two 400kV lines between Turkey and Bulgaria and one 400kV line between Turkey and Greece). The planned 400kV 3-circuit connection and the configuration of 400-220kV systems in the Balkan countries and Hungary will ensure a reliable interconnection with Central Europe, which is adequate for the MW capacity of the Turkish power system.

The interconnection of Turkey with the UCTE grid via Greece and Bulgaria is also a pre-requisite for the feasibility of the prospective Mediterranean Synchronous Ring. However, given UCTE's technical requirements, the synchronisation Turkey's power system with its Eastern and South-Eastern neighbours cannot be realised in the short-term.

According to the UCTE procedure for a planned extension of the synchronous zone, a Project Group was set up to manage the interconnection of the Turkish power system with UCTE. This Project Group is responsible for the preparatory phase and the trial parallel operation including the necessary system tests as well. The

Project Group will be finished when the Turkish power system fulfils all requirements for a reliable and secure parallel operation with UCTE.

The possible synchronisation of Turkish and Syrian Power Systems has been investigated in the framework of the Mediterranean Ring study.

Tunisia and Libya

The closure of the two, already built, 225kV lines between Tunisia and Libya would extend the UCTE synchronous zone to the following five countries: Libya, Egypt, Jordan, Syria and Lebanon (Morocco, Algeria and Tunisia being already synchronously interconnected to UCTE). At the request of Tunisia and Libya, UCTE is conducting a study to take an appropriate decision concerning the technical feasibility of closing these two interconnection lines.

After a detailed programme which included network studies; the installation of WAMS (measurement tools); and two months of measuring campaign on the suitable settings of power system stabilisers in Libya, a 3-day closure test was launched on midday 21 November 2005. This test led to the opening of the Tunisia-Libya tie line and the tripping of the Algeria-Morocco Interconnections 7 minutes after breakers closure in the Tunisia-Libya interconnection.
After this failure, an in-depth analysis using WAMS and control centre recordings was performed to determine the origin of the incident. The main conclusion of these analyses is that normal daily load deviations can often activate the defence plans at international tie lines.

To prevent these problems, it is necessary to:

- Commission the scheduled network reinforcements in the TAM systems (400 kV corridor Spain-Morocco-Algeria, additional 225kV interconnection line Algeria-Tunisia).
- Check the Automatic Generation Control (AGC) proper performances in some countries.

CIS and Baltic States

In January 2002 the Electric Power Council of the CIS requested UCTE to study possibilities of synchronous interconnection of the European power grid – UCTE with the transmission systems of CIS and Baltic States. The connection of these two power systems is not a new issue and so far a number of studies[5] were elaborated. However, this project is not of the same kind as a “simple” extension of the UCTE synchronous area, like all other UCTE past and present extensions. This should be rather seen as the attempt to interconnect two large electrical blocks that are of similar size.

For the time being both systems operate according to different technical standards; the UCTE system is based on a decentralised power/frequency control policy and the UPS system is based on a centralised control system where the peripheral areas are under load control. Although last time the frequency control also becomes decentralised – the IPS of Baltic States and IPS of Ukraine have built their own secondary power/frequency controllers.

The following facts summarise the nature of the project:

- Presently, there is no existing electricity system in the world spanning more than 10 time zones with different load characteristics and various generation structures;
- Due to the similar size of the power systems, it is a project of a completely new dimension;
- All previous studies can be considered only as preliminary investigations;
- Improving or at least securing at its present level the reliability of the present power systems is a guiding principle for each step in the process of interconnection.

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[5] *«Technical Study of the Interface between the Extended West European Power System and their Eastern Neighbours» - 1996 (PreussenElektra AG - Bayernwerk AG - EDF - RWE Energie AG), «Study on Conditions of Interconnected Operation of the UCPTE system and Power Systems of Eastern Europe and Central Asia» – 1997 (PreussenElektra AG - IREL), the study TACIS EREG 9601 “Synchronous Interconnection of the TESIS and UPS Networks – Requirements and Feasibility” finished in 1999.*

After the completion of a pre-feasibility study in 2003, dealing with steady state load-flow analysis, it was agreed to launch a detailed feasibility study. The study was launched in 2005. The three-year project will evaluate in different scenarios the feasibility of synchronous coupling the power systems of IPS/UPS and UCTE and identify all necessary measures and their respective costs, being well aware that the fundamental prerequisite to any system development is to maintain or increase the security of operation of both systems, once coupled. The study is performed as a joint project under the responsibility of UCTE. More than 100 experts from UCTE and IPS/UPS are involved in the project. The UCTE part of the project budget is co-financed by the European Commission from the TEN-E Programme.

The three main questions to be answered by the study are:
- Is a full synchronous interconnection of IPS/UPS with UCTE feasible?
- What are the mandatory requirements on both sides?
- What are the associated costs?

On the working level, five working groups deal with subtasks such as steady-state analysis, system dynamics, power system control, operational and organisational issues and legal aspects. The total project duration is globally divided into several main phases such as data collection and modelling, system simulation and verifying and summarising of results.

The results – to be delivered in 2008 - will be used as a basis for further decisions on system extension on both sides.

The Project Status Summary Report published in December 2006 concluded:
- Data compilations and models available at the end of 2006 and the results of first steady state load flow calculations already performed do not allow to identifying fundamental technical barriers to a positive assessment of the feasibility of a synchronous operation between IPS/UPS and UCTE.
- The next essential step to be started in the beginning of 2007 will address the dynamic behaviour including the control performance of the common system model, once both systems would be synchronously interconnected. This will be the crucial step towards assessing the technical feasibility of a possible synchronous interconnection.
- Besides the technical, operational and reliability standards including their legal and contractual framework, the study will deliver in 2008 a list of necessary investments to be made on both sides of the investigated interface, and their associated costs.
- Furthermore, in 2008 the study will present an open outlook on other non-synchronous system coupling possibilities with the aim of a global benchmark in terms of economic efficiency for the investigated system coupling.

2.2.2 Nordic Countries – Grid Investment Projects

Two projects connecting the Nordic market with the neighbouring markets are presently going on:

- The NorNed Link between Norway and the Netherlands. TenneT and Statnett have started the construction of the 580 km long NorNed cable between Norway and the Netherlands. The link will be commissioned before the turn of the year 2007/2008.

- Estlink between Finland and Estonia. Nordic Energy Link AS has constructed a 350 MW DC merchant interconnection across the Gulf of Finland. It is the first interconnector linking the Baltic countries with the Nordic electricity system. Estlink was commissioned in December 2006.

With the aim of improving the prerequisites for an efficient Nordic electricity market, Nordel has identified five network investments deemed especially important from a Nordic perspective. During the year, various possibilities have been analysed for financing and organising these investments. A bilateral financing model with earmarked congestion revenues has shown itself to be the best and simplest solution in the short-term. The system-responsible companies make investment decisions, implement, and finance the projects, entailing that no major structural or regulation-related changes need to be introduced. Today, the Nordic TSOs are investing € 1,000 million in five prioritised network projects.

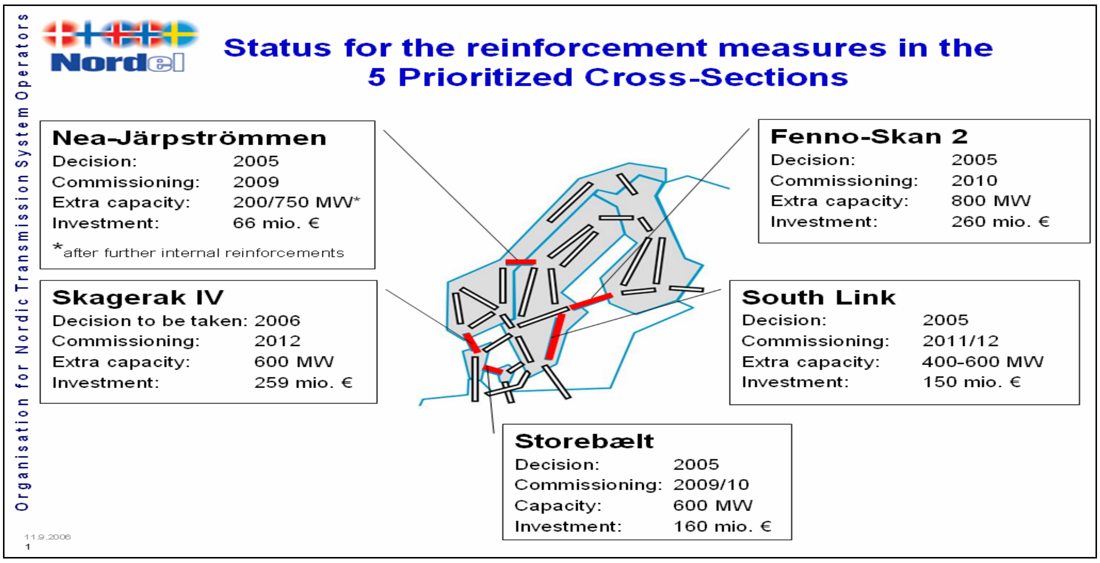

Figure 11: *Status of the reinforcement measures in Nordic countries*

2.2.3 United Kingdom

England - Norway, North Sea Interconnector

For three years National Grid has been developing an interconnection between the east coast of England and the south west coast of Norway under a Joint Development Agreement with Statnett (the Norwegian grid operator). The project is referred to as the North Sea Interconnector (NSI). NSI will have a capacity of around 1200 MW, and at around 700km length it will be the longest DC sub-sea cable in the world. Construction was due to start in 2002 and completion is envisaged by 2007. A seabed survey was completed in October 2000 and a feasible route was identified. This project is currently on hold.

Britain – Netherlands Interconnector, BritNed

Following feasibility studies in 1999 carried out under a joint development agreement, National Grid and TenneT (the grid operator in the Netherlands) established a joint venture company, BritNed Development Ltd., to develop a sub sea interconnector between England and the Netherlands. The link will be around 200km long and capacities between 1000 and 1320 MW are being considered. The target date for commercial operation is 2010.

Wales – Ireland

National Grid and ESB NG undertook a feasibility study in 2000/2001 to identify the options for a HVDC sub sea link between the West Coast of Wales and the East Coast of Ireland.

2.2.4 Commonwealth of Independent States and Baltic States

During the last years more and more interconnection projects of Baltic IPS with NORDEL and UCTE are considered. So far all of them are DC technology based. After the construction of Estlink 1 based on ABB Light technologies, a second Estlink cable project has been proposed and might be based on conventional DC technologies although details are not known. Both Lithuania and Latvia are studying projects for DC connection with Sweden. The first one is SwedLit cable with retard power of 700-1000MW connecting area of Klaipeda (Lithuania) with the south of Sweden and a pre-feasibility study is ongoing. The second one is the Gotlink cable proposed by the Latvian side which could be connecting the Ventspils area (Latvia) with Gotland (Sweden), in this case requiring reinforcement of connection between Gotland and continental Sweden. Some activities related to the "old" Poland-Lithuania AC connection with DC back-to-back could be noted, but without particular progress.

One of the main considerations for the Baltic IPS future power balance is the closure of the second Ignalina NPP reactor (Lithuania). During 2006 based on government decisions Eesti Energia, Latvenergo and Lietuvas Energija together with invited consultant companies performed a study in order to identify the need for new nuclear power plant construction in the Ignalina area. As a consequence it was decided that there are grounds for continuing with this project and a proposal was made to the Lithuanian government. If this proposal will be supported, all three Baltic states may become major investors in the new NPP construction.

Azerbaijan – Iran, Georgia

Two lines between Azerbaijan and Iran are under construction and will be commissioned in 2007:

- OHL 330/400 kV Imishly – Tagi Dizek (330 – in Azerbaijan, 400 – in Iran) with a transport capacity of about 450 MW;
- OHL 230 kV Massaly – Astara, 250 MW.

With existing two OHL (230 kV Parsabad and 110kV Astara) between Azerbaijan and Iran the power transmission corridor will pass 700-800 MW). The restoration of the interconnector 500 kV/650 MW (OHL – "Muhranisvelli") between Azerbaijan and Georgia is planned for 2007. With existing OHL (330 kV Gardabani) between Azerbaijan and Georgia, the transport capacity will be increased up to 1000MW. This project is highly considered by Azerbaijan as a connection towards Black Sea basin countries and GUAM countries' power markets in the near future.

Armenia – Iran, Georgia

The feasibility study of a new double-circuit OHL 400 kV Razdan TPP (Armenia) – Akhar, Khoy (Iran) was completed in 2006 and the construction began in 2007. With that and two existing OHL 220 kV the net transport capacity Armenia – Iran amounts to 1200 MW.

From the same Razdan TPP (Armenia), another OHL 400 kV is to be built in 2007 to Ksani SS (Georgia), where a new AT 500/400 kV is also foreseen. The designing phase is already finished.

Many other projects are under discussion, e.g. non-synchronous links Georgia – Turkey, from the IPS of Central Asia to the south, but there are no clear plans yet.

2.2.5 Mediterranean Countries

Around 19 major interconnection development projects exit in the Mediterranean region, among which is the reinforcement of the interconnections from Egypt to Morocco (ELTAM project), some HDVC interconnections in the Mediterranean basin and a number of projects to reinforce interconnections in the Mashrek. For a full list of these projects, see table 15 below.

The ELTAM Project

A study on the reinforcement of interconnections between Egypt, Libya, Tunisia, Algeria and Morocco (ELTAM) to 400 kV was launched in 2000. It was lead by Tractebel Engineering and financed by the Arab Fund (FADES). The study was completed in 2004.

A full 400 kV reinforcement of interconnections is expected to facilitate market integration between the five countries. Following on from the conclusions of the study, which was finalised in 2004, the completion of all 400 kV interconnection lines is expected by 2010:

- 400kV interconnection Tunisia-Libya (Bouchemma – El Rowis);
- 400kV interconnection Libya – Egypt (Tobruk – Saloum) including 400kV/500kV transformers in Tobruk.

Meanwhile, the introduction of the 400 kV is gradually beginning to take place. In Tunisia, STEG planned to build a 400 kV axis in the system between the north and south of the country (expected by 2015). In Algeria, in June 2005, the first 400 kV station came into operation in Skikda. Three Algerian 400 kV lines had already been completed in 2002 and 2003, though they are still being operated at 200 kV for now. In Algeria, the 400kV backbone from west to east is expected to be completed before 2010.

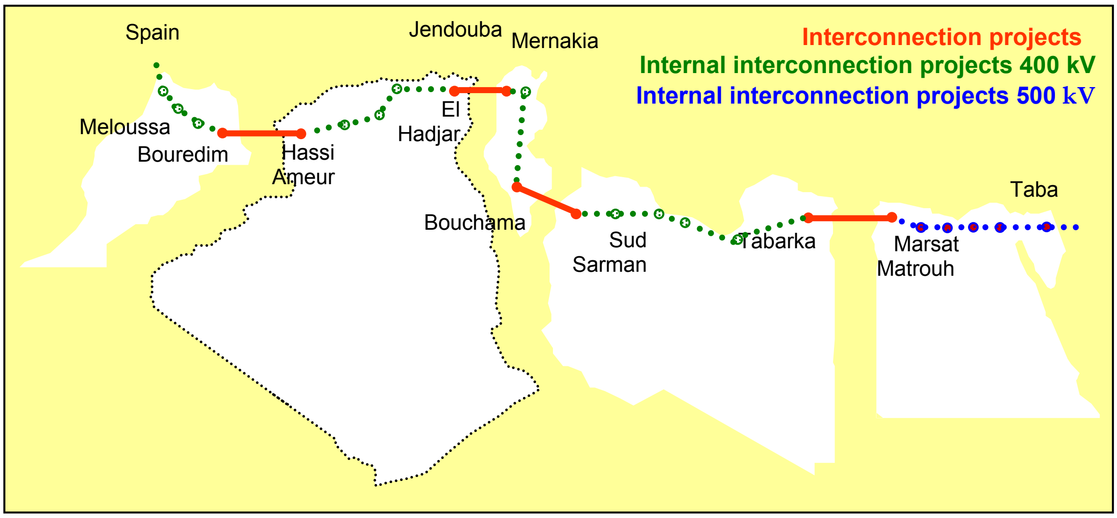

Figure 12: *Interconnection projects in 400-500 kV for the whole ELTAM region (Source: presentation at the 2006 Convention of COMELEC).*

HVDC interconnections in the Mediterranean basin

Recently, issues of security of supply, integration of electricity markets and economic cooperation in the Mediterranean region have drawn some attention to the idea of North-South HDVC links (between Spain/ France/ Italy and the Maghreb countries). Early in 2000, significant feasibility studies were begun to identify the most economically viable undersea corridors. The impetus to start these studies came in particular from Algeria and Libya, who are very interested in increasing their exports to Europe.

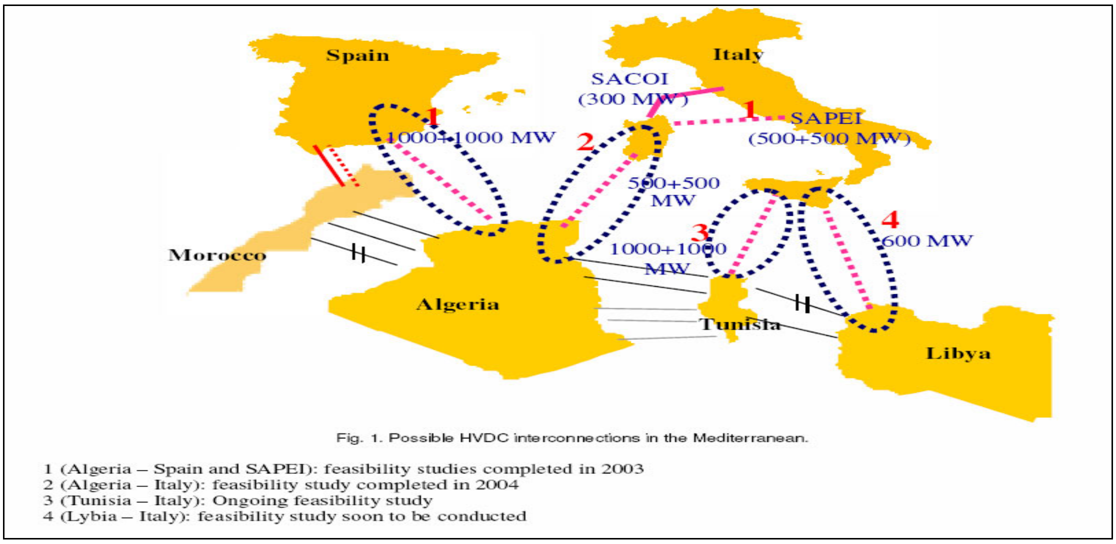

Figure 13: *Possible HVDC interconnections in the Mediterranean region (Source: Article by B. Cova and al.)*

The feasibility study Algeria-Spain was conducted by CESI for the AEC (Algerian Energy Company), with the involvement of the Spanish and Algerian TSOs. Completed in 2003, the study came to the conclusion that, besides transmission costs, the production costs in Algeria (gas costs plus costs for the financing of poser stations) and the sales prices in Spain would strongly influence the profitability of the project. Much thought is still given to the idea of submarine cables between Algeria and Europe, and Algeria organised an international conference in late 2005 with the view to seek the involvement of foreign partners. The decision on the possible implementation of the project is now in the hands of AEC, Sonelgaz and Red Electrica de Espana.

If a decision to build the interconnection would be made, the study suggests that the best solution would be a 1000 MW and 500 kV direct HVDC connection between Terga (Algeria) and the Litoral de Almeria (Spain), together with a 200 MW AC connection crossing Morocco. The significant depth of the sea (1900 m) is however a critical element that would call for substantial engineering work (maximum depth reached so far: 1000 m for the connection Italy-Greece).

The Algeria-Italy feasibility study was also conducted by CESI (and TERNA) on behalf of the Italian and Algerian TSOs. It was completed in June 2004. Two solutions for a 500 to 1000 MW 400 kV interconnection were studied: a "direct" line between El Hadjar (Algeria) and Latina (Italy) and an "optimised" line between El Hadjar and South Sardinia. The "direct" line is reaching the limits of technical feasibility given the depth of the sea in the region (2000 m). The "optimised" solution faces equivalent problems but with lower levels of investment and power losses (cost estimated to € 750-900 million for the direct line; € 205-578 million for the optimised line). The construction of this line is however also under question as its financial feasibility is uncertain and the project is strictly tied to the entry in service of the SAPEI project (HDVC cable between Sardinia and mainland Italy).

A consortium of Algerian and foreign companies was established in November 2005 for the realisation, exploitation and financing of the two undersea cables (Algeria-Italy via Sardinia; Algeria-Spain).

A feasibility study for a 500 MW Tunisia-Italy interconnection was carried out by CESI and finalised in February 2006. It is expected that this interconnection could be in operation by 2010-2011. The estimated cost is around € 380-410 million.

Finally, a study for an interconnection Libya-Italy is also to be launched.

Interconnection developments in the Mashrek region

Several projects exist in the region, which have different status. Among these are notably the following:

- The upgrade of the Libya-Egypt double circuit 220kV interconnection to 400kV in Libya and 500kV in Libya (with a transformation from 400 to 500 kV in Tobruk, Egypt); and the reinforcement of the interconnection with a second line of 1000 MW between Tobruk and Aldbaah (Egypt), projected for 2010-2015.
- The reinforcement of the current 400kV Egypt-Jordan submarine cable to 1100MW by 2010.
- The doubling of the interconnection capacity between Lebanon and Syria (to 400 MW) in two phases. The first phase, already commissioned in 2004, now allows for the transfer of 300 MW. Around 2010, the second phase should be commissioned.
- The doubling of the existing 400kV interconnection between Syria and Jordan by 2010.
- The coming on stream on 2007 of the two new lines between Algeria and Tunsia, and between Algeria and Morocco. The construction is completed and will be operational by 2007 (firstly operated at 225kV and later under 400kV).

Electrical Line	Thermal Limit (A)	Length (km)	Tension kV AC or DC	OVL or subsea	Year of operation
Spain - Algeria	2000		500 DC	subsea	under study
Italy - Algeria	-		400 or 500 DC	subsea	2010
Italy - Tunisia	500		500 DC	subsea	2010
Algeria - Morocco (3rd line)	1720x2	250	220 AC (400 AC)		2005 (2010)
Algeria-Tunisia (5th line)	1720	120	220 AC (400 AC)		2005 (2010)
Tunisia-Libya (3rd line)		210	400 AC		2010
Libya-Egypt (2nd line)	-		400/500 AC		2010-2015
Reinforcement EG-LI-TU-AL-MO (ELTAM project)			400 AC		2015
Egypt-Jordan (2nd line)	880	20	500/400 DC	subsea	2010
Egypt-Palestine	1440		220		2007
Palestine (WB)-Palestine (Gaza)	1440		220 or 240		2007
Palestine - Jordan	1450		400		2007
Jordan-Syria (2nd line)		210	400 AC		2010
Lebanon - Syria	1660	22	400 AC		2004 (2010)
Syria-Turkey	1440	124	400 AC		2008
Turkey-Greece	2165/2887	250	400 AC		2007
Libya- Italy			HVDC		Study soon
Sardinia-Peninsula of Italy			HDVC		2007-08
Balearic Islands – Mainland Spanish Peninsular system			HVDC	subsea	Foreseen 2009

Table 16: *Major interconnection development projects in the Mediterranean region (Source: OME, Electricity interconnections in the Mediterranean countries, October 2006)*

2.3 The List of Projects

2.3.1 Projects and Studies Completed in 2005 - 2006

The European transmission system operators continuously reinforce the transmission network. The list below summarises studies and projects completed within the period of 2005 – 2006 to show the progress achieved since the 2nd SYSTINT Report, published in 2005.

Country/Lines	Characteristics of Lines	Status
Estonia		
Estonia - Finland	**Estlink – submarine cable, 350MW, 150kV**	**December 2006**
Finland:		
Finland - Estonia	**Estlink – submarine cable, 350MW, 150kV**	**December 2006**
Hungary:		
Györ - Szombathely	AC OHL Double 400kV	Completed in 2006
Italy		
Fiume Santo – Latina	DC submarine cable Double 500 kV	Study completed in 2005 (project launched)
Candela – Foggia	AC OHL Single 380 kV	Completed in 2005
Turbigo – Bovisio	AC OHL Single 380 kV	Completed in 2006
Laino – Rizziconi	AC OHL Single 380 kV	Completed in 2005
S.Teresa – Bonifacio (F)	AC submarine cable Single 150 kV	Completed in 2006
S.Fiorano - Nave - Gorlago	**AC OHL Single 400 kV**	**No more included in the Italian Grid Development Plan.**
Norway:		
Viklandet-Nyhamna (Connection offshore project Ormen Lange)	AC OHL 420kV	Completed in December 2006
Portugal:		
Cedillo (ES)-Falagueira	AC OHL 400kV	Opening of a former line in a substation near the border. Commissioned in 2005
Romania:		
Nadab-Beckescsaba (HU)	AC OHL Double 400kV	Study completed in 2005 (project launched)
Arad-Nadab	AC OHL Single 400kV	Study completed in 2005 (project launched)
Oradea-Nadab	AC OHL Single 400kV	Study completed in 2005 (project launched)
Gutinas-Bacau	AC OHL Single 400kV	Study completed in 2006
Bacau- Roman	AC OHL Single 400kV	Study completed in 2006
Roman-Suceava	AC OHL Single 400kV	Study completed in 2006
Russia:		
Tver NPP – Belozerskaya (with the 3-d unit 1000 MW)	AC OHL Single 750kV, 272km	Completed in December 2004
Entries of Amur – Khabarovsk line to Bureya HPP (East)	AC OHL Single 500kV, 2x64 km	2004
Bureya HPP - Khabarovsk (East)	AC OHL Single 500kV, 238 km 430	2005
Primorskaya TPP – Khekhtsir[1] (East) 500	AC OHL Single 500kV, 290 km	Completed in November 2006
Blagoveschensk (Russia) – Sirius (China)	Double circuit OHL 220 kV, 350 MW	Commissioned in November 2006
Serbia:		
Ugljevic (BH) – Sremska Mitrovica	AC OHL Single 400kV	Completed in 2006
Sombor -Subotica	AC OHL Single 400kV	Completed in December 2006
Jagodina 4	New SS 400/110kV	Completed in December 2006
Sombor 3	New SS 400/110kV	Completed in December 2006

Switzerland		
Commissioning of the "Bernina" line with the T-connection Sils/Pradella – Gorlago and the circuit Filisur – San Fiorano	AC double circuit line in 380 kV operation	January 2005
Commissioning of the station Robbia positioned between the existing stations Sils, Filisur and Pradella on the one side and Gorlago and San Fiorano on the other side	Station in 380 kV operation. The commissioning of the station Robbia led to a topology change on the route of the "Bernina" line. The following circuits have been thus created: Filisur – Robbia; Sils/Pradella – Robbia; Robbia – Gorlago; Robbia – San Fiorano	October 2005
Commissioning of the "Nufenen" line between All' Acqua and Ulrichen	AC double circuit line in 220 kV operation. Using this line topological changes have been introduced resulting in the creation of the T-connection Fisch/Airolo – Ponte and the circuit Mörel – Airolo	October 2005
Renovation works in the 220 kV Chamoson substation after 4 years of construction concluded	Station Chamoson 220 kV is an important node for the evacuation of generation of hydro power plants	2006
Sweden:		
Långbjörn	Reinfurbished switchyard and new transformers	Completed in 2006

2.3.2 *Ongoing and Planned Projects for the Reinforcement of the Present System*

Following on from the previous chapter, the list below shows the internal and international projects for the reinforcement of the present system.

Projects in bold are "**projects of the European interest**" as specified in the TEN-E Guidelines adopted in July 2006.

Country/Lines	Characteristics of Lines	Status	Starting date Study/Project
Austria:			
10 – Lienz (AT) – Cordignano (IT)	**AC OHL Double 380kV**	**Foreseen project**	
Südburgenland (AT) – Kainachtal (AT)	**AC OHL Double 380kV**	**Ongoing project**	
Tauern (AT) – Salzach – St. Peter (AT)	**AC OHL Double 380kV**	**Ongoing project**	
Zell/Ziller – Westtirol	AC Upgrade 220kV to 380 kV	Foreseen project	
Lienz – Obersielach	AC OHL Double 380kV	Foreseen project	
Wien-Südost (AT) – Györ (H)	AC Additional 380kV system	Foreseen project	
Slavetice (CZ)- Dürnrohr (AT)	**AC Additional 380kV system**	**Foreseen project**	
Belgium:			
05 – Aubange (BE) – Moulaine (FR)	**AC OHL Double 380kV**	**Ongoing study**	
Avelgem (BE)– Avelin (FR)	**AC OHL Double 380kV**	**Foreseen project**	
Bulgaria:			
29 – Chervena Mogila s/s – Stip (MK)	AC OHL Single 400kV	Ongoing study	
30 – Maritza East 3 s/s – Filippi (GR)	AC OHL Single 400kV	Ongoing study	
Zlatitsa – Plovdiv	AC OHL Single 400kV	Under construction	
Croatia:			
18 – Ernestinovo-Pécs (HU)	AC OHL Double 400kV	Ongoing study (to be commissioned by 2010)	
08 – Mraclin-Prijedor/HPP Jajce (BH)	AC OHL Single 220kV	Ongoing reconstruction (to be commissioned in 2007)	
HPP Dubrovnik - Trebinje (BH)	AC OHL Single 220kV	Foreseen reconstruction	
Plomin –Vodnjan	AC OHL Double 220 (110) kV	Ongoing project (to be commissioned in 2007)	
Submarine cable to Italy	DC Submarine 400-500 kV	Foreseen study (to begin in 2007)	
Zagvozd – Plat	AC OHL Double 400 (220) kV	Ongoing study	
Czech Republic:			
Slavetice-Durnrohr (AT)	**AC OHL Double 400kV**	**Ongoing project (install 2nd circuit)**	
Krasikov-H.Zivotice	AC OHL Single 400kV	Ongoing project	
Bezdecin-C.Stred	AC OHL Single 400kV	Ongoing project	
Nosovice-Prosenice	AC OHL Single 400kV	Ongoing study (REC, inst 2nd circ)	
Denmark:			
Vendsysselværket-Ferslev	AC OHL Single/Double 400kV	Under construction (com. 2004)	
KontiSkan 1 (Denmark West-Sweden)	DC Submarine 400 kV	Reconstruction (com. 2005)	
(Vester Hassing) /Tange-Trige	**AC OHL combined 150-400 kV**	**Foreseen project (upgrading 150 kV, com. 2005)**	
Kassø-Revsing-Tjele	**AC OHL Double 400 kV**	**Foreseen project (upgrading from single line, com. 2007)**	
Kasso(DK) - Hamburg/Dollern (DE)			
Denmark-Norway	**Submarine cable Skagerak 4**	**Ongoing study**	
Finland:			
Finland – Sweeden	**AC/DC 400kV 500MW**	**Foreseen project**	
France:			
12 – Bescano (ES) – Baixas	**AC OHL Double 400kV**	**Ongoing project**	
05 – Moulaine (FR) - (Belgium-BE)	**AC OHL Double 380kV**	**Ongoing study**	

Avelin (FR) - Avelgem (BE)	**AC OHL Double 380kV**	**Foreseen project**	
Greece:			
30 - Maritza East 3 (BG) – Filippi	AC OHL Single 400kV	Ongoing study	
33 - Filippi – Babaeski (TR)	**AC OHL Single 400kV**	**Under construction (com 2008)**	
Florina – Bitola (MK)	AC OHL Single 400kV	Under construction (com 2007)	
Korinthos – Patras	AC OHL Double 150kV	Under construction (com 2006), partially completed	
Langadas – Philippi	AC OHL Single 400kV	Under construction (com 2008)	
Ag. Dimitrios – Trikala	AC OHL Double 400kV	Cancelled	
Germany:			
02 - St. Peter (AT) – Isar (DE)	AC OHL Double 380kV	Foreseen project 2020	
Hamburg (DE) – Schwerin (DE)	**AC OHL Double 400 kV**	**Ongoing project**	**2004**
Diele	Phase-Shift-Transformers	Under construction (com 2007/08)	2006
Bechterdissen – Twistetal	Installation of second circuit	Ongoing project	2005
Hamburg/Nord - Dollern	AC OHL Double 380kV	Ongoing project	2006
Audorf – Hamburg/Nord	AC OHL Double 380kV	Ongoing project	2006
Ganderkesee – Wehrendorf	AC OHL Double 380kV	Ongoing project	2006
Diele - Niederrhein	AC OHL Double 380kV	Ongoing project	2006
Wahle - Mecklar	AC OHL Double 380kV	Ongoing project	2006
Hradec – Vernerov – Vitkov – Mechlenreuth	AC OHL Double 380kV	Foreseen project 2016	
Prenzlau – Berlin/Neuenhagen (Uckermark-OHL)	**AC OHL Double 380 kV**	**Ongoing project**	**2006**
Extension of Uckermark-OHL and upgrading Vierraden - Krajnik	AC OHL Double 380 kV	Foreseen project after 2015	
Lauchstädt - Vieselbach	**AC OHL Double 380 kV**	**Ongoing project**	**2004**
Vieselbach - Altenfeld	**AC OHL Quadruple 380 kV**	**Ongoing project**	**2005**
Altenfeld - Redwitz	**AC OHL partly Quadruple 380 kV**	**Ongoing project**	**2005/2006**
Hungary:			
17 – Héviz – Cirkovce (SI)	AC OHL Double 400kV	Ongoing study (com.2008-2009)	
18 - Ernestinovo (HR) –Pécs	AC OHL Double 400kV	Ongoing study (com. 2010)	
35 - Sajoivanka-Rimavska Sobota (SR)	**AC OHL Double 400kV**	**Foreseen project**	
03 - Szombathely –Südburgenland (AT)	AC OHL Double 400kV	Foreseen project	
19 – Pécs – Sombor (CS)	AC OHL Double 400kV	Ongoing study	
Italy:			
Udine (IT) - Okroglo (SI)	**AC OHL Double 380kV**	**Ongoing study**	
Sorgente – Rizziconi	AC Submarine Double 380 kV	Foreseen project	
Fiume Santo – Latina	DC Submarine Double 500 kV	Under construction (com 2008-2009)	
Cordignano (IT)– Lienz (AT)	**AC OHL Double 380kV**	**Foreseen project**	
Matera – Santa Sofia	AC OHL Single 380kV	Under construction (com 2007)	
Italy – Austria (Thaur-Brixen)	**AC underground Single 380kV**	**Ongoing study**	
Venezia Nord (IT) – Cordignano (IT)	**AC OHL Single 380kV**	**Ongoing study**	
Lithuania:			
21 - Ełk (PL) – Alytus	AC OHL Double 400kV	Ongoing study (2002, com after 2008)* Back to Back 600MW station in Alytus	
Macedonia:			
29- Stip - Chervena Mogila (BG)	AC OHL Single 400kV	Under construction (starting 2005)	
32 - Bitola – Florina (GR)	AC OHL Single 400kV	Under construction (starting 2005)	
37 - Skopje 5 – Niš (CS)	AC OHL Single 400kV	Ongoing study	
Macedonia – Albania - Italy	AC OHL Single 400kV (Macedonia – Albania) DC submarine cables 400kV (Albania-Italy)	Ongoing study	
Montenegro:			

Podgorica-Tirana (AL)	AC OHL Single 400 kV	Ongoing study	
Netherlands:			
Netherlands – UK	**HVDC 400kV Submarine 1300MW**	**Ongoing study**	
Netherlands - Norway	ACDC 450kV subsea link, 580km, 700MW	To be commissioned in late 2007 or early 2008	
Norway:			
Norway – Netherlands	ACDC 450kV subsea link, 580km, 700MW	To be commissioned in late 2007 or early 2008	
Nea-Järpstrømmen (SE)	OHL 420kV	2009	
Norway - Denmark	**Submarine cable Skagerak 4**	**Ongoing study**	
Norway – Germany	Subsea link 1000MW (merchant link)	New study	
Evje-Holen	OHL 420 kV	In operation 2008	
Sima-Samnanger	OHL 420 kV	Planned: 2009-2011	
Fardal-Aurland	OHL 420 kV	Planned 2010-2015	
Balsfjord-Melkøya	OHL 420 kV	Planned 2010-2015	
Several voltage and temperature upgrading projects			
Poland:			
21 - Ełk – Alytus (LT)	AC OHL Double 400kV	Foreseen project (com after 2010)	1992 – study was launched, 1st expected com. - 1999
23 - Rzeszów Widełka – Khmielnitskaya (UA)	Activating AC OHL Single 750 kV line + BTB station	Foreseen project (com after 2010)	1st report on BTB ready in 1995
15 - Krajnik – Vierraden (DE)	**AC OHL Double 400 kV (switching over from 220 kV to 400 kV level)**	**Foreseen project (com not defined yet, further investigations by bilateral WG agreed)**	
16 – New 3rd 400 kV PL – DE line	AC OHL Double 400 kV line or PST on lines PL – DE	Project not defined yet, further investigations by bilateral WG expected	
24 - Byczyna – Varin (SK)	AC OHL Double 400kV	Foreseen project (further investigations by bilateral WG agreed)	
Ostrow-Rogowiec/Trebaczew	AC OHL Double 400kV	Under construction (com 2008)	1st planned com – 1997
Ostrow – Plewiska	AC OHL Single 400kV	Under construction (com 2007)	1st planned com 1997
Dunowo –Zydowo – Krzewina - Plewiska	AC OHL Double 400kV	Foreseen project (com 2015)	
Kromolice - Patnow	AC OHL Double 400kV	Under construction, upgrading line (com 2009)	
Patnow - Grudziadz	AC OHL Double 400kV	Foreseen project, upgrading line, (com 2015)	
Portugal:			
Minho-Galiza	AC OHL 400kV	New interconnection at north of country, 2010 (under study)	
Macedo de Cavaleiros-Pueblo de Sanabria	AC OHL 220kV	New interconnection at north of country, 2010 (under study)	
Pocinho - Aldeadávila 1 (ES)	**AC OHL 220kV**	**Final situation, 2009, of the interconnections with Aldeadávila after the opening of the Douro Internacional substation, 2008, and the refurbishment and upgrading works on the two existing interconnections.**	
Pocinho - Aldeadávila 2 (ES)	**AC OHL 220kV**		
Douro Internacional- Aldeadávila (ES)	**AC OHL 400kV**		
Algarve-Andaluzia	AC OHL 400kV	New interconnection at south of country, 2010 (under study)	
Romania:			
OHL Nadab - Bekescsaba (HU)	AC OHL Double 400kV	Project launched (com 2008)	

OHL Oradea – Nadab	AC OHL Single 400kV	Project launched (com. 2008)	
OHL Arad – Nadab	AC OHL Single 400kV	Project launched (com. 2008)	
OHL Suceava-Balti (MD)	AC OHL Single 400kV	Ongoing study (com.2015)	
OHL Gadalin-Suceava	AC OHL Single 400kV	Study will begin end 2007 (com.2015)	
OHL Timisoara-Vrsac (SM)	AC OHL Single 400kV	Study will begin end 2007 (com.2015)	
OHL Ostrovu Mare -Cetate	AC OHL Single 220kV	Study completion 2007 (com 2010)	
OHL Portile de Fier -Cetate	AC OHL Single 220kV	Study completion 2007 (com 2010)	
OHL Portile de Fier-Ostrovu Mare	AC OHL Single 220kV	Study completion 2007 (com 2010)	
OHL Portile de Fier I – Resita	AC OHL Single 400kV	Study completion 2007 (com 2010)	
OHL Resita –Timisoara – Arad	AC OHL Single 400kV	Study will begin end 2007 (com.2010)	
OHL Gutinas-Bacau	AC OHL Single 400kV	SS Bacau project to be launched 2007 (com.2010)	
OHL Bacau- Roman	AC OHL Single 400kV	SS Roman project to be launched 2008 (com.2010)	
OHL Roman-Suceava	AC OHL Single 400kV	project launch 2008-2009 (com.2010)	
Constanta-Pasakoy (TR)	DC Submarine 400kV	Pre-feasibility study completed 2006, further study	
Russia:			
Tver NPP - Kaluga (with the 4-th unit 1000 MW)	AC OHL Single 750kV, 320 km	Planned 2011	
Balakovo NPP - Kurdium (Middle Volga)	AC OHL Single 500kV, 238 km	Design 2008	
Kurdium – Frolovo (Middle Volga – Center)	AC OHL Single 500kV, 377 km	Design 2008	
Frolovo – Rostov (Center – North Caucasus)	AC OHL Single 500kV, 460 km	Design 2007	
Krasnoarmeisk – Gazovaya (Middle Volga – Urals)	AC OHL Single 500kV, 450km	Design 2008	
Kurgan – Kozyrevo (Urals)	AC OHL Single 500kV, 280 km	To be built in 2007	
Barabinsk – Omsk (Siberia)	AC OHL Single 500kV, 382 km	To be built in 2007	
Gusinoozersk TPP – Petrov-Zabaikalsky (Siberia)	AC OHL Single 500kV 184 km	Commissioned 2006	
Kola NPP – Petrozavodsk (IPS of North-West)	AC OHL Single 330kV, 759 km	2004-2008	
Serbia:			
19 – Pécs (HU) – Sombor	AC OHL Double 400kV	Foreseen project	Not yet defined
37 - Niš – Skopje (MK)	AC OHL Single 400kV	Ongoing project (to be commissioned by 2009)	2006
Romania - Serbia	AC OHL Single 400kV	Ongoing study	2006
Slovakia:			
Moldava (Rimavska Sobota) (SK) - Sajoivanka (HU)	**Double AC, 400 kV**	**Ongoing project**	
Varin - Byczyna (PL)	Double AC, 400kV	Ongoing project	
Stupava (Podunajske Biskupica) (SK) - Austria	**Double AC, 400kV**	**Ongoing project**	
Lemesany (SK) – Moldava (SK)	**Double AC, 400 kV**	**Ongoing project**	
Slovenia:			
Krsko – Bericevo	AC OHL Double 400kV	Ongoing project (to be commissioned by 2010)	
17 – Cirkovce – Heviz (HU)	AC OHL Double 400kV	Ongoing project	
Okroglo (SI)– Udine (IT)	**AC OHL Double 400kV**	**Ongoing study**	
Spain:			
12 – Bescanó (ES)– Baixas (FR)	**AC OHL Double 400kV**	**Ongoing project/Under construction (commisioned 2009)**	
Adrall (ES) – Andorra (Andorra)	AC OHL Double 220kV	Ongoing project, upgrading existing double circuit line 110kV (commisioned 2008)	

Aldeadavila (ES)-Douro International (PT)	**AC OHL Double 400kV**	**Ongoing project/Under construction (commisioned 2009)**	
New 400 kV corridor Andalucía (ES) – Algarve (PT)	AC OHL Double 400kV	Decided. Detailed definition under study . Expected 2010-2011	
New 400 kV "Miño" corridor Gacilia (ES) – Northern Portugal (PT)	AC OHL Double 400kV	Decided. Detailed definition under study. Expected 2013-2014	
New corridor northwest of Spain-northeast of Portugal (ES) –(PT)	Not defined	Not decided. To be studied	
Spain (ES) - Algeria	DC Submarine cable	Not decided.Under Study. Not expected before 2015-2016	
Switzerland:			
Bickigen - Flumenthal	Reconstruction of the existing double circuit 132 kV line into a line with one 132 kV and one 220 kV circuit; 16.9 km		2007
Mühleberg - Wattenwil	Reconstruction of the existing 132 kV line into a double circuit line with one 220 kV and one 132 kV circuit; 32 km		2008
Chamoson – Chandoline - Chippis	Replacement of the existing double circuit 220 kV line by a new triple circuit line (2 x 220 kV + 1 x 380 kV) in order to establish a new 380 kV circuit Choson – Chippis and re-establish the 220 kV circuits in somewhat different order; 27.5 km. Intersection of one of the 220 kV circuits into the 220 kV station Chandoline		2009
Chippis – Mörel - Airolo	Divers constructions, reconstructions and decommissioning in order to rebuild the series of the existing 220 kV double (to the most part) circuit lines between Chippis, Mörel and Airolo into a new series of lines with one 380 kV and one 220 kV system. In that way a new 380 kV circuit Chippis – Airolo will be established; the length of the part Chippis – Mörel is 44 km		2012
Chippis – Stalden	Hanging up of the second 220 kV circuit on the existing 220 kV line; 27.5 km		2009
Obfelden – Thalwil	Replacement of the existing 150/50 kV line by a new single circuit 220 kV line; 10 km		Not before 2010
Galmiz - Mathod	Divers constructions, reconstructions and decommissioning in order to establish (after having realised some other projects in preparation) a series of 380 kV circuits on the route Bassecourt – Pieterlen - Mühle-berg – Mathod – Romanel with 380/220 kV transformers in Mühleberg and Romanel; 59 km		2012
Connection Schiffenen	Construction of a connecting double circuit 220 kV line to the 220 kV station Schiffenen that will be intersected into the existing circuit Mühleberg – Hauterive; 2.1 km		2015
Galmiz - Schiffenen	Construction of a new double circuit line with a 220 kV circuit Galmiz – Schiffenen; 7 km - the other circuit is foreseen for the 65 kV voltage level		2014
Sweden:			
Horred	Reinfurbished switchyard	2007	2003
Ramsele	Reinfurbished switchyard	2008	2006
Hjälta	Reinfurbished switchyard and reactive compensation	2007	2004
Strömma	Reinfurbished switchyard	2008	2005
Stenkullen – Lindome 400 kV	New line	2007	1999
Nea-Järpströmnmen (Norway-Sweden) 400 kV	New line	2009	2004
Fenno-Skan 2 (Finland – Sweden)	**New HVDC cable**	**2010**	**2003**
Hallsberg-Skåne (Sydlänken) 400 kV	New line	2011	2003
Turkey:			
33 – Filippi (GR) – Babaeski	**AC OHL Single 400kV**	**Ongoing project ***	
31 – Maritza East 3 (BG) – Hamidabat	**AC OHL Single 400kV**	**Under construction ***	
Birecik – Aleppo (Syria)	AC OHL Single 400kV	Under construction	
UK:			
England – NL	**HVDC 400kV Submarine 1300 MW**	**Ongoing study**	
Wales – Ireland	**HVDC 400kV Submarine**	**Ongoing study**	

500MW

** Lines have been mentioned at both sides of concerned countries*

3. CONCLUSIONS

The beginning of 2006 started with Europe-wide debate on the main features of a common European Energy Policy. Expectations are high as Europe needs to be urgently equipped with a long-term vision accompanied by a proper policy framework and realistic objectives to be able to face the pressing challenges of an increasing energy demand, import dependency and the threat of climate change. Discussion will continue throughout 2007 after the European Commission tabled in January 2007 a comprehensive Energy Package proposing more concrete measures and actions. An underlying feature and at the same time a challenging task for the new Energy Policy would be to pursue the objectives of sustainability, competitiveness and security of supply in compatible and tangible ways.

The important role of open and transparent energy markets in helping to cope with these challenges, notably contributing to security of supply, has been recognised. The electricity grid is the backbone of any electricity market. Interconnections facilitate transport of power and energy and hence are a prerequisite for any market development.

However, the original function of the interconnected electricity system, which started its expansion in the late 1950s, was to improve the security of supply at European level, providing backup in case of local shortages. To this end, the system has been developed with a view to assuring mutual assistance between national subsystems, including common use of reserve capacities and optimisation of the use of energy resources by allowing exchanges between systems.

Presently, there are a number of dominant movements shaping the structure and functioning of the European electricity sector and impacting the development of networks:

- The recent and still on-going debate on a future Energy Policy for Europe
- The ongoing liberalisation process, requiring further reinforcement of the power system, especially in cross-border transmission capacity
- The possible expansion of the current UCTE synchronous area eastwards and southwards in response to requests coming from other systems and following the EU's expansion strategy
- Large scale capture of renewable energy (wind power)

A vision of a European grid and the essential role of TSOs in securing network operation, but also as a market integration facilitator was stressed in the Commission's March 2006 Green Paper. Further discussion will continue within the framework of a European Energy Policy on how to improve coordination between TSOs.

The liberalisation of energy markets has brought tremendous changes in the way markets are operated and developed. With further electricity market integration, commercial flows among and through EU Member States are rapidly increasing, which was not foreseen in the original system design. Consequently, transmission lines are now frequently operating closer to their technical limits as far as allowed by the security criteria.

The power cuts and electricity blackouts which occurred in several parts of Europe in 2003 and 2004, but also the recent one of 4 November 2006, demonstrated the urgent need to strengthen energy networks in Europe, to establish sufficient generation capacity to provide alternative transmission routes, and to improve defence plans. These events have led to investigations on more dynamic system security criteria and on the need for more relevant information-exchange and strengthened coordination and co-operation among TSOs.

New challenges relating to infrastructure also arise in the context of the environmental targets set by the European Union. Adequate energy infrastructure is a key requirement to accommodate new energy sources, which frequently require additional investment. This is especially true for the connection of wind farms now being located in off-shore sites, and for distributed generation.

Against this background, interconnector-investments are crucial to ensure both the commercial capacity and the security of the network. Of particular importance are measures to reinforce transmission networks so as to be able to respond to more, and unexpected, changing patterns of flows in networks due to commercial activities and the cost-minimising approach of market parties, plus growth in renewable energies and other distributed generation.

In this context, the UCTE Operation Handbook – a comprehensive set of binding common security and reliability standards – in force since July 2005, constitutes an important milestone towards ensuring high operational security in the interconnected system.

No less important is to overcome obstacles surrounding the construction of new transmission lines, especially the opposition at local and regional level with regard to authorisation procedures and the growing public resistance. The lead times for obtaining permits for interconnection projects need to be shortened. Mechanisms must be found to achieve a better balance between the interests of society at large and the concerns of local communities. When it comes to public acceptance for projects and the issuing of regulations, public authorities and the public at large must be made aware of the crucial importance of guaranteeing the availability of a sufficient level of power generation and transmission infrastructure. The importance of this issue has been finally recognised at the political level. Some concrete proposals have been made in the European Commission's Communication on Priority Interconnections issued in January 2007.

The power system of much of the European Union is a single integrated system. Adding new grid elements has an effect on an important part of that overall system. All transmission system operators affected by these new investments should therefore coordinate such grid developments and jointly study in advance the positive and negative consequences of the system changes. This approach is should also be pursued when dealing with requests for synchronous interconnection to UCTE. A series of studies have to be carried out to assess not only the feasibility of such an extension, but also the impact on the whole UCTE system.

To optimally integrate distributed energy resources and renewable energy sources, to get closer to the system's physical limits while maintaining security, it is vital to improve knowledge of system behaviour, to develop new concepts of control and protection and new means of simulation and optimisation, and to adopt appropriate market regulation. All these items demand a broad effort in RTD organised at international level and involving TSOs and other market players.

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Country Contributions

WG SYSTINT

(with contribution of WG SYSTMED experts)

UCTE

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UNION OF THE ELECTRICITY INDUSTRY
eurelectric

The **Union of the Electricity Industry–EURELECTRIC** is the sector association representing the common interests of the electricity industry at pan-European level, plus its affiliates and associates on several other continents.

In line with its mission, EURELECTRIC seeks to contribute to the competitiveness of the electricity industry, to provide effective representation for the industry in public affairs, and to promote the role of electricity both in the advancement of society and in helping provide solutions to the challenges of sustainable development.

EURELECTRIC's formal opinions, policy positions and reports are formulated in Working Groups, composed of experts from the electricity industry, supervised by five Committees. This "structure of expertise" ensures that EURELECTRIC's published documents are based on high-quality input with up-to-date information.

For further information on EURELECTRIC activities, visit our website, which provides general information on the association and on policy issues relevant to the electricity industry; latest news of our activities; EURELECTRIC positions and statements; a publications catalogue listing EURELECTRIC reports; and information on our events and conferences.

EURELECTRIC pursues in all its activities the application of the following sustainable development values:

Economic Development
Growth, added-value, efficiency

Environmental Leadership
Commitment, innovation, pro-activeness

Social Responsibility
Transparency, ethics, accountability

What is UCTE?

The Union for the Co-ordination of Transmission of Electricity (UCTE) co-ordinates the interests of transmission system operators in 23 European countries. Their common objective is to guarantee the security of operation of the interconnected power system. 50 years of joint activities laid the basis for a leading position in the world, which the UCTE holds in the quality of synchronous operation of interconnected power systems. Through the networks of the UCTE 450 million people are supplied with electric energy and annual electricity consumption totals approx. 2300 TWh. Close co-operation of member companies is imperative to make the best possible use of benefits offered by interconnected operation. For this reason, the UCTE has developed a number of rules and recommendations that constitute the basis for the smooth operation of the power system. Only the consistent maintenance of the high demands on quality will permit in the future to set standards in terms of security and reliability as in the past.

Key figures

33	Transmission System Operators (TSO)
23	European Countries
450	million Customers served by the represented power systems
540 GW	Installed capacity
2400 TWh	Electricity consumption in 2003
265 TWh	Sum of electricity exchange between member TSOs
200.000 km	Length of high-voltage transmission lines managed by the TSOs

Principles

– UCTE is convinced that the reliability of the biggest electric European synchronous interconnected area and the development of stable conditions for flourishing electricity markets in this area are inseparable and mutually interdependent issues.
– UCTE manages the security of the UCTE system, which is the ability of the system to withstand major or sudden disturbances, such as the loss of production units, grid elements, but also accidents or attacks.
– UCTE is monitoring the adequacy of the UCTE system, which is the structural ability of the system to balance actual power and energy demand.
– Each member TSO in UCTE is responsible for the quality of its own transmission system services, and together, all UCTE members will keep up the technical basis for a sound market development.
– UCTE ensures the quality of international transmission services, and also an early alert in case of declining generation and/or transmission capacities that might lead to sudden restrictions or adverse impacts on competitive electricity markets.

Please do not hesitate to visit our website or to contact us for information or publications:

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http://www.ucte.org

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ANNEX 1: The Interconnected Electric Systems - Country Reports

UCTE

AUSTRIA

1. Basic capacity, generation and consumption data (year 2005)

Installed capacity by fuel, MW		
	Thermal	5959
	Hydro	11698
	Nuclear	0
	Renewables	2667
	Total	**20324**
Yearly generation fuel by fuel, TWh		
	Thermal	25.878
	Hydro	39.019
	Nuclear	
	Renewables	1.462
	Total	**66.359**
Annual consumption, TWh		**69.024**
Imports, TWh		**20.397**
Exports, TWh		**17.732**

2. Industry structure

2.1 Recent key developments

The year 2005 was characterised by a high use of the Austrian transmission grid. Especially the lines from the north to the south of Austria were loaded up to the maximum capacity. This was due to the high production in the north and the high demand in the south on the one hand and the solely market based operation of power plants on the other. Only congestion management measures (e.g. reduction of the production in the north and increase of production in the south requested by TSO) guaranteed a safe operation of the grid. To prevent this situation arising in the future and to ensure security of supply without expensive congestion management measures, APG is determined to build as soon as possible a 380kV-line Südburgenland to Kainachtal.

Another key development was the increase of installed wind power plants up to 956MW and the injected energy also tightened the above mentioned situation.

2.2 Main actors

Transmission system operator
- Verbund-Austrian Power Grid AG (manager of control area APG)
- Tiroler Regelzone AG (manager of control area TIRAG)
- VKW Übertragungsnetz AG (manager of control area VKW-UNG)
- 9 province service utilities

Main generators

Electrical Power plants > 200MW	Typ	P [MW]
Malta	S	850
Kaprun	S	333

Zemm/Ziller	S	936
Sellrain-Silz	S	781
Kaunertal	S	392
Kopswerk	S	247
Lünerseewerk	S	232
Rodund I	S	198
Rodund II	S	276
Altenwörth	R	328
Greifenstein	R	293
Ybbs-Persenbeug	R	237
Aschach	R	287
Wallsee-Mitterkirchen	R	210
Dürnrohr	T	405
Dürnrohr 2	T	352
Voitsberg 3	T	330
Theiss	T	757
Mellach	T	246
Neudorf-Werndorf	T	285
Simmering	T	973
Donaustadt	T	376
Riedersbach	T	220

<u>Distributors</u>
13 province and urban electricity service utilities and other regional distributors at medium voltage level

<u>Main traders</u>
About 80 balance groups are acting on the Austrian electricity market.
Other players

3. Transmission network and system issues

3.1 Status of international interconnections

Interconn.	Capacity	Allocation method	Momment
A>CZ	600MW Base	Auction	www.auction-office.at www.ceps.at
CZ>A	50MW Base; 150MW Peak	Auction	www.auction-office.at www.ceps.at
A>I	110MW Jan-Apr, Oct-Dec; 100MW Mai- Sep;	Splitting of capacity	only share of A
I>A	110MW Jan-Apr, Oct-Dec; 100MW Mai- Sep;	Splitting of capacity	
APG>SLO	225MW Base; 100MW Peak	Splitting of capacity	
SLO>APG	225MW Base; 100MW Peak	Splitting of capacity	
APG>H	100MW Base	Splitting of capacity	Allocation by H
H>APG	100MW Base, 100MW Peak	Splitting of capacity	Allocation by A

Auction: The allocation of capacity is organised by an auction office.

Splitting of capacity: Each country (TSO) is responsible for 50% of the available capacity. The allocation of each share takes place according to national laws.
Splitting of direction: Each country is responsible for a single direction.

Base: 01.01.2005 00:00h – 31.12.2005 24:00h
Peak periods: 07.01.2005 – 31.12.2005 Monday to Friday daily 08:00h – 20:00, excluding during Austrian holidays.

Existing international interconnections

From	To	Type AC/DC Single/Double	U,kV	P,MW
Meiningen	Y-Rehag(CH (Montlingen Sarelli)	AC-Double	220	501 782
Bürs	Obermooweiler(D)	AC-Double	380	2 x 1369
Bürs	Herbertingen, Dellmensingen(D)	AC-Double	220	389 762
Westtirol	Memmingen(D)	AC-Single	220	762
Westtirol	Leupolz(D)	AC-Single	380	1316
Silz	Oberbrunn(D)	AC-Double	220	2 x 793
St.Peter	Altheim(D)	AC-Single	220	301
St.Peter	Simbach(D)	AC-Single	220	301
St.Peter	Pirach(D)	AC-Single	220	518
St.Peter	Pleinting(D)	AC-Single	220	518
Westtirol	Pradella(CH)	AC-Double	380	2 x 1340
Lienz	Soverzene(I)	AC-Single	220	257
Obersielach	Podlog(SLO)	AC-Single	220	351
Kainachtal	Maribor(SLO)	AC-Double	380	2 x 1514
Wien-SO	Györ(H)	AC-Single	380	1514
Wien-SO	Györ(H)	AC-Double	220	2 x 305
Bisamberg	Sokolnice(CZ)	AC-Double	220	2 x 269
Dürnrohr	Slavetice(CZ)	AC-Single	380	1711

Ongoing studies in international/cross-border interconnections

From	To	Type AC/DC Single/Double	U,kV	P,MW	Date for study completion	Expected date for commissioning the line under study
Thaur(A)	Bozen(A)	AC-Double	380			

Future projected interconnections
Lienz(A)-Cordignano(I), AC-Double 380kV
Wien Südost(A)-Slavetice(CZ) (Construction of an additional 380kV line)
Study needs
Congestion management (internal, external)

4. Electricity market structure

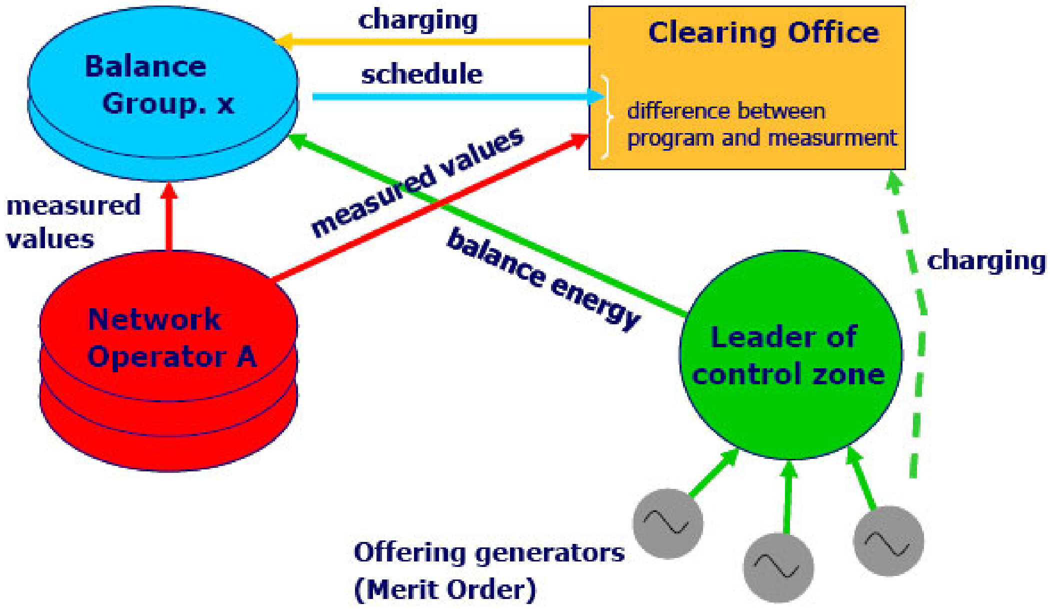
To achieve a 100% opening of the electricity market in Austria, a balance group system was implemented on 1 October 2001. The legal base is the Austrian Electricity Act (ElWOG). A balance group is a virtual alliance of market participants within a control area. Market participants are producers, traders and costumers which must belong to a balance group of their choice. The balance group coordinator (settlement agency) calculates the needed balancing energy (deviation of program and physical values) for each balance group and charges it to the balance group.

The control area manager is responsible for load frequency control, that is the balance of fed in and consumed power at every moment. In case of deviations, the primary and the secondary control try to balance the system automatically. If the deviation cannot be balanced through this mechanism, the control area manager calls up additional balance energy according to a merit order which is prepared by the balance group coordinator, based on offers for balance energy from producers.

The first important step for the liberalisation was unbundling,(i.e.. the separation of transmission, distribution and generation), which took place on 19 February 1999 The delivered energy is charged by the supplier based on contracts with a negotiated price for delivered energy. The use of the network is charged by the usage of the grid, which is a natural monopoly.

The Energy Control Ltd. - is the regulatory authority and responsible for monitoring, supporting and regulating the Austrian electricity market.

For more detailed information on the Austrian electricity market, see the listed homepages (see chapter 5).



5. Other

Institutions/companies	Links
www.bmwa.gv.at	Federal Ministry of Economic Affairs an Labour
www.e-control.at	Electricity Control (Regulator)
www.apcs.at	Settlement Agency (Control area APG)
www.aundb.at	Settlement Agency (Control areas TIRAG and VKW-UNG
www.apg.at	TSO
www.tirag.at	TSO
www.vkw-grid.at	TSO
www.veoe.at	Others

BELGIUM

1. Basic capacity, generation and consumption data (2005)

Installed capacity by fuel, MW		
	Thermal	8673
	Hydro	1493
	Nuclear	5801
	Renewables	385
	Total	**16352**
Yearly generation fuel by fuel, TWh		
	Thermal	36.9
	Hydro	1.3
	Nuclear	44.9
	Renewables	0.2
	Total	**83.3**
Annual consumption, TWh		**83.8**
Imports, TWh		**14.3**
Exports, TWh		**8.0**

2. Industry structure

2.1 Recent key developments

According to the provisions of the Special Act of 8 August 1988, the Federal Government of Belgium is responsible for "matters which, owing to their technical and economic indivisibility, require equal treatment at national level". This includes, amongst others, tariffs (e.g. for using the transmission and distribution networks), the production and the transmission of electricity at a voltage level above 70 kV.

The federal law of 29 April 1999 transposing EU Directive 96/92 into Belgian law was published in the Official Bulletin on 11 May 1999. This law defines the general framework for the opening of the Belgian electricity market, which has been put into effect in stages through different executive decrees.

The text adopted includes all the directive's essential clauses and supplements them on numerous points.

The law establishes the access conditions for third parties to the transmission network as well as the related regulatory aspects. Consequently, a Federal Regulatory Commission has been set up in 2000 in order to monitor the electricity and gas markets. The Commission is responsible for advising authorities on the organisation and operation of the liberalised electricity and gas markets. Moreover, it supervises and monitors the application of relevant laws and regulations.

A General Council (consisting of representatives of the federal and regional Governments, of associations of employees, employers and small businesses as well as generators, distributors and consumers, is responsible for monitoring its operation.

The regional legislators(Flemish, Walloon and Brussels) have the power to regulate distribution and local transmission of electricity over networks with a voltage level less than or equal to 70 kV.
The three regions have also transposed the EU Directive:

- Flanders : decree of 17 July 2000;
- Wallonia : decree of 12 April 2001;
- Brussels : decree of 19 July 2001.

Each of the three regions has also set up a regulatory commission, which is responsible for establishing the technical legislation regulating the distribution networks (up to 70 kV) and defining the eligibility conditions for customers connected to this grid (most SMEs and household consumers).
In Flanders, all electricity consumers are eligible since 1 July 2003; in Wallonia and Brussels, the industrial consumers are already eligible whereas the "smaller"business and household customers will gradually become eligible.

Most of legal documents as well as further information are available on the websites of the following Institutions:

- Federal Public Service Economy (Federal Government)
- CREG (Federal Regulator)
- VREG (Regulator of the Flemish Region)
- CWAPE (Regulator of the Walloon Region)
- IBGE-BIM (Regulator of the Brussels Region)

The royal decrees implementing the new multi-annual tariff system established in the amended Electricity Act (transposing EU Directive 2003/54/EC), were not available at the beginning of 2006. Multi-annual tariffs are expected to be introduced as from 2007.

On 3 December 2005 the CREG authorised Elia to allocate the Belgian-French border transit capacity via a coordinated auction sale. A similar auction sale was authorised for the north border with the Netherlands on the 22 December 2005.

Belpex was created on 7 July 2005 by Elia, power stock exchange APX, Powernext and Dutch transmission system operator Tennet to operate the power exchange in Belgium. Elia holds a share of 70 % and the three other participants hold 10% each. On 15 December 2005 French transmission system operator RTE took 10 % of Belpex capital from Elia's share. On 12 January 2006, the Belgian federal government approved Belpex's application for a licence to operate the power exchange in Belgium.

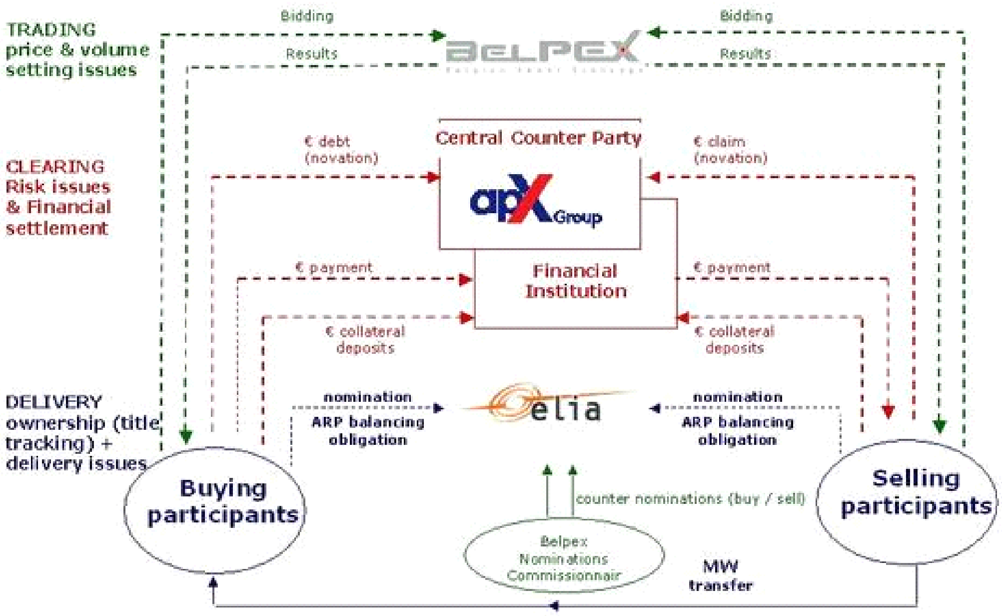
The Belpex Day-Ahead Market (DAM) provides standardised products (hourly instruments) for producers, distributors, industrial groups, traders and brokers to sell and purchase electricity. The financial clearing and settlement of the Belpex DAM will be secured by a central counterparty, which will offer guarantee of payment.

The prices for electricity on the Belgian DAM are determined via a double-sided blind auction. These prices are also known as market clearing prices and are quoted in €/MWh. These clearing prices will be published daily on the Belpex website. Furthermore, these hourly market prices and volumes are used as a basis for the calculation of the Belpex DAM indexes which are also published on the website.

The Belpex DAM market model may be characterised by three distinctive layers:

- Trading
- Clearing and Settlement
- Delivery

The following picture illustrates this market model:



CREG approved the trilateral market coupling as communicated by Elia on 6 September 2006. However, the launch of Belpex as a day-ahead spot market coupled with APX and Powernext also requires the approval of the Dutch and the French regulator. Such approvals are expected by the end of September 2006.

Trading of electricity will start on Belpex during the third quarter of 2006. Market coupling will replace auctions for daily capacity in both directions at the Dutch and French borders. Implicit daily auctions will ensure that capacity at the borders is used more efficiently. Monthly and annual capacity will continue to be auctioned as in the past.

Further information are available through the from Belpex website www.belpex.be

2.2 Main actors

Transmission system operator

The high-voltage network is operated by ELIA, an independent public limited company founded in June 2001 in order to comply with the federal requirements of independence. ELIA former shareholders (Electrabel and SPE) reached an agreement with the Federal Government on the shareholder structure. Electrabel holds now 27.45 % of the shares, Publi-T (a cooperative company representing the Belgian municipalities) has taken a 30 % stake, 0.54 % of the shares are held by Elia's employees, and 2.55 % by Publipart and 39.45 % of the shares are listed on the Euronext Brussels stock exchange.

A law of 29 April 1999 defines the mission and the general framework of rules of access to the transmission network for customers in Belgium, and for the transit of electricity. The technical legislation regulating this access has been published by Royal decree of 19 December 2002 (Official Bulletin of 28 December 2002) and the Belgian Federal Government has, by Ministerial Order of 13 September 2002 (Official Bulletin of 17 September 2002), officially appointed ELIA as Transmission System Operator.

ELIA System Operator (ESO) has a licence as TSO at the federal level, as well as licences as distribution system operator in Flanders and local or regional transmission system operator in the Walloon and Brussels regions.

Main generators

- Electrabel (Net generation capacity: about 13 165 MW in Belgium)
- SPE (Gen. capacity: 1 500 MW in Belgium)
- RWE (from 2005 with 50% of 385 MW at BASF Antwerp)
- Essent (from 2006 with 120 MW at INEOS Antwerp)

New generating units 2004
- Cogeneration (3 units ≤ 0.7 MW each) : 2 MW
- Wind turbine (13 units of 2 MW each) : 26 MW

New generating units 2005
- Combined Cycle Gas Turbine (Zandvliet Power :400 MW)
- Cogeneration (3 units ≤ 4.8 MW each) : 5.9 MW
- Wind turbine (23 units ≤ 2 MW each) : 40 MW

New generating units 2006
- Combined Cycle Gas Turbine (INEOS :120 MW)

Ongoing projects in generation (for 2006 and after)
- Wind energy onshore (135 units ≤ 2 MW each, mainly in 2006-2007) : 247 MW
- Wind energy offshore (50 units x 2 MW each, but Council of State cancelled recently the related licence) : 100 MW
- Wind energy offshore (60 units x 5 MW each) : 300 MW
- Cogeneration and biofuel motor (8 units ≤ 3.2 MW each) : 14 MW
- Hydro (1 unit) : 0.5 MW

Distributors
The former distribution companies (mainly inter-municipal companies) have been appointed as operator of the distribution network for their respective territory. In order to comply with the regional legal requirements, they transferred their sales activities to another company, when their customers will become eligible.

Number of distribution system operators

Private companies	1
Municipality companies	4
Mixed Inter-municipality companies[(a)]	15
Pure Inter-municipality companies	8

[(a)] *association of the public sector with a private company more often ELECTRABEL*

In Belgium, 91 % of the total electricity demand can be provided by the customer's choice. Only household low-voltage customers in the Walloon and Brussels-Capital Regions do not yet benefit from the status of eligible customer. In the Walloon Region, household customers are able to choose their suppliers freely since 1 January 2007. No date is set for the Brussels-Capital Region, but this shall occur before 1July 2007.

Main traders and other players
The Royal Decree of 2 April 2003 on licence for the supply of electricity by third parties and the rules of conduct which apply to third parties was published in the Belgian Official Bulletin on 22 April 2003. Henceforth, a licence is required for supplying electricity to customers connected to the transmission grid or linked via a direct line with a voltage higher than 70 kV. The application must be submitted to CREG, the federal regulator, which will investigate the application. The licence is given by the relevant minister and the ministerial decision is published in the Belgian Official Bulletin. The licence is granted for a period of five years.

The decree also sets out the rules of conduct which apply to the suppliers. These rules of conduct concern:
- the general obligations on suppliers;
- interruption of supply;
- the content of the supply contract;
- the obligation to provide information.

A licence is also required to supply to end users connected to distribution networks. These licences are delivered by regional regulators, namely VREG in Flanders, CWAPE in Wallonia and BIM/IBGE in Brussels.

Suppliers are required to submit to the regulators a number of green power certificates in proportion to their sales. Consequently, they are also potential buyers of green power certificates. Generators of renewable power and cogeneration facilities can obtain approval from the regulators. In doing so, they receive green power certificates that they can sell to suppliers. In Flanders, a distinction is drawn between green power and high-quality cogeneration. In Wallonia, the concept of green power includes high-quality cogeneration.

The list of holders of a supply licence in Wallonia, Flanders and Brussels are listed on the website of the respective regulators.

3. Transmission network and system issues

3.1 Status of international interconnections

Existing international interconnections

From	To	Type AC/DC Single/Double	U,kV	P,MW
Avelgem	Avelin (France)	AC Single	380	
Avelgem	Mastaing (France)	AC Single	380	
Achene	Lonny	AC Single	380	
Zandvliet	Borssele/Geertruidenberg	AC Double	380	
Herderen	Masbracht	AC Single	380	
Meerhout	Masbracht	AC Single	380	
Aubange	Moulaine	AC Single	220	
Jamiolle	Chooz	AC Single	220	

ELIA and RTE set up in July 2002 an auctioning system on the transfer capacities between France and Belgium (combining former systems organised separately by ELIA and RTE).

ELIA, TenneT, RWE Net and E.On Netz set up an auctioning system on the transfer capacities between the Netherlands and Belgium and between the Netherlands and Germany; this system is operated by TSO Auction, a subsidiary of TenneT (NL).

Ongoing studies in international/cross-border interconnections

From	To	Type AC/DC Single/Double	U,kV	P,MW	Date for study completion	Expected date for commissioning the line under study
Aubange	Moulaine	AC Double	380			

Phase shifter transformers are going to be installed in Monceau, Kinrooi and Zandvliet to regulate the transit through Belgium.
Transit capacity was enhanced by the end of 2006 when the voltage on the Chooz (F)-Monceau (B) line will be increased from 150 V to 220 kV between Jamiolle and Monceau and a phase shifter was installed in Monceau in February 2007.

Future projected interconnections
Courcelles Gouy 380 kV AC 2 circ. OHL 2 km

3.2 Network development plan

As part of the Electricity Act, the Belgian Transmission System Operator ELIA must draw up a development plan explaining how it intends to adapt the system to the future needs of system users. This development plan covers a period of 7 years and is updated every 2 years. The plan contains a detailed estimate of the capacity requirements and specifies the investment programme that the system operator will have to implement in order to meet these requirements. The development plan takes account of the need for adequate reserve capacity and any trans-European project. The development plan is submitted to the CREG, who in turn submits it to the Minister for approval.

3.3 Main events

25 and 26 November 2005: extreme weather conditions overnight caused a power failure on more than 20 lines causing several power cuts in the provinces of East Flanders and Antwerp. Power supply on the high-voltage network was restored at around 4.30 p.m. on Saturday 26 November.
27 June 2006: an incident in the 150 kV substation of Bruges resulted in the outage of several 150 kV lines and power cuts in cities in the North-West of Belgium. The situation was back to normal after 1h30.

4. Electricity market structure

(The following information is mainly provided from the ELIA website www.elia.be)

General
ELIA operates the 380-26 kV power grid in Belgium. Accordingly, ELIA is:
- the federal transmission system operator;
- a distribution system operator in Flanders;
- the regional transmission system operator in Brussels;
- the local transmission system operator in Wallonia.

The distribution system operators (DSOs) operate, maintain and develop lower-voltage networks (up to 70 kV by law, but usually at 15 kV and lower). The distribution system operators fall under the authority of Belgium’s three regions.

Among installations connected to the grid, a distinction can be drawn between generation and consumption facilities. The vast majority of consumers are connected to the lower-voltage networks of distribution system operators. The larger generating facilities inject their energy into the grid at a voltage of 70 kV or higher. Some 300 generation and consumption facilities are connected to ELIA networks.

The ELIA networks perform three major functions. The 380 kV links form the backbone of the Belgian and European network. International supplies transit over these lines, and the nuclear power stations as well as the Coo pump storage station are also connected to the 380 kV network. The 220- and 150 kV connections in turn carry electricity to large consumption centres and ensure Belgium's domestic supply. Finally, power is carried over 70- and 36-kV lines to the off-take points used by the distribution companies. Large industrial customers are directly connected to the high-voltage grid.

Geographic length (km) on 01.01.2006			
Voltage	**Overhead lines**	**Underground cables**	**Total**
380 kV	890	0	890
220 kV	297	0	297
150 kV	2 012	344	2 356
70 kV	2 425	270	2 695
36 kV	8	1 926	1 934
30 kV	26	146	172
Total	**5 658**	**2 686**	**8 344**

The Belgian network forms an integral part of the European transmission network. Connections with the Netherlands and France primarily carry electricity at 380 kV. Thanks to these international connections, the Belgian electricity market is an international market where power can be imported and exported. At the same time, these international connections also offer an additional safeguard: if necessary, ELIA can ask neighbouring TSOs for assistance.

Third parties may use ELIA grid to transmit electricity. ELIA offers a range of services in order to steer this in the right direction.

The connection of facilities to ELIA grid is governed by a connection agreement.

Any party wishing to transmit electricity over the ELIA grid must first sign an access contract which stipulates the level of compensation required for using the ELIA grid. The places where energy is injected into or withdrawn from the grid are called access points.

An *access responsible party* (ARP) is appointed for each access point. The ARP is responsible for the actual injection and off-take of energy. He is also responsible for maintaining balance between its injections and off takes. The ARP submits 'nominations', programmes which determine where, when and how much electricity is injected into or withdrawn from the grid. ARPs are authorised to perform their tasks under a contract signed with ELIA.

Further information can be accessed through the ELIA website.

<u>Connection Agreement</u>
All equipments required to connect the installations of a grid user to the ELIA-grid are subject of a connection agreement which stipulates all mutual rights and obligations between ELIA and the grid user (producer/consumer). The connection agreement contains also the necessary technical descriptions concerning the installations to be connected to the ELIA-grid (such as voltage level, point of connection, installation description, equipment protection). This information is required by ELIA to monitor the safe and reliable functioning of its grid.

Specific tariffs are applicable for the realisation of new connections as well as adaptation and/or the use of them, including the operation and maintenance of existing connection equipments.

<u>Access - Access Responsible Party</u>
Any party wishing to access to the ELIA grid from one or more injection and/or off take points within the ELIA control area, must first sign an access contract stipulating the level of compensation for using the ELIA grid. An *access responsible party* (ARP) is appointed for each access point. The ARP is responsible for the injection and/or off take of energy.

ARPs are authorised to perform their tasks under an Access Responsibility Contract signed with ELIA. Once the ARP has been authorised, it is included in the ARP's Register. Examples access contracts are available on ELIA website.

Access contract for customers directly connected to the ELIA grid.

In these contracts a distinction is drawn between:
- access rights at an off take point in Belgium;
- access right at an injection point in Belgium.

Any party wishing to import or export electricity must first obtain capacity on the interconnection links between Belgium and the Netherlands, or between Belgium and France. Here, the following distinction can be drawn:
- access rights on the South Border for imports from France:
- access rights on the South Border for exports to France;
- access rights on the North Border.

To use these access rights, the appointed ARP must submit a **nomination** to ELIA the day before the desired day of transmission.

Nomination / Balance
The **ARP is responsible for maintaining quarter-hourly balance** between total injections and total off takes under its responsibility.

The ARP must submit to ELIA an access schedule of all injections and off takes (also known as a 'nomination') by no later than 1 p.m. on the day prior to the transmission.

ARPs can also buy electricity from and sell it to each other. This is done on the 'hub'. Both buyer and seller must submit their nominations by 12 noon on the day prior to the transmission. If the two nominations do not correspond, the buyer and seller have one hour to reconcile them. If they fail to do so, then the 'inconsistent' nominations will only be accepted if grid security is not jeopardised. However, the relevant ARPs will have to pay a price for external inconsistency.

In addition, Access Responsible Parties can avoid an imbalance caused by unexpected circumstances, such as breakdown of an industrial client or a production unit, by exchanging energy on the "intra-day hub" on an intra-daily basis (meaning at the same day). The nomination for this exchange has to be passed to ELIA before noon the following day.

ELIA uses measurement data to check that each ARP is actually complying with his obligation to ensure balance. If an imbalance is detected between the injections and off takes monitored by a given ARP, then the ARP will have to pay the price for imbalance.

Metering
Each connection, interconnection and injection point of the ELIA grid has been equipped with energy metering devices. They are used for collecting, saving and controlling energy exchanges. The data obtained allows technical and economic control of the energy transport.

ELIA offers various metering-data services to system users:

- provision (supply)of metering impulses;
- provision of load curves (monthly / daily / near-time).
- upon the system user's request and in accordance with the technical regulations, ELIA can also offer services that do not directly relate to the ELIA system.

In order to control the energy exchange balance, European system operators have to interchange market participant’s data. This requires a uniform identification system.

For this purpose ETSO has developed a code system named EIC (ETSO Identification Code). Each market participant has to dispose of such a code which is valid throughout Europe. ELIA is the Issuing Office for Belgium and it is therefore authorised to issue EIC codes. Market parties that already dispose of an EIC code do not need to apply for another code.

5. Other

Institutions/companies	**Links**
Federation of the Electricity and Gas Network Managers in Belgium	www.synergrid.be
Transmission System Operator (TSO)	www.elia.be
Private Electricity Company	www.electrabel.com
Public Electricity Generating Company	www.spe.be
The Electricity and Gas Regulatory Commission (Federal regulator)	www.creg.be
The Flemish Electricity and Gas Regulatory Commission	www.vreg.be
The Walloon Energy Commission CWAPE (Walloon regulator)	cwape.wallonie.be
The Brussels Institute for Environment management (IBGE-BIM) (Brussels regulator)	www.ibgebim.be
Ministry of Economic Affairs (Belgium)	www.mineco.fgov.be

BOSNIA & HERZEGOVINA

1. Basic capacity, generation and consumption data (2005)

Installed capacity by fuel, MW		
	Thermal	1797
	Hydro	2092
	Nuclear	0
	Renewables	40
	Total	**3929**
Yearly generation fuel by fuel, TWh		
	Thermal	6.61
	Hydro	5.96
	Nuclear	0
	Renewables	0.14
	Total	**12.71**
Annual consumption, TWh		**10.92**
Imports, TWh		**2.17**
Exports, TWh		**3.58**

2. Industry structure

2.1 Recent key developments

The process of reforming the electricity sector in Bosnia and Herzegovina (BiH) began in 2000, with the signature of statements on electricity policy, followed by the adoption in 2002 of the Act on Transmission of Electric Power, Regulator and System Operator of Bosnia and Herzegovina and the Entity Laws on Electricity. However it is only in 2004 that the actual process of reform of the electricity sector began in practice, following the adoption of the Law *establishing an Independent System Operator for the Transmission System of BIH* and the Law *establishing the Company for Transmission of Electric Power in BIH*.

Laws adopted at the State and Entity levels have provided for the establishment of the regulatory practice in the electricity sector of BiH. Today, three regulatory commissions exist in the country:

- SERC (State Electricity Regulatory Commission) – competent for ISO BiH, Transco BiH and international trading.
- Two entity commissions (Regulatory Commission for Electricity in the Federation of BIH and the Regulatory Commission for Electricity of Republika Srpska) – competent for generation and supply on their respective area and for internal trade.

The Independent System Operator in BiH (ISO BiH) started its operation in July 2005, and the Company for Transmission of Electricity in BIH (Transco BiH) started in February 2006. ISO BIH and Transco are two separate and independent companies (fully unbundled) from other electricity market actors.

The electricity market in BiH is a single economic space and it is founded on a free and equal access to the electricity transmission network, the principles of regulated approach as well as relevant EU Directives. Currently there are three regulated generation-distribution companies (mainly state-owned) which have licenses for internal and international trade of electricity and have the right to buy or sell electricity on the market.
Additionally, one of these companies has a license for trading, and by the end- of 2006 few companies will receive licenses for trading (ongoing).

In June 2006 SERC issued a Decision on the *Scope, Conditions and Time Schedule of Electricity Market Opening* in BIH. According to the Decision, electricity market opening in BIH shall be implemented in accordance with the time schedule according to which the eligible customer status may be acquired by:

- all customers with annual consumption of electricity higher than 10 GWh as of January 1, 2007,
- all customers with annual consumption higher than 1 GWh as of January 1, 2008,
- all customers, except households, as of January 1, 2009,
- all electricity customers as of January 1, 2015.

Following this Decision and the coming into force of the initial consumption level for eligible customers, the percentage of electricity market opening in BiH shall be around 33%. From January 1, 2008 the percentage of electricity market opening shall be around 40%.

The Way and scope of privatisation are not yet finally defined.

2.2 Main actors

<u>Transmission system operator</u>
According to legal and regulatory framework in BiH, ISO and Transco exist as two separate companies with defined tasks.

<u>The Independent System Operator in Bosnia and Herzegovina (ISO BiH)</u>
Main tasks:

- system operation to ensure reliability;
- operation of all high voltage transmission facilities in BiH that are rated at 110 kV or above;
- administration of balancing market;
- supply of ancillary services and provide system services;
- develop a long-term indicative generation development plan.

<u>The Company for Transmission of Electricity in BIH (Transco BiH)</u>
Transco BiH owns the transmission system of BiH (400 kV, 220 kV and 110 kV networks, include SS 110/x) and conducts its transmission and transmission related activities in full compliance with technical standards.

<u>Main generators and Distributors</u>
Today, there are three generation-distribution-supply companies in BiH. All of them are regulated and supply regulated (non-eligible) customers. These companies are:

Elektroprivreda Bosne i Hercegovine (EPBiH)

- ca 600.000 consumers, installed capacity 1691 MW, yearly consumption 3,5 TWh, yearly generation ca 5,7 TWh.

Elektroprivreda Hrvatske Zajednice Herceg-Bosna (EPHZHB)

- ca 150.000 consumers, installed capacity 775 MW, yearly consumption 3,2 TWh, yearly generation ca 1,8 TWh.

Elektroprivreda Republike Srpske (ERS)

- ca 400.000 consumers, installed capacity 1423 MW, yearly consumption 3,0 TWh, yearly generation ca 5,2 TWh.

<u>Main traders</u>

Until November 2006 four companies obtained licenses for electricity trade (internal and external).

3. Transmission Network and System Issues

3.1 Status of international interconnections

Existing international interconnections

From	To	Type AC/DC Single/Double	U,kV	P,MW
TE Ugljevik	Ernestinovo (CRO)	AC Single	400 kV	1329
Mostar 4	Konjsko (CRO)	AC Single	400 kV	1329
Prijedor 2	Međurić (CRO)	AC Single	220 kV	316
Prijedor 2	Mraclin (CRO)	AC Single	220 kV	316
TS Gradačac	Đakovo (CRO)	AC Single	220 kV	316
TE Tuzla	Đakovo (CRO)	AC Single	220 kV	316
Mostar 4	Zakučac (CRO)	AC Single	220 kV	360
TE Ugljevik	S.Mitrovica (SR)	AC Single	400 kV	1329
Višegrad	Požega (SR)	AC Single	220 kV	316
Trebinje	Podgorica (Montenegro)	AC Single	400 kV	1329
Sarajevo 20	Piva (MN)	AC Single	220 kV	316
Trebinje	Perućica (MN)	AC Single	220 kV	316

3.2 Network development plan

Transco BiH is in charge for preparing a long-term plan for the development of the transmission network. After revision by ISO BiH, the plan will be send to SERC for approval.

4. Electricity market structure

The BiH electricity market is currently based on bilateral contracts between utilities (generation-supply companies) and bilateral export/import contracts. In the future, the market will be based on bilateral agreements between producers and suppliers, eligible consumers, traders and on balancing market managed by ISO BiH for balance-adjusting and settlements.

5. Other

Links	Institutions/companies
www.derk.ba	State Electricity Regulatory Commission
www.ferk.ba	Regulatory Commission for Electricity in Federation of BIH
www.reers.ba	Regulatory Commission for Electricity of Republika Srpska
www.nosbih.ba	Independent System Operator in Bosnia and Herzegovina
www.elektroprenos.ba	Company for Transmission of Electricity in BIH
www.elektroprivreda.ba	Elektroprivreda BiH
www.ephzhb.ba	Elektroprivreda HZHB
www.ers.ba	Elektroprivreda RS

BULGARIA

1. Basic capacity, generation and consumption data (year 2005)

Installed capacity by fuel, MW		
	Thermal	6553
	Hydro	2870
	Nuclear	2880
	Renewables	0
	Total	**12303**
Yearly generation by fuel, TWh		
	Thermal	20.849
	Hydro	4.664
	Nuclear	18.407
	Renewables	0
	Total	**43.920**
Annual consumption, TWh		**36.462**
Import TWh		**0.799**
Export TWh		**8.380**

2. Industry structure

2.1 Recent key developments

Following the adoption of a new Energy Act by the Bulgarian Parliament on 26 November2003, Bulgaria has fully harmonised its legislation with EU requirements. The Energy Act foresees the restructuring and a step-by-step liberalisation of the energy sector in the country. Its application will lead to significant changes directly related to the NEK structure and activities.

On 11 April 2006, the Board of Directors of Natsionalna Elektricheska Kompania EAD (NEK EAD) issued a decision on the restructuring of the Company.

The adopted model of unbundling of NEK foresees the establishment of a new subsidiary company – Electricity System Operator EAD, 100% owned by NEK EAD, which will perform the functions of Transmission System Operator, Balancing Market Administrator as well as operation and maintenance of the transmission system which will remain property of NEK EAD.

The unbundling of NEK EAD is in accordance with the provisions of EC Directive 2003/54 on legal, functional and accounts separation of the transmission system operator from non-transmission-related activities of the company able to compete on the market, in particular in trading and generation.

Following its restructuring, NEK EAD will perform the functions of wholesale public supplier, hydro generator and electricity trader as a holder of three separate licenses. Pursuant to the Energy Act NEK EAD will purchase electricity under the existing long-term PPAs with TPP Maritsa East 1, TPP Maritsa East 2 and TPP Maritsa East 3 as well as the electric energy produced by renewable energy sources and CHP plants at preferential prices, and upon resolution by the Council of Ministers, will proceed with the development of the NPP Belene project.

The model will be implemented following effectiveness of the amendments to the Energy Act.

Investments
A priority in the NEK Investment Program for 2005 is given to the construction of projects in compliance with the energy policy for the system development in order to provide stable and reliable power supply, losses reduction in electricity transmission and transformation, development and modernisation of the transmission system and increase of the hydro power capacities in the country.

Main achievements in 2005
The electric power system of Bulgaria has been the main exporter within the Balkan region for the recent years. About 75% of the electricity export in this part of Europe was realised by NEK EAD. Besides being the main exporter, NEK EAD acts also as a guarantor of power supply in the event of deviations from the forecasts.

NEK EAD and Elektrostopanstvo Macedonia (ECM) have signed agreements for joint implementation of 400 kV Bulgaria-Macedonia power line with a total length of 150 km, 80 km of which are on the territory of Bulgaria. The construction of the new interconnection line will be a new stage in the strategy of the electric power companies of the Balkan countries for improving the connections among the electric power systems in the Region that are in parallel operation and to facilitate the creation of a Regional Energy Market.

In 2005, four new dispatch control systems were commissioned at the Regional Dispatch Centres (RDC) in Sofia, Plovdiv, Pleven and Varna. The Sinaut Spectrum systems at RDC are some of the most modern systems for dispatch control.

During the summer 2006, the s/s Plovdiv 400/110 was commissioned, and it will play a very important role for load flow and stability in the south region of Bulgarian network.

2.2 Main actors

TSO
With the legal unbundling of the Electricity System Operator as from 1 January 2007, the new company acts as an operator of the national transmission network (110, 220, 400 and 750 kV) and will hold a license for system control.

Main generators (incl. IPPs)
The main generators in the Bulgarian Power system are:
Kozloduy NPP - 2880MW (since 1.01.2007 – 2000MW).
Maritsa East 2 TPP - 1450MW
Varna TPP - 1260 MW
Maritsa East 3 TPP - 800 MW
Bobov Dol TPP - 630 MW

Foreseen projects for new generating units
Maritsa East 1 TPP (2 x 300 MW).
Zhankov Kamak (80 MW).

Number of distributors
3 distribution companies, operating the grids of 110 kV and medium voltage.

Main traders & other players (exchanges etc)
The National Electric Company (NEK) performs the role of the Wholesale Public Supplier, Hydro Generator and Electricity Trader. More than 10 companies are holders of a *Trading License*, out of which 5 are active in the market.

3. Transmission network and system issues

3.1 Status of international interconnections

Existing Interconnections

FROM (BG)	TO	Type AC/DC Single/Double	U, kV	S, MVA
Kozloduy NPP	Tintareni (RO)	AC - Double	400	2600
Kozloduy NPP	Isalnita (RO)	AC - Single	220	360
Sofia West s/s	Nish (YU)	AC - Single	400	1300
Blagoevgrad s/s	Thessaloniki (GR)	AC - Single	400	1300
Dobrudja s/s	Isaccea (RO)	AC - Single	400	900
Varna s/s	Isaccea (RO)	AC - Single	400	2500
Maritza East 3 s/s	Babaeski (TR)	AC - Single	400	1300
Maritza East 3 s/s	Hamidabat (TR)	AC - Single	400	1300

Lines under construction (internal and cross-border)

FROM	TO	Type AC/DC Single/Double	U,kV	S,MW	Expected date for commissioning the line
Chervena Mogila s/s	Stip (FIROM)	AC - Single	400	1300	
Zlatitsa s/s (BG)	Plovdiv s/s (BG)	AC - Single	400	1300	

3.2 Network development plan

The transmission network will be capable of carrying out continuously its main application – transmission of the required electricity quantities under the existing standards for electricity supply quality and reliability without violating the operational technological parameters and the equipment technical limitations.

The transmission network development plan is a document that describes the future changes and development of the transmission grid as well as the expected operational characteristics of the transmission grid over the years.

The process of planning will envisage a necessary time for projects preparations as well as proposals from different parties concerned, in a non-discriminatory way.

The plan identifies those points in the power grid that are most suitable for creating new connections for future electricity transmission, in order to encourage the competition and transmission network development.

The Development Plan contains the following information about the operating parameters of the transmission network:

- Transmission capacity by main directions;
- Power flows at maximum EPS loading;
- Loading of the nodes of users' connection to the transmission grid;
- Short circuit current levels at 750 кV, 400 кV, 220 кV and 110 кV busbars of the distribution and transformer substations;
- Losses of power and energy during transmission and transformation in the electric power network at a maximum EPS loading;
- Proposals for the transmission network development and/or changes in the topology;
- Planned exchanges of electric power with the foreign partners;
- Proposals for the construction of new interconnection lines.

During a normal operation mode the transmission network shall meet the security criterion "n – 1".

When a nuclear power plant is connected to the transmission network, the security criteria "n -2" is applied.

The power grid configuration will allow to carry out planned outages of the facilities for repair purposes without violating the security criteria mentioned above.

Once approved by the Ministry of Energy and Energy Resources (MEER), the transmission network development plan is published and made accessible to all existing and potential users of the transmission network.

The Bulgarian transmission network observes the UCTE Operation Handbook recommendations.

4. Electricity market structure

Market Model

The Bulgarian electricity market is operating in a competitive environment since September 2004. The trade under freely negotiated prices represents 55% from consumer's consumption, eligible to switch between suppliers, and about 14.5% from the total country net demand. The current eligibility threshold is 9 GWh. As from 1 January 2007, all industrial customers have the right to switch electricity suppliers. The adopted Amendments and supplements to the Energy Act in September 2006 regulate the relations after 1 July 2007, when the market will be liberalised for all customers, including households' consumers.

The market model of bilateral contracts and a balancing market will be developed further. A complex market place incorporating a spot "day-ahead market" for short-term deals with electricity and ancillary services will be put in place progressively.

In a new market environment NEK's commercial relations are likely to change significantly. In its function as Transmission Company and wholesale public supplier, the company will enter into agreements with market participants. At the same time the Electricity System Operator will enter into agreements with market participants in respect of providing system services and balancing.

The functions of the Electricity System Operator relating to the organisation of the electricity market include:

- Registration of trading participants and balance responsible parties;
- Validation and registration of delivery schedules under contracts;
- Validation and registration of offers and bids for balancing energy;
- Preparation of merit orders of balancing energy sources;
- Determination of imbalance prices and settlement of balance responsible parties imbalances;
- Drawing up settlement statements, issuance and receipt of invoices;
- Management of a market operation database;
- Management of a separate balancing energy accounts;

The provision which gives the legal basis for trans-border market opening provides for the possibility of concluding electricity transactions between generators, traders, the wholesale public supplier, the public retailers of electricity, eligible consumers, and local entities in EU Member States, as of the date of Bulgaria's EU accession on 1 January 2007

The secondary legislation (commercial and technical codes) will be further developed and amended in compliance with the last amendments to the Energy Act. The main regulations comprise:

- New nomination and scheduling procedures;
- Gate closure for the different markets;
- Introduction of market based balancing mechanism;
- Introduction of market principles for contracting reserve and ancillary services;
- Capacity allocation and congestion management mechanisms using a market based approach (explicit or implicit auctions).

5. Websites.

Link	Company
www.nek.bg	NEK
www.dker.bg	State Energy Regulatory Commission
www.doe.bg	Ministry of Energy and Energy Resources

CROATIA

1. Basic capacity, generation and consumption Data[1] (year 2005)

Installed capacity by fuel, MW		
	Thermal	1944
	Hydro (all = large+small)	2080
	Nuclear	0
	Other renewables (wind, waste, solar)	8
	Total	**4032**
Yearly generation fuel by fuel, TWh		
	Thermal	5.1
	Hydro (all = large+small)	6.4
	Nuclear	0
	Other renewables (wind, waste, solar)	0.1
	Total	**11.6**
Annual consumption, TWh		**16.7**
Imports, TWh		**8.8**
Exports, TWh		**3.6**

2. Industry structure

2.1. Recent key developments

The year 2000 is generally considered as the starting point of the reform in the energy sector in Croatia, including the electricity sector, when the concept of energy sector reform was adopted on the basis of earlier preparatory activities. In relation to the Electricity sector, in July 2001 the Parliament of the Republic of Croatia adopted key energy laws (i.e. Energy Act, Electricity Market Act and Energy Activities Regulation Act). These acts introduced market relations in the electricity sector, provided for gradual liberalisation of the electricity market and defined a transparent relation between energy undertakings and customers. This has created a legislative framework for further restructuring of the electricity sector based on a public service obligation (tariff customers' supply, network infrastructure services and system operation) and a competitive market. The electricity market was opened to customers with an annual consumption above 40 GWh and network access has been provided through regulated third party access. After that, the Croatian Energy Regulatory Council was set up; *Energy Development Strategy of the Republic of Croatia* was passed as well as a number of secondary legislative acts.

Following changes in the European energy legislation, changes have also been made in the Croatian legislative framework in order to harmonise national provisions with EU energy legislation related to electricity (especially Directive 2003/54/EC and Regulation 1228/2003/EC). Towards the end of 2004, new energy laws (Energy Act, Electricity Market Act and Energy Activities Regulation Act) were approved.

Among other changes, such as the creation of several new institutions responsible for the implementation of new energy laws, the timeline for further opening of the electricity market was set up:

- January 1, 2005, for customers with a consumption above 20 GWh
- July 1, 2006, for customers with a consumption above 9 GWh,
- July 1, 2007, for all commercial customers,
- July 1, 2008, for all customers.

Hrvatska energetska regulatorna agencija (HERA) – Croatian Energy Regulation Agency (CERA), whose mandate also includes electricity, was established in July 2005, as the successor to the Croatian

[1] *Please try to ensure consistency with EURELECTRIC EURPROG report "Statistics and prospects for the European electricity sector"*

Energy Regulatory Council. The organisational structure of CERA comprises a Steering Committee, a Director and professional service staff. The Steering Committee, composed of 5 members, is appointed by the Croatian Parliament following a proposal of the Government. The Agency issues and revokes licenses for energy activities, resolves complaints relating to operator's work, rejection to connect or conditions for connection to the network. CERA is also responsible for adopting methodologies for tariff systems, for connection to the network and for electricity system balancing. In addition, it monitors the implementation of the rules on allocation of cross-border capacity, on separation of accounts, on connection of new producers and customers, on the level of transparency of competition, and whether deadlines for repairs and connections are met. CERA does also carry out supervision of tariff systems and charges, network access and quality of services provided by energy undertakings.

Hrvatski operator tržišta energije (HROTE) – Croatian Energy Market Operator (HROTE) was established under the Electricity Market Act in March 2005. The main tasks of the market operator are to adopt Electricity Market Rules and to organise the market, to propose measures for market improvement, to register contractual obligations between market participants, to keep records of eligible customers and to keep a register of eligible producers. HROTE is responsible for settlement of balancing energy and recording and matching of contractual schedules. HROTE enters into contracts with eligible producers who are entitled to an incentive price and with suppliers, in order to ensure minimal share of electricity produced from renewable sources and cogeneration. It also calculates, collects and allocates the funds collected from charges for incentivising renewable energy sources and cogeneration to eligible producers. At the end of 2006 HROTE has been separated from HEP Group and its ownership assigned to the Republic of Croatia.

The establishment of the **transmission system operator (TSO)** and the **distribution system operator (DSO)**, as legal, accounting and functional unbundled companies, has been carried out in compliance with the requirements of the EU Directives and national legislation as part of the restructuring of incumbent utility Hrvatska Elektroprivreda d.d. (HEP).

HEP was established in 1990 as a public enterprise and in 1994 it was transformed into the stock company Hrvatska Elektroprivreda d.d. (HEP d.d.). The Republic of Croatia has retained full ownership of HEP d.d. and in March 2002 the Act on privatisation of HEP d.d. was passed. Pursuant to the Act, HEP d.d. will be privatised in the manner of corporate privatisation with the Republic of Croatia retaining the ownership of 51% of HEP d.d. shares until the Republic of Croatia becomes a member of the European Union, and individual interested investors will be able to buy up to 10% of shares.

As of 1 July 2002 HEP d.d. started to operate as a group of related daughter companies (HEP Group) headed by the parent company HEP d.d. (a holding).

With the approval of the remaining set of secondary legislation throughout 2006, the institutional, organisational and legal preconditions for continuing the electricity market opening in the Republic of Croatia are being met.

In the framework of the negotiations for EU accession, explanatory and bilateral screening meetings (i.e. analytical examination of the *acquis*) for Chapter 15 (Energy) and Chapter 21 (Trans-European Networks) took place in 2006.

The Republic of Croatia is geographically, especially in terms of its electricity system, a link between Central and South-East Europe. It is one of the signatories of the *Energy Community Treaty* (signed on 25 October 2005, ratified by Croatian Parliament in June 2006, and in force since 1 July 2006).

2.2. Main actors

<u>Transmission system operator</u>

HEP – Operator prijenosnog sustava d.o.o. (HEP- Transmission System Operator LLC) was founded in March 2005 by merging the two previously existing regulated companies, namely CROISMO LLC. and HEP-Transmission LLC. HEP-OPS holds a license for electricity transmission and, as from the 4 April 2005, performs the activity of the transmission system operator. Its basic tasks are power system control, operation, maintenance, development and construction of the transmission grid, as well as the production of a part of reactive electricity.

Main generators
HEP – Proizvodnja LLC (HPPs, TPPs, CHPs)
TPP Plomin LLC
Industrial/"self-producers" power plants (INA, Petrokemija, Belišće, DINA …)

Foreseen/Outgoing projects for new generating units

New units in CHPP Zagreb (100 MW under construction), TPP Osijek (250 MW), TPP Sisak (250 MW), and TPP Plomin (500 MW)
New HPP Lešće /under construction/, Zaprešić and Drenje (app. 40 MW each)
New Wind Parks (> 300 MW)

Distributors
HEP-Operator distribucijskog sustava d.o.o. was founded in December 2005 through a transformation of the previously existing HEP-Distribution LLC.
HEP-ODS holds the license for electricity distribution and performs the activity of a distribution system operator (with 21 regional distribution areas that operate medium voltage networks and exceptionally parts of 110 kV network in larger urban areas).

Main traders
17 licensed companies

Other players
For supply business there are 3 licensed companies.
Status of eligible customer: more than 100 customers (with an annual consumption exceeding 9 GWh,), which amounts to approximately 25% of the total annual electricity consumption in Croatia.

3. Transmission Network and System Issues

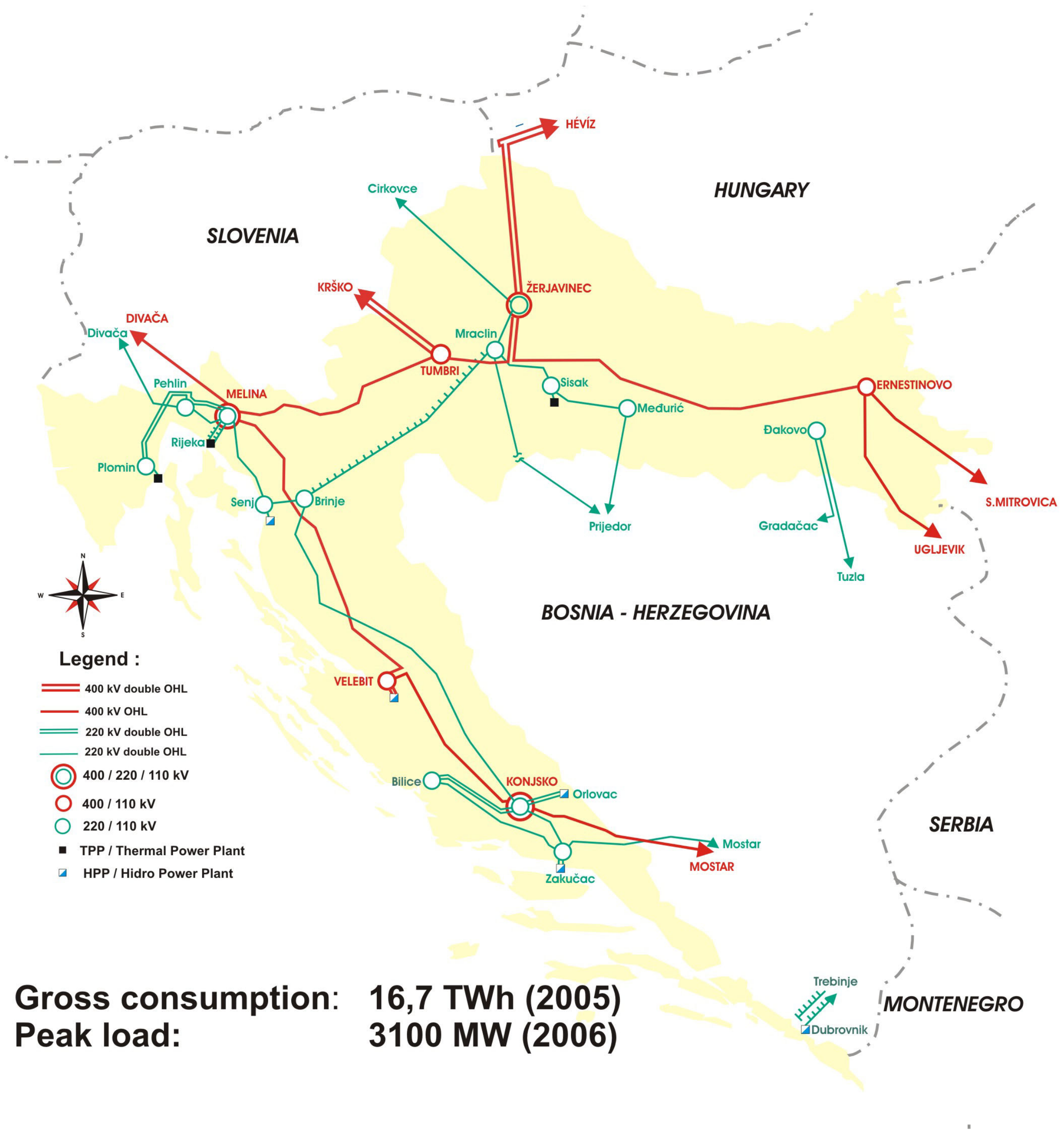
3.1. Status of international interconnections

Croatian Transmission Grid is well interconnected with neighbouring grids. Existing interconnection include all high voltage levels (400, 220 and 110 kV).

Total length of high voltage lines is 7125 km (400 kV – 1159 km, 220 kV – 1212 km and 110 kV – 4754 km) with 158 substations 400-110/x kV with 11043 MVA transformer capacity installed.

CROATIAN ELECTRICITY TRANSMISSION GRID
(only voltage levels 400 and 220 kV)

(Status as of July 2006)



Gross consumption: 16,7 TWh (2005)
Peak load: 3100 MW (2006)

Existing international interconnections

From	To	Type AC/DC Single/Double	U,kV	P,MW
Tumbri	NPP Krško (SI)	AC, D	400	2528
Melina	Divača (SI)	AC, S	400	1264
Pehlin	Divača (SI)	AC, S	220	366
Žerjavinec	Cirkovce (SI)	AC, S	220	311
Nedeljanec	HPP Formin (SI)	AC, S	110	120
Buje	Koper (SI)	AC, S	110	95
Matulji	Ilirska Bistrica (SI)	AC, S	110	95
Žerjavinec	Heviz (H)	AC, D	400	2600
Nedeljanec	Lenti (H)	AC, S	110/120	95
D.Miholjac	Siklos (H)	AC, S	110/120	120
Konjsko	Mostar (B&H)	AC, S	400	1264
Ernestinovo	TPP Ugljevik (B&H)	AC, S	400	1264
HPP Zakučac	Mostar (B&H)	AC, S	220	311
Međurić	Prijedor (B&H)	AC, S	220	311
Đakovo	TPP Tuzla (B&H)	AC, S	220	311
Đakovo	Gradačac (B&H)	AC, S	220	311
HPP Dubrovnik	Trebinje (B&H)	AC, S	220	492
Županja	Orašje (B&H)	AC, S	110	95
Gračac	Kulen Vakuf (B&H)	AC, S	110	120
Knin	Bos.Grahovo (B&H)	AC, S	110	120
Buško Blato	Livno (B&H)	AC, S	110	120
Imotski	Grude (B&H)	AC, S	110	80
Opuzen	Čapljina (B&H)	AC, S	110	95
Opuzen	Neum (B&H)	AC, S	110	95
Ston	Neum (B&H)	AC, S	110	95
Komolac	Trebinje (B&H)	AC, S	110	95
Ernestinovo	S. Mitrovica (SR)	AC, S	400	1264
B. Manastir	Apatin (SR)	AC, S	110	120
Nijemci	Šid (SR)	AC, S	110	120

Ongoing studies in international/cross-border interconnections

From	To	Type AC/DC Single/Double	U,kV	P,MW	Date for study completion	Expected date for commissioning the line under study
Ernestinovo (HR)	Pécs (H)	AC, D	400	2600	2004	2010
Croatia	Italy	DC, submarine cable	400 - 500	500-1000	2007	2015

Lines under construction (internal and cross-border)

From	To	Type AC/DC Single/Double	U,kV	P,MW	Expected date for commissioning the line
Mraclin (HR)	Prijedor/HPP Jajce (B&H)	AC, S	220	311	2007 (Reconstruction)
HPP Dubrovnik (HR)	Trebinje (B&H)	AC, S (second line)	220	492	2007 (Reconstruction)
Plomin	Vodnjan	AC, D	220 (110)	700	2007

Future projected interconnections

Possible upgrading or strengthening of interconnections with Bosnia & Herzegovina and /or Slovenia may be considered, as well as establishing the first electricity interconnection with Montenegro, the only neighbour without connection to Croatian grid.

Study needs
See above, and a possible strengthening of internal 400 kV connections on north-south and east-west routes.

3.2. Network development plan

TSO and DSO have a legal obligation to prepare a proposal for their three-year Transmission (respectively Distribution) Network Development and Construction Plan in line with the Energy Development Strategy of the Republic of Croatia and the Programme for its implementation. Both plans are being submitted to CERA each year for approval, in order to enable financing of the planned investments from transmission and distribution network fees.
TSO and DSO have to harmonise their proposals, particularly as regards their interfaces.

3.3. Main events

Due to the steady electricity consumption growth (in average 4 %), both in winter and summer, all time peak demand of 3100 MW was recorded in early 2006.

The project for overall revitalisation and modernisation of the TSO's information and communication technology system has been launched in order to improve performance and reliability of the Croatian transmission grid operation in several phases.

4. Electricity market structure

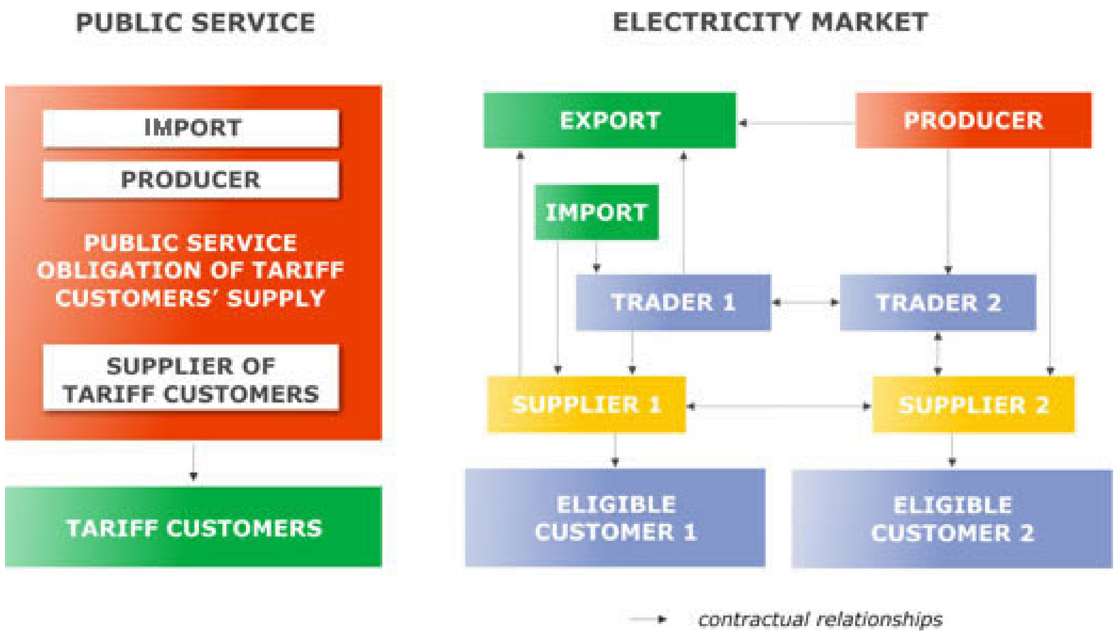
The bilateral market model, which is based on electricity trading via bilateral contracts, was chosen for the initial phase of the electricity market opening in Croatia. Contractual parties in the bilateral contract for electricity supply are an eligible customer and a supplier. Bilateral contracts on purchase/sale of electricity (wholesale) are concluded between a supplier, a trader or a producer. Apart from the supply contract and the electricity purchase/sale contract, an eligible customer and a producer must also conclude the contract on network usage with TSO or DSO depending on the voltage level they are connected to.

A participant in the electricity market (a market participant) is any producer, supplier, trader and eligible customer. A producer, (except the one with a generation facility of up to 1 MW), a supplier or a trader must have a license to carry out energy activities. These licences are issued by the Croatian Energy Regulatory Agency.

TSO is responsible for the procurement of electricity required for the system balance. Every supplier has a responsibility to TSO for any deviation done by its customer. Apart from the suppliers, other entities responsible for deviation include the producers (regarding their generation facilities) and the traders (regarding the implementation of the registered contractual schedules). All balance responsible parties are obliged to enter into balancing energy contract with TSO.

The electricity market model in Croatia distinguishes between the following (see Figure):

- the system of public service obligation of tariff customer supply,
- open electricity market.



Through the process of further market opening the number of tariff customers, i.e. the "portion" of the public service system is expected to decrease. However, when a tariff customer from the household category or a small customer acquires a status of an eligible customer but does not wish to exercise that right, it can remain in the system of public service electricity supply.

In three neighbouring countries, there are significant Croatian investments in generating plants, made in the period before the disintegration of the former Yugoslavia. Unfortunately, the exercise of the rights attached to these investments is still unsettled, especially with the Republic of Serbia and partly with the Republic of Bosnia and Herzegovina.

5. Other

Institutions/companies	Links
Ministry of the Economy, Labour and Entrepreneurship	www.mingorp.hr
Croatian Energy Regulatory Agency	www.hera.hr
Croatian Energy Market Operator	www.hrote.hr
HEP-Operator prijenosnog sustava d.o.o. (TSO)	www.hep.hr/ops
HEP Group	www.hep.hr

CZECH REPUBLIC

1. Basic capacity, generation and consumption data (year 2005)

Installed capacity by fuel, MW		
(gross)	**Thermal**	11444
	Hydro	2165
	Nuclear	3760
	Renewables (without Hydro)	43
	Total	**17412**
Yearly generation by fuel, TWh		
(gross production)	**Thermal**	54.760
	Hydro	3.027
	Nuclear	24.728
	Renewables (without Hydro)	0.064
	Total	**82.579**
Annual consumption, TWh *		**62.691**
Imports		**12.351**
Exports		**24.985**

** net production + balance - Pumping Storage Power Station (hydro) consumption*

2. Industry structure

2.1 Recent key developments

Legislative (selected list)

- Energy Act (Act No.458/2000 Coll. on business conditions and public administration in the energy sector), and related regulations.
- Rules governing electricity market operation (Regulation No. 541/2005 Coll.), set by the Energy Regulatory Office (ERU).
- The Grid Code

2.2 Main actors

TSO

CEPS,a.s. is the transmission system operator and owner of power lines for a total length of 5,388 km (4,396 route kilometres), of which 66% are 400 kV lines, 33% are 220 kV lines and 1% are 110 kV lines.

TSO is responsible for parallel operations with the power systems of neighbouring countries via cross-border tie-lines according to UCTE rules. It has a duty to maintain, upgrade and develop the transmission system according to Grid Code standard. TSO offers customers the transmission capacity of its facilities, ensures balance in the Czech power system, provides system services, and procures ancillary services and standard-quality electricity supply.

The principles underlying CEPS's activities are defined, in accordance with the Energy Act, in the Grid Code. The current version of this document, as approved by the Energy Regulatory Office (ERU), is available at www.ceps.cz.

Shareholders of CEPS: Osinek,a.s. (51 % of State-owned shares), Ministry of Labour and Social Affairs (15 % shares), Ministry of Finance (34 % shares).

Main producers

CEZ,a.s.

SU,a.s., ECKG-Kladno, Dalkia Morava, Elektrarny Opatovice

Number of distributors
Three DSO (Distribution System Operators), operating the grids of 110 kV and lower voltage.
It is CEZ Distribuce, a.s., E.ON Distribuce, a.s. and PREdistribuce, a.s.

Relevant market players
Producers, TSO, DSOs, the market operator (OTE), electricity traders, customers.

Main generators (incl. IPPs)

Type	No. of Units	MW/Unit	Total MW
TPS	1	500 and more	500
	22	200-210	4450
	12	100-200	1360
	30	50-100	1672
	x	up to 50	2668
CCGT+SCGT	2	100-200	374
	3	50-100	232
	x	up to 50	168
NPS	2	1000	2000
	8	220	1760
HPS	2	200-500	650
	4	100-200	450
	6	50-100	484
	x	up to 50	565

3. Transmission network and system issues

3.1 Status of international interconnections

Planned construction of a second circuit on the existing 400 kV line to Austria.
Under construction or planned new 400 kV lines:

- between substations Krasikov-H.Zivotice and
- between Bezdecin – C. Stred
- between Vyskov (Chotejovice) – Babylon
- between Hradec – Vitkov (Vernerov)

Under reconstruction with installation of a second circuit on the existing 400 kV line between substations Nosovice-Prosenice.

Existing Interconnections (To Country, Type AC/DC, Voltage, Capacity)

	FROM (CZ)	TO	Type AC/DC	U,kV	P,MW
1.	HRADEC	ROHRSDORF (DE)	AC	400	1206
2.	HRADEC	ROHRSDORF (DE)	AC	400	1206
3.	HRADEC	ETZENRICHT (DE)	AC	400	1363
4.	PRESTICE	ETZENRICHT (DE)	AC	400	1363
5.	SLAVETICE	DURNROHR (AT)	AC	400	1386
6.	SOKOLNICE	BISAMBERG (AT)	AC	220	251
7.	SOKOLNICE	BISAMBERG (AT)	AC	220	251
8.	NOSOVICE	VARIN (SK)	AC	400	1206
9.	SOKOLNICE	KRIZOVANY (SK)	AC	400	1206
10.	SOKOLNICE	STUPAVA (SK)	AC	400	831
11.	LÍSKOVEC	POV.BYSTRICA (SK)	AC	220	221
12.	SOKOLNICE	SENICA (SK)	AC	220	250
13.	ALBRECHTICE	DOBRZEN (PL)	AC	400	1206

14.	NOSOVICE	WIELOPOLE (PL)	AC	400	1206
15.	LISKOVEC	BUJAKOW (PL)	AC	220	400
16.	LISKOVEC	KOPANINA (PL)	AC	220	400

Other Developments in TSO
More than 40% of the total number of substations (400 and 220kV) is currently under remote control from the National Control Centre in Prague. The Company's strategic objective is that all of the substations are under remote control by the y.2013. Equipping of the backup Control Centre with all the functions necessary for transmission system control in emergency situations.

4. Electricity market structure

Since 2006, all the end consumers are eligible customers. Consequently, the Czech electricity market is been fully opened.

Electricity transits. Czech national rules for cross-border exchanges in electricity (exports, imports and transits) were unified during the period 2004-2005 and harmonised with the respective rules applied by neighbouring TSOs. Consequently, integrated contracts for cross-border electricity transfers were introduced.

Auctions – allocation of available transfer capacity on interconnectors. Transfer capacity is being allocated by means of auctions organised in cooperation with neighbouring transmission system operators (SEPS, PSE-O, VE-T, E.ON and APG), in a transparent and non-discriminatory manner. Coordinated yearly auctions for transfer capacity on interconnectors between ČEPS, PSE-O and VE-T for 2006 were organised via the e-Trace trading system implemented at the end of 2004. Monthly auctions were organised throughout the year and daily auctions were launched in April 2005. The introduction of the e-Trace system brought about a considerable improvement in terms of the transfer of capacity rights purchased in yearly or monthly auctions; such rights may be transferred to another transmission system user up to the moment when electricity transfer is arranged for which the allocated capacity is to be used. ČEPS is responsible for carrying out the functions of the Coordinated Auctions Office in 2005 and 2006. Joint auctions (yearly, monthly and daily) for available transfer capacity on interconnectors with other neighbouring TSOs continued to be organised on a bilateral basis.

Negotiations on organising coordinated auctions for available transfer capacity on interconnectors with other TSOs within the Central European region (APG, E.ON, MAVIR, SEPS and ELES) commenced in February 2005. Subsequently, agreements on coordinated auctions for available transfer capacity on interconnectors between ČEPS, E.ON, PSE-O, SEPS and VE-T were signed in November 2005. The first coordinated auction for yearly capacity allocation for 2006 was held in November 2005. Auction rules for the year 2007 are currently being prepared and the main principles being preserved.

ITC – Inter TSO Compensation (formerly CBT – Cross-Border Trade). The Company has joined the European transmission system operators' clearing and settlement scheme known as ITC. The aim of the scheme, implemented in compliance with Regulation of the European Parliament and Council No. 1228/2003, is to harmonise the financial settlement of the costs of electricity transfer across international interconnectors. This issue has recently received a lot of attention from the European Commission and substantial changes to ITC scheme principles were requested due to anticipated significant unfavourable financial impact on ČEPS and subsequently on the Czech Republic as a whole.

Energy and financial flows. Amount of electricity transferred across the transmission system, including transits: 61 379 GWh. Transmission losses 833 GWh (Specific losses in energy input to the transmission system, including transits: 1,3 %). CEPS,a.s. Revenues: 15 975,0 (in mil. CZK), Expenses before tax total: 12 671,8

5. Other

Link	Companies
www.ceps.cz	TSO (CEPS,a.s.)
www.e-trace.biz	Coordinated Auction Office
www.cez.cz	Producer (CEZ,a.s)
www.eru.cz	Energy Regulatory Office (ERU)
www.ote-cr.cz	Electricity Market Operator (OTE)
www.mpo.cz	the Ministry of Industry and Trade (MPO)
www.csze.cz	Czech Association of Energy Sector Employers (CSZE)

FORMER YUGOSLAV REPUBLIC OF MACEDONIA

1. Basic capacity, generation and consumption data (year 2005)

Installed capacity by fuel, MW		
	Thermal	1010
	Hydro	518
	Nuclear	-
	Renewables	-
	Total	**1528**
Yearly generation fuel by fuel, TWh		
	Thermal	4.997
	Hydro	1.478
	Nuclear	-
	Renewables	-
	Total	**6.475**
Annual consumption, TWh		**8.089**
Imports, TWh		**1.659**
Exports, TWh		**0.045**

2. Industry structure

2.1 Recent key developments

<u>The Ministry of Economy</u>
The Ministry of Economy is the institution responsible for policy-making and governance in the electricity sector. Up until 31 December 2004 the Macedonian power sector has been under the responsibility of the electric utility “Elektrostopanstvo na Makedonija”(ESM), a vertically integrated state-owned company. The government started a restructuring of the power sector in order to increase its efficiency and to respond to the EU directives.

The first step in the energy reform process was the unbundling, on 1 January 2005, of the vertical integrated state-owned company ESM into two companies:

1. MEPSO (the Transmission System Operator, Grid Owner and Market Operator, join stock state-owned company)
2. ESM (Company for production and distribution of electricity)

The second step was unbundling, on 1 September 2005, of ESM (Company for production and distribution of electricity) into three companies:

1. ELEM – Company for production of electricity;
2. ESM – Company for distribution of electricity;
3. TPP Negotino.

ESM-distribution was privatised by EVN Austria in March 2006. TPP Negotino is currently on-going a process of privatisation.

<u>The Energy Regulatory Commission (ERC)</u>
In December 2002, the energy law was modified in order to establish a Regulatory Commission for Energy of Republic of Macedonia. In 2003 a Regulatory Commission was appointed by the Parliament as an independent body for regulating activities in the energy sector in Macedonia.
The ERC regulates the whole energy sector, namely electricity, natural gas, district heating, oil and geothermal energy. it is responsible for supply quality for promoting a competitive energy market. In addition, ERC is responsible for defining the methodology for price setting and prescribes the tariff system. The ERC also issues licences for performing certain activities in the energy field and monitors performances.

The ERC participates in dispute settlement as well initiating or submitting proposals for modification to laws or other regulation in the energy sector.

The State Energy Agency

The State Energy Agency , soon to be established, will be in charge of technical support for data management, for strategy analysis and for project assessment.

Laws

A new Energy Law was approved on 23 May 2006. This responded to the need to:

- Regulate the complete energy field in one law.
- Approximate and harmonise national legislation in the Republic of Macedonia with EU legislation and approximation to the economic and criteria and conditions set in the acquis communautaire. Approximate with Directive 2003/54/EC; Directive 2003/55/EC
  - law covers the market liberalisation,
  - protection of competition, criteria on investments in electricity, gas, oil and thermal and geothermal sector,
  - relations and obligations in the regulated part of the market,
  - principles of sustainable development of the electricity, gas, oil and thermal and geothermal sector,
  - maintenance, usage, storing and financing ways for oil derivative commodity reserves etc.
- Creation of the conditions for EU integration and achievement of membership in the energy fields.

Secondary Legislation

On January 2005, the Energy Regulatory Commission passed a Rulebook on the method and conditions for regulating electricity prices. The rulebook regulates the method for establishing, approving and controlling prices for generating, transmitting and distributing electricity.

The Rulebook describes:

1. Methods and calculations of regulated maximum revenue of the electricity transmission company, the electricity distribution company and the electricity generation company for tariff consumers.
2. Methods and procedures for applying for an approval and price control.

Grid Code

The Grid Code was approved by Regulatory Commission on 25 August 2006 and published on 6 September in Official Gazette. The Grid Code describes minimum technical requirements for connection and for open access to the transmission network and basic technical and organisations instructions for operation and planning of transmission network. The Main issues of the Grid Code are:

- Explicit definition of technical rules with transparency in operation of transmission network and unification of regulations for the system and
- Legalisation of the relationship between users of transmission network.

Market Code

A draft Market Code (MC) has been prepared by SEETEC in cooperation with MEPSO, as part of its assistance to the Macedonian Government and its institutions. In accordance to Article 44-d of the Energy Law , MEPSO -Market Operator has a duty to publish the Market Code in the Official Gazette with a provisional confirmation from the Regulatory Commission. The official version has to be approved by the Regulatory Authority. The Macedonian electricity market is based on Third Party Access, bilateral contracts and balancing mechanism.

2.2 Main actors

Transmission system operator (TSO)

On 14 November 2005, the Energy Regulatory Commission issued four licences for MEPSO in accordance with the new amendments in the Energy Law:

1. License for System Operators;
2. License for Transmission Operators;
3. License for Market Operators;
4. License for Wholesale Public Suppliers of tariff customers.

All of these are activities of public interest,. As a result, the provider must fulfil the obligation for provision of public services (obligation for provision of access and connection and secure, safe, quality and continuity delivery and supply of electricity for all system users, prices and tariffs previously endorsed and published by the Regulatory Commission, as well as efficient exploitation of electricity resources, protection and improvement of the environment and climate) in the manner and through the procedure determined by the licence for performing the corresponding electricity activity, in accordance with the terms and conditions stated by law or by any another regulation.

High voltage transmission system operates at four (4) voltage levels: 110, 150 (which will be dropped out, i.e. upgraded at 400 kV), 220 and 400 kV. The length of overhead transmission lines is about 418.7 km on 400 kV voltage level, 103.2 km length of overhead transmission lines on 220 kV voltage level, 22.5 km length of OHTL-s on 150 kV voltage level and 1479.7 km length OHTL-s on 110 kV voltage level.

The backbone of the system is the 400 kV level. The ring of three 400 kV lines connects the biggest consumption area in the northern parts in the country (Skopje) with the main power generation plants, situated in the southern parts (Bitola and Negotino).

The transmission system , in the year 2005, included 44 substations 110/x kV, one substation 110/150 kV with 100 MVA installed capacity, two substations 220/110 kV with total 600 MVA installed capacity and four substations 400/110 kV with total 2100 MVA installed capacity.

<u>Main generators</u>
TPP Negotino was established as a separate company on 1 September 2005, with an installed capacity of 210 MW, heavy fuel oil (mazut) and is consideration generation as a reserve capacity.

ELEM, a company for electricity production was established in the second step of the energy reform on 1st September 2005.

ELEM has a License for generation of electricity as "Regulated Generator", which is a producer of electricity for tariff consumers who has an obligation to sell its entire production to the wholesale tariff supplier according to a regulated agreement.

The generation by ELEM is shared between thermal and hydro power plants. The ELEM's thermal power plants, with an installed capacity of 800 MW, represent 50% of total installed capacity, and the hydro power plants, with an installed capacity of 518 MW, represent approximately 34% of total.

New ongoing projects by ELEM:

- HPP Sv.Petka which will be with average generation 63 GWh, installed capacity 36,40 MW , which will be finished year 2008.
- Brod-Gneotino – lignite mining which will extended operation life of mine Suvodol and will supply TPP Bitola with fuel in next 30 years.

Development generation projects:

Projects	Implementation	Installed capacity/Generation	Construction period
1. HPP Boskov Most	BOT concession	70 MW/126 GWh	4,5 years
2. Utilisation of river Crna Reka			
- HPP Cebren	- BOT concession	1. 333-347 MW/ 840-786 GWh	1. 6 years

- HPP Galiste	- BOT concession	2. 194 MW / 262 GWh	2. 5 years
3. Vardar Valley Project – Feasibility study details with development of energy sector, agricultural sector, environmental protection and possible navigation way- include 12 HPP and one storage lake			
1. Storage Lukovo pole 2. HPP Veles 3. HPP Gradec 4. HPP Kukurecani		1. 110 GWh 2. 93 MW/ 300 GWh 3. 54,60 MW/ 252 GWh 4. 17 MW/ 80 GWh	1. 4 years 2. 7 years 3. 4 years
4. CCHPP Energetika	Independet Power Plant	Electricity 190 MW / 1.100 GWh Heat 150 MW / 620 GWh	
5. Suvodol Deep Underlying Seam Mining – extension of operating life of mine Suvodol in next 30 years for TPP Bitola			
6. Zivojno Lignite Mining - extension of operating life of mine Suvodol in next 30 years for TPP Bitola			
7. Wind Energy – measuring campaign in cooperation with Norwegian Government Technical Parameters: - number of potential location – 20 - average wind speed – 6,7-8,4 m/s - installed capacity per location – 25-33 MW - number of units per location – 10-15 - generation per location – 100 GWh			

Distributors
ESM-distribution was privatised by EVN Austria in March, 2006.
ESM- distribution has four licenses:

1. Distribution of electricity (owner of distribution network);
2. Distribution System Operator
3. Supply of electricity for retail tariff customers;
4. ESM Distributed Generation.

The distribution network comprises over 17 000 km of overhead lines and over 5 000 km of underground cables. The primary distribution network operates at 110, 35, 20 and 10 kV voltage levels, while the secondary distribution is performed on the 0.4 kV voltage level.

2.2.4. Main traders & other players
MEPSO contacting with 9-10 traders for electricity supply for wholesale tariff consumers based on competitive bidding and for transit through Macedonian power system. In accordance with the new Energy Law, the electricity trader is responsible for providing the electricity market operator with information on the quantities and diagram of electricity loads from sale contracts with eligible consumers, export and import contracts as well as for contracts for transit through the transmission network.

Direct consumers who receive the electricity at delivery point on the transmission network, and which have status of tariff consumers and who are consuming or planning to consume at least 20 GWh of electricity during each year, would be an eligible consumer. Consumption of direct consumers amounts to 25-30% of total consumption of electricity in Macedonia.

In accordance with the provisions of the Energy Law, Government of Republic of Macedonia can extend through a Government Decision, the category of customers which could be eligible consumers based on different criteria including consumption, voltage level, group of consumers or type of network (transmission or distribution).

3. Transmission network and system issues

3.1. Status of international interconnections

Existing interconnections
The Macedonian power system has interconnection lines with Greece, Bulgaria and Serbia (UNMIK).

FROM (BG)	TO	Type AC/DC Single/Double	U,kV	P,MW
SS Skopje 5	SS Kosovo B (Serbia-UNMIK)	AC, single	400	1330
SS Dubrovo	SS Thessaloniki (Greece)	AC, single	400	1330
SS Skopje 1 220*	TPP Kosovo A (Serbia-UNMIK)	AC, single	220	314
SS Skopje 1 220*	TPP Kosovo A (Serbia-UNMIK)	AC, single	220	314
SS Bitola 1	SS Florina (Greece)	AC, single	150	100
SS Kriva Palanka	SS Skakavica (Bulgaria)	AC, single	110	110
SS Susica	SS Petric (Bulgaria)	AC, single	110	110

***out of operation because of damage**

Ongoing studies in international/cross-border interconnections;

FROM (BG)	TO	Type AC/DC Single/Double	U,kV	P,MW	Date for study completion	Expected date for commissioning the line under study
SS Skopje 5	SS Nis (Serbia)	AC single	400	1330	2007	2009
SS Bitola 2	Albania - Italy	AC single – DC single	400	1330-1000	2007	2011

Lines (internal and cross-border) and Substations under construction

FROM	TO	Type AC/DC Single/Double	U,kV	P,MW	Expected date for commissioning the line
SS Stip	SS Chervena Mogila (Bulgaria)	AC, single	400	1330	End of the 2007
SS Stip		SS	400/110	300 MVA	
SS Skopje 5 – expansion		New transformer	400/110	300 MVA	End of the 2006
SS Bitola 2	SS Florina (Greece)	AC, single	400	1330	Middle of 2007
SS Vrutok – SS Gostivar – SS Polog – SS Tetovo (internal line)		AC, double	110	110	End of the 2007

Future projected interconnections

Feasibility Study of the 400 kV OHTL and 400 kV Submarine Cable Interconnections from Macedonia to Albania and to Italy

On 25 March 2000, Albania, Bulgaria and Macedonia signed a Memorandum of Understanding (MoU) for the development of the East-West power corridor, which involves a series of 400 kV overhead transmission line (OHTL) interconnections between Bulgaria, Macedonia and Albania.

On 13 April 2005, in Sofia, Albanian Minister of Industry and Energy, the Bulgarian Minister of Energy Resources, the Italian Minister of Production Activities and the Macedonian Minister of Economy signed a “Join Statement for Energy Infrastructure Cooperation” for cooperation in particular of the energy infrastructure and declared their support to the development of a Regional Energy Market and to the implementation of the Energy Community Treaty, taking into account that one of the important directions for the region and for Europe for energy resources transmission and supply is along route of European Corridor No.8.

The section of the 400 kV OHTL interconnection between Bulgaria and Macedonia is under-construction financed by EBRD. Italy has also joined the initiative and is looking toward the extension of this East-West power corridor by the development of a 400 kV submarine cable link between Albania and Italy.

Feasibility study includes investigations and calculations of 400 kV interconnection, with a 400 kV interconnection overhead transmission line (OHTL) between Albania and Macedonia and the 400 kV submarine cable interconnection between Albania and Italy.

The study aims at assessing if these interconnections are technically and economically feasible and if a bankable report can be subsequently prepared for potential lenders.

This study is undertaken by SEETEC at the request of KESH of Albania, NEK of Bulgaria, MEPSO of Republic of Macedonia and TERNA of Italy.

Site investigation
In the summer 2005 first investigations for alternative corridors on the territory of Macedonia and Albania were finalised

Load flow analyses
In October 2005 load flow analyses were prepared by MEPSO with an alternative for connection with OHTL Bitola (Macedonia)– Elbasan (Albania) – Vlore (Albania) and with theHVDC submarine cable from Vlore(Albania) to Brindisi (Italy). The other alternative which was proposed from Italian side from Bitola (Macedonia) – Elbasan (Albania) – Tirana (Albania) – Dures (Albania) as OHTL and as HVDC submarine cable from Dures (Albania) to Bari (Italy) was analysed in May 2006. A Regional Network Model for 2010 (RM 2010) is used for a detailed view of regional network operation imposing different power transfers. This model is developed in the framework of the SECI Regional Transmission Planning Project.

Regional Cooperative Projects

Electric Power Systems of SECI Countries for better integration to European System- Regional Transmission System Planning Project

Scope of the Regional TSP Project

The overall idea of the Transmission System Planning (TSP) project is to introduce a regional approach in transmission network planning practice and to construct a common database for the electricity network in the region that will be constantly updated and used of all power utilities from the South-eastern Europe countries.

The TSP Project, which was launched in March 2001, is accomplished in two phases. The 1st phase was finalised in January 2003 and the 2nd phase proceeded in May 2003 and should be finalised by the end of 2006 with an option to be extended in 2007.

The following countries are involved in the project: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia, Romania, Serbia – EPS and Montenegro. Slovenia and UNMIK joined the project in the 2nd phase. Greece, Turkey and Hungary also cooperate in the project.

1st phase of the Regional TSP Project

In the 1st phase three main goals has been successfully accomplished:

- Installation of well-known PSS/E software in each country and training of transmission planning personnel.
- Construction of regional transmission network model for the year 2005.
- Preparation of the study where all potential interconnection projects are distinguished and technically compared.

In the framework of the project *PSS/E software* was purchased and delivered and appropriate training courses for experts from the power companies in SEE were performed. That means that transmission planning engineers in SEE have the universal software tool and therefore access to easier way for exchanging information and data.

The 2005 regional model was built based on the internal national models prepared by experts from each country using PSS/E. EKC (Electricity Coordination Centre from Belgrade) was entrusted to merge all individual models, perform the harmonisation, tests of accuracy, implementing the links (interconnections) for the base case. Interactive communication and work in the process of the model construction was established and several steps were taken until the final result achieved. In addition, based on an established cooperation with relevant UCTE bodies, a UCTE equivalent on the borders of the region was defined and implemented. The model comprised mainly 220 and 400 kV level network, and parts with lower voltage level if they have significant influence. Two regimes were modelled: winter peak and summer peak regimes. The model has been prepared only for the steady state analyses.

Using the regional network model for 2005 a Regional Electricity Interconnection Planning Study was prepared. The study considered 13 scenarios of power exchange and 12 new candidate investment options, which led to several hundreds of power flow simulations, handled by PSS/E. A prioritisation procedure based on technical criteria was used to rank candidate lines.

2nd phase of the Regional TSP Project

In the next phase of the TSP Project, planning activities are further extended:

- Expanding and updating existing model for the year 2005 and construction of models for year 2010.
- Publishing of reports and studies on:
    1. network bottlenecks,
    2. network development and new investments till 2010,
    3. light load regime in the region,
    4. dynamic performance of the network,
    5. cooperation on EC/WB regional supply/demand study.
- Organising workshops and trainings for enrichment of technical knowledge of planning staff.

The regional Network Model for 2010 comprises the complete transmission network of countries in Southeaster Europe. 750 kV, 400 kV, 220 kV, 150 kV, 120 kV and 110 kV voltage level is implemented in the model. Influence of the rest of the network: West UCTE, CENTREL and Burstyn area in Ukraine are modelled with appropriate equivalents. All generation units that are connected to the transmission network are modelled as they are in reality (with respective step-up transformers). Topology of the network, power production and demand in RM 2010 match two regimes:

- forecasted 3rd Wednesday in January in 2010, 10:30 CET (peak load) and
- forecasted 3rd Wednesday in July in 2010, 03:30 CET (light load).

Size of the RM 2010 is shown in the following table:

Buses	**Plants**	**Machines**	**Loads**	**Branches**	**TR-s**	**Shunts**
5494	968	1443	3447	8321	2009	232

The model is expanded with sequence and dynamic data that gives opportunities for complete system analyses: steady-state load flow, faults analyses and dynamic simulations.

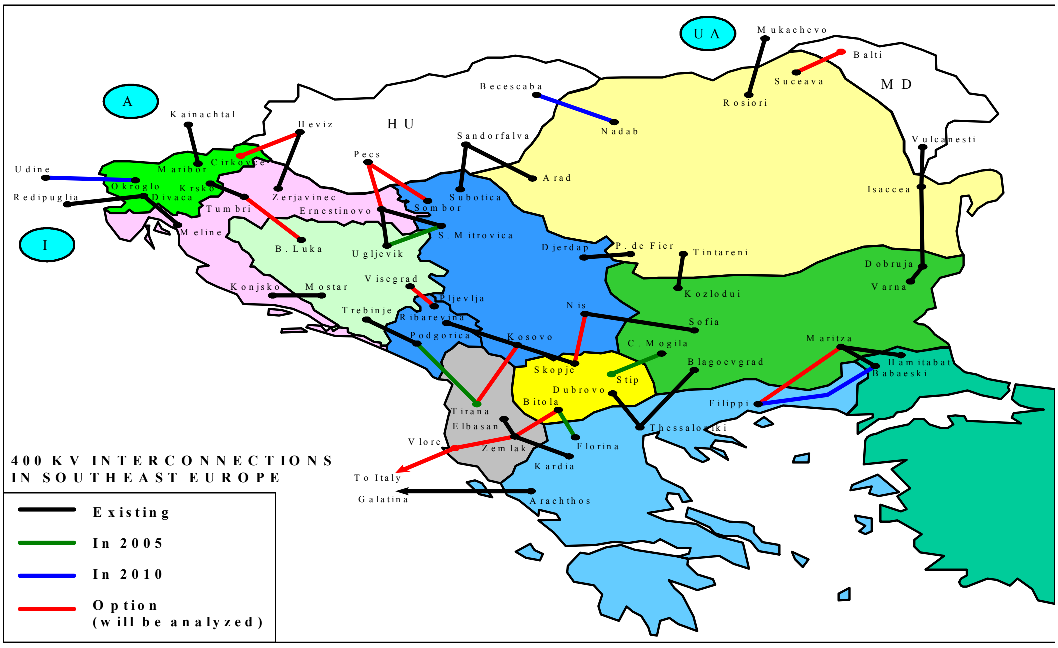
Upgrading of the Regional TSP Project

The 8th Athens Forum asked for reinitiating of SECI TSP Project. The main goal is the establishment of a regional electricity market. Therefore, new investments in generation and transmission are necessary in order to maintain security of supply in a market environment. A challenging task is to apply regional approach in prioritisation of generation and transmission projects by defining the transmission planning criteria. Focus in analyses should be put not only on the Balkans, but the wider SEE region including Italy, Hungary, Turkey, Moldova and Ukraine should be considered.

SECI TSP Group will take these tasks to fulfil Athens Forum requirements:

- Preparation of the Study on regional transmission planning methodology and criteria applicable for prioritisation of transmission line projects in market conditions.
- Update of the SECI TSP Study based on Generation Investment Study (GIS) supply/demand scenarios and new regional planning criteria. In preliminary analyses will be used regional network

model 2010 with some potential projects implemented. Later, SECI group will precise details of model for 2015. Study to be completed by spring 2007.



Status of interconnection lines in SEE, year 2010

<ins>Cross-border transmission capacities</ins>

MEPSO allocate cross-border transmission capacities on monthly level using NTC based mechanisms.

Due to the strong interdependence among the transmission capacities for certain SEE borders, SEE's TSOs, through SETSO NACMPF SG, have agreed on a regular procedure for making monthly reference network model, in order to obtain compatible and comparable results in monthly binding NTC calculation. Most of TSOs use this model as a basis for the monthly NTC calculation. Modelled reference regime is 3rd Wednesday at 10.30 am of next month. The countries whose models are exchanged and merged into a common regional model according to this procedure are: Albania, BiH, Bulgaria, Croatia, Greece, Hungary, Austria, Macedonia, Romania, Slovenia, Serbia, Montenegro and Ukraine (Burstyn).

Since only bilateral allocation procedures exist in the region at present, the interdependence among these borders has been taken into account by calculating the composite, simultaneously feasible NTC values, which are then fractioned per individual borders, then again split 50:50 at each border and offered at the separate allocation procedures. When calculating Macedonian north border transmission capacity, simulations consider joint import of Macedonia, Greece and Albania from Bulgaria and Serbia. Considering capacity of south Macedonian border to Greece, export from north to Greece and Albania is simulated. In that manner, typical borders are "coupled" into a composite NTC calculation, assessing maximum bulk power flow from north to south and distributing NTC on north and south Macedonian border.

3.2. Network development plan

The Regulatory Commission has to approve MEPSO's short and medium term investment programs which have to be prepared as a licence obligation.

In accordance with new Grid Code which was established at the end of August 2006, MEPSO will create a System Reliability Report every year in the future.

Retrospect reports published in year Y concern the years Y-1 and Y-2. Forecast reports published in year Y concern three levels of forecasts :

Short term forecast : years Y+1,Y+2 and Y+3

Middle term forecast : year Y+5

Long term forecast : year Y+10

The System Reliability Report has to Ensure that the least cost development of the transmission system is able to cope with future demands and maintain a level of quality in compliance with the UCTE reliability standards. This report is based on the forecast demand, the assessment of the generation adequacy (the generation can meet the demand for the following years with respect to the N-1 criterion), the assessment of the transmission system adequacy and the need for interconnection with other power systems. The aim of this report is to propose a list for the construction of new transmission network elements and network enhancements.

This report, after approval by the Regulatory Authority has to be published and provided to UCTE as a System Adequacy Forecast.

4. Electricity market structure

Cross-border trading

Since the beginning of the electricity market liberalisation process, the tarification of cross-border network access, now known as ITC (inter TSO compensation) has been one of the most important and consequently most discussed issues among the European countries.

Following the Athens Forum's decision , the ITC mechanism was implemented in SETSO countries in the second half of 2004, based on the same principles of the ITC mechanism applied in European Union by ETSO. The ITC mechanism consists in a calculation of the compensation for the usage of each transmission network for cross border flows in the SEE countries, thus calculating the so-called "SEE ITC fund" and the financing of that SEE ITC fund.

As a result of the positive experience gained from the first implementation and the expectation to merge the two existing funds SETSO and ETSO as per January 1st 2006, SEE CBT Clearing and Settlement Agreement 2005 was signed at the beginning of 2005. The calculation of the fund for 2005 was based on the real 2004 data. However, due to the reconnection of the UCTE synchronous zone in October 2004, significant changes in the cross-border flows and consequently in the transits have occurred, resulting in unexpected increase of fund. As a result am unexpected increases of payments of the countries that are exporting and importing electricity was registered

.The existence of two separate ITC funds within the same synchronous zone has generated irregularities in the remuneration of the usage of each transmission network in the SEE countries. In order to overcome these irregularities, an Addendum to the 2005 Agreement was signed in September 2005.

After ETSO SC decision to postpone the merger of the two ITC funds (ETSO and SETSO) to 2007, significant efforts have been made by all the parties of SETSO in order to maintain the mechanism functional during 2006. A compromise solution called "50% Edge Country Concept" (average value of calculation with and without Edge Country Concept is amount to be paid in the fund), as well as capping the SEE ITC fund, was adopted and an Agreement for 2006 was signed in March.

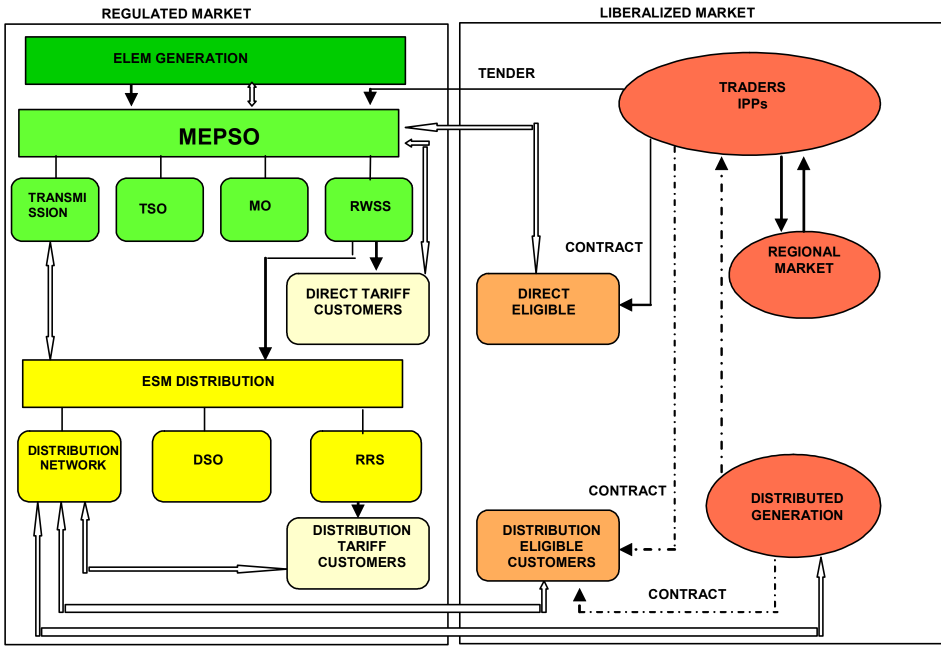
Electricity Market Design

The main objective of the Market Model in Macedonia is to provide sufficient flexibility to interface with market designs considered in the region and fit well in Regional Market and European Internal Market. The Electricity Market Design Plan proposes a gradual approach in market opening in a way which allows the consumers and to the electricity sector as a whole to obtain the highest gains at the minimum risk and at the lowest implementation cost.

The creation of appropriate Electricity Market Design Plan, according to which a transition from vertically integrated utility structure to an open access market structure is achieved primarily on bilateral contracts between suppliers and consumers, required the prior establishment of policy principles and the identification of the main constrains to the development of a competitive electricity market in Macedonia.

The Policy principles which were established are: Consumer Benefit Principle (bring benefit for the consumers by ensuring reliability at appropriate economic costs); Recognition of Assets Principle (identify the attributes, capabilities, and deficiencies of existing assets); Cost Matching Principle (match costs and revenues for all participants in the electricity sector); No-Cross Subsidies Principle (make subsidies explicit and eliminate them where possible); Management of Human Impacts Principle (identify and manage human impacts produced by the reform); Public Service Principle (provide every household consumer with an opportunity to purchase a secure supply of electricity at transparent and reasonable prices); Sustainable Development Principle (favour development employing non-renewable sources in a rational manner and renewable sources in a sustainable manner); and EU Compatibility Principle (comply with relevant EU Directives and Athens Memoranda).

The following figures presents a schematic representation of the selected Market Model:.



The Market Participants and their relationships are shown by Double arrows – double lines represent network services, while single arrow – single lines represent electricity supply flows. Dash – dot lines represent the supply flows which are not available with the initial opening of the market.

The essential attributes of the Market Participants are as follows:

- MEPSO comprises four separate units to perform functions of transmission owner (TRANSMISSION), system operator (TSO), market operator (MO) and regulated wholesale supplier of tariff customers (RWSS). For the foreseeable future, it will be owned by the Government of the Republic of Macedonia. As transmission system owner, MEPSO owns, maintains, operates, and expands the transmission system. As system operator, MEPSO performs power system dispatch, and procure ancillary services under regulated contracts with ELEM. As market operator, MEPSO has responsibility for monitoring regulated wholesale agreements and creating, over time, market opportunities for eligible customers. Finally, as regulated wholesale supplier, MEPSO procures electricity demanded by Tariff Customers on their behalf. MEPSO procures electricity under: i) Regulated Purchase Agreements with ELEM under regulated rates; and ii) unregulated electricity supply agreements, subject to tendering procedure, with other sources (TRADERS, IPPs, other generators, located within or outside the country). MEPSO's procurement function will: i) allocate the benefits of Macedonia's existing generation mix to all Tariff Customers within Macedonia; and ii) help keep wholesale prices at reasonable levels.
- ELEM represents the newly established company AD Macedonian Power Plants, which owns all the generating facilities formerly owned by the vertically integrated utility and which are connected to high voltage grid. It has an obligation to sell all the generation requested by MEPSO to MEPSO under regulated contracts in order to maintain the benefits of depreciated assets for tariff consumers, while providing financial stability for units which may not otherwise survive in competitive markets.

- ESM Distribution comprises four separate units to perform functions of distribution network owner (DISTRIBUTION), Distribution System Operator (DSO), Regulated Retail Supplier of Tariff Customers (RRS) and ESM Distributed Generation. As distribution network owner, ESM Distribution owns all distribution systems, maintains, and expands the distribution systems. As distribution system operator, ESM Distribution operates the distribution systems, and provides distribution services to the future Distribution Eligible Customers, allowing for competition at a distribution level in the further opening of the market. As regulated retail supplier, ESM Distribution procures electricity demanded by Distribution Tariff Customers, under Regulated Purchase Agreements with MEPSO and Distributed Generation. ESM Distributed Generation unit owns, maintains and operates few small generation units formerly owned by vertically integrated utility and connected to the distribution grid.
- Eligible Customers will purchase electricity from other sources, to the extent they choose not to remain Tariff Customers, with balancing and transmission services provided by MEPSO. The initial eligibility threshold is defined as consumption of at list 20 GWh/year for customers directly connected to the transmission network (DIRECT Customers). As further opening of the market occurs at lower voltages or consumption levels, eligible customers will also receive distribution services from ESM Distribution. Further opening of the market will be initiated by a Government Decision and implemented by licensees under Regulator's control.
- Tariff Customers purchase bundled services from ESM Distribution or MEPSO, depending on weather the tariff Customer is Low Voltage or High Voltage. Tariff customers include: i) those not yet permitted to be eligible customers; ii) those potential eligible customers who choose to continue purchasing bundled services; and iii) eligible customers as long as they continue to purchase regulated services, such as transmission and ancillary services, or balancing energy.
- Distributed Generation includes generation units connected to distribution network, which are not owned by ESM Distribution. Distributed Generation sells electricity to ESM Distribution under regulated contracts. With further opening of the market for competition at a distribution level, Distributed Generation will be offered an opportunity to also sell electricity to Eligible Customers and Traders.

5. Other

Link	Company
www.mepso.com.mk	MEPSO – Macedonian Transmission System Operator
www.elem.com.mk	ELEM - Macedonian Power Plants
www.esmak.com.mk	ESM distribution (EVN Macedonia)
www.erc.org.mk	Energy Regulatory Commission of Macedonia
www.economy.gov.mk	Ministry of Economy

FRANCE

1. Basic capacity, generation and consumption data* (year 2005)

Installed capacity by fuel, MW [1]		
	Thermal Conventional	25300
	Hydro	25400
	Thermal Nuclear	63300
	Renewables	1500
	Total	**115500**
Yearly generation fuel by fuel, TWh [2]		
	Thermal Conventional	58.9
	Hydro	56.0
	Thermal Nuclear	430.0
	Renewables	4.3
	Total	**549.2**
Annual consumption, TWh [2]		**482.4**
Imports, TWh [2]		**32.3**
Exports, TWh [2]		**90.9**

[1] ***Values denote brute power at generator mains.***
[2] ***Values denote net energy at substation –i.e., consumption at power stations are netted-.***
(Data are derived from temporary closure of year 2005)

2. Industry structure

2.1 Recent key developments (liberalisation, TSO, unbundling etc.)

Regulations
December, 19 1996 - European directive 96/92/CE regarding common rules for the implementation of the single European Electricity Market.

March, 1 1999 - As from this date, EDF has arranged to open up the market to competition for eligible customers consuming over 100GWh per year and all requests for network access were directed to a single input point, the BART (Office for Transmission System Access)

February, 10 2000 - French Act n° 2000-108 on the modernisation and development of the public electricity service (Official Journal of 11 February 2000).

March, 24 2000 -Order of the Secretary of State for Industry (Official Journal of 30 March 2000), setting up the Electricity Regulation Commission (CRE). The main task of this independent administrative authority is to monitor the electricity market and to verify the absence of discrimination, cross subsidies or constraints on competition.

May, 2 2000 -French Decree n° 2000-381 on the organisation and the functioning of the Electricity Regulation commission (CRE) (Official Journal 4 Mai 2000)

May, 30 2000 -French Decree n° 2000-456 on the eligibility of electricity consumers reducing the eligibility level from 100GWh/year to 16GWh/year

July, 1 2000 - Creation of the single French Transmission System Operator RTE (approved by the French Electricity Regulation Commission), which legally remained within the EDF group but unbundled from

EDF on managerial, financial and technical issues (recommendation of the CRE dated 12 July 2000) in order to ensure transparency and a fair competition on the French market.

August, 31 2000 - A Notice listing eligible consumers for 2000 published in the Official Journal. This list will be completed on 24 November 2000.

October 2000 - The CRE reports on the introduction of a balancing market and a spot market for the electricity in France.

November 2000 - publication of the « trading » decree N°2000-1069 on the purchase of electricity for resale to eligible customers.

November, 14, 2000 - the CRE approves the « balance responsible contract » proposed by RTE.

December 14, 2000 - Decision of the French electricity regulatory commission, regarding the creation of a non-mandatory power exchange on the French hub.

August 14, 2001 - French legal Statement authorising the indirect participation of EDF/RTE in Powernext through a joint venture with other European TSOs (HGRT).

September 20, 2001-Decision of the French Electricity Regulation Commission, regarding the market code for Powernext.

November 26, 2001, first day of quotation at Powernext.

January 23, 2003 - the French Electricity Regulation Commission issues a decree approving the rules of the balancing mechanism (which begins operations on April 2003) in accordance to Article 15 of the French Act n° 2000-108 dated February 10, 2000 on the modernisation and development of the public electricity service (Official Journal of February 11, 2000), modified by the French act dated January 3, 2003, (Official Journal of January 4, 2003),

February 5, 2003 -French Decree n° 2003-100 on the eligibility of electricity consumers. As from this dare the eligibility level in France reduced from 16GWh/year to 7GWh/year. In addition, , municipal distribution companies also become eligible.

June 26, 2003- new EU Directive 2003/54/CE amending the EU Directive 96/92/CE and dealing with market opening, unbundling issues, regulatory issues, regulated TPA issues, and public service obligations.

December 24, 2003-Communication of the French electricity regulatory Commission toward the implementation of the new EU Directive 2003/54/CE in France by July 1, 2004.

July 1st, 2004- All professional customers become eligible representing 70% of the French market. Full Market opening to be accomplished by 1 July 2007.

August 9, 2004- French Act 2004-803 (Official Journal of August 11, 2004) amending French Act of February 10, 2000 and enforcing the new EUDirective 2003/54/CE. As a result, EDF becomes a joint stock company and RTE is foreseen as a separate legal entity, subsidiary of EDF with an independent management

April 4, 2005 - The first development plan for the public electricity transmission system (2003-2013) is approved by the Minister of Industry.

August 31, 2005 - Governmental decree published on the Official Journal approving the RTE articles of association.

September 1, 2005 - RTE becomes a limited liability company with an Executive Board and a supervisory board. "RTE-EDF Transport" is the official legal name of the new corporation which may go on operating under the commercial name of RTE.

December 1, 2005 - The CRE decision, referring to the decision of the European Court of Justice on 7 June 2005, puts an end to a system that granted transactions under long term contracts for priority access to interconnections

January 1, 2006 - All capacity allocations on interconnections with EU countries are based on market mechanism and done via a bidding system.

2.2 Key actors

TSO

The single French Transmission System Operator RTE (8300 employees) is responsible for the operation and maintenance of the French EHV and HV networks between 400kV and 63kV.

To fulfil this task RTE is organised into four divisions:

The Power System Division which includes,

The National Control Centre (CNES) managing power flows on the 400kV network, real time nation wide balance between generation and demand, access to the system by European players.

Seven Regional Control Centres (CRES) managing power flows on the 225kV & HV networks as well as transmission system access by customers and market players based in France. They are also responsible for customer relations and for system development and renewal.

The National Information Engineering Centre (CNII) dealing with RTE information system engineering and the operational management of projects in this field.

The Power Transmission Division which includes,

The National Transmission Expertise Centre in charge of engineering activities policies and methods related to transmission system operation and development

Seven regional transmission units dealing with the construction, operation and maintenance of transmission system structures

The Economics and Finance Division in charge of establishing RTE's economic and financial policy It is also in charge of its accounting and financial management and for RTE management control and statistics.

The Human Resources Division managing RTE's human resources policy

The Legal Department, managing RTE's legal affairs with regard to competition law. this division is also managing RTE's real estate policy.

The General Secretary managing**, the Audit Mission, the Quality Mission, the Security & Confidentiality Mission and** reporting directly to RTE's Chief Executive Officer, so as do **the Communication and External Relation Department**

The Information System Department reporting directly to the Director of the Power System Division**,**

The International Affairs Department managing the subsidiary of RTE **"RTE International"** in charge of international consulting activities and reporting directly to the Director of the Economics and Finance Division of RTE

Main generators (incl. IPPs)

The four main generating companies in France are:

Electricité de France (EDF)

Turnover 34400M€, installed capacity-102GW, generation-482TWh, employees-117000,

Energie du Rhône (former CNR)
Turnover 459 M€, installed capacity-3GW, generation-12,5TWh, employees 1060,

Société Nationale d'Electricité et de Thermique (SNET)
Turnover 810M€, installed capacity-2,5GW, generation-8,7TWh, employees-1074,

Société Hydroélectrique du Midi (SHEM)
Turnover 75M€, installed capacity-0,8GW, generation-2 TWh, employees-220,

Electrabel (Suez Group) direct via 25% in Chooz B1 &B2 (750MW), 14% in Tricastin (458MW),

Virtual Power Plants (14-45TWh/year) under the cover of Powernext, acting in this case as a broker on the OTC market.

Number of distributors

Historical background: Based on the French Act of 15 June 1906, the public distribution of electricity has been placed under the responsibility of local territorial administrations (councils, regions, or public joint ventures). The management of these local public utilities has been either given to a public operator (today EDF for 93% of the local councils) or are managed directly by the local councils through communal subsidiaries, which may work together within syndicates.

Beside EDF, **Electricité de France (EDF)**
Turnover electricity-34400M€, sales in distribution-~316 TWh, employees-117000 [80000 in the distribution sector], customers-31000000

There are in France 22 municipal distribution companies. The 4 main distributors are:

Electricité de Strasbourg (ES)
Turnover electricity-~415M €, sales electricity ~6 TWh, employees-1363, customers-435000 living in 376 communal entities

Gaz et Electricité de Grenoble (GEG)
Turnover electricity-59M€, sales electricity -8 TWh, employees-448

Usine d'Electricité de Metz (UEM)
Turnover electricity-135M€, sales electricity ~1,7TWh, employees-500, customers-140000,

Vialis (Colmar)
Turnover electricity-53M€, sales electricity –0,4TWh, employees-259, customers-36650,

Main traders & other players (exchanges etc.)
The other actors selling to eligible customers on the French market are:

Energie du Rhône- sales on the French market outside EDF-1,5TWh
RWE PLUS sales on the French market –1TWh
ENDESA France sales on the French market- 0,6TWh
Electrabel (via SHEM) sales on the French Market 2TWh
CNR (Main shareholder Electrabel 49,97%)-sales on the French Market 12,5TWh
SNET (Main share holder Endesa 65%)-sales on the French market 8,7TWh
Total (via Gas and Power North Europe)-sales on the French market 9,5TWh
HEW (now Vattenfall Europe)-sales on the French market 3TWh

The eligible customers are not allowed to trade on Powernext

On November 1st 2006, the 52 registered members on Powernext are

AARE-TESSIN LIMITED FOR ELECTRICITY (ATEL)
ABLY CARBON SAS
ACCORD ENERGY LIMITED
AEM TRADING Srl
ATEL TRADING AG
BARCLAYS BANK Plc
BGC INTERNATIONAL
BKW FMB ENERGIE SA
BNP PARIBAS
BP GAS MARKETING LIMITED
CALYON
CARBON CAPITAL MARKETS
CARGILL INTERNATIONAL SA
CENTRICA ENERGIA S.L.U.
CEZ, a.s.
CLIMATE CHANGE MARKETS LIMITED
CLIMATE CORPORATION EMISSIONS TRADING GmbH
COMPAGNIE DE CHAUFFAGE INTERCOMMUNALE DE L'AGGLOMERATION GRENOBLOISE
COMPAGNIE NATIONALE DU RHÔNE
CONSUS FRANCE SARL
CONSUS sp. z.o.o.
DANSKE COMMODITIES A/S
DELTA ENERGY BV
DERIWATT AG
DUBUS SA
E.ON SALES & TRADING GmbH
ECOPROGRESSO SA
ECO-WAY SRL
EDF TRADING LIMITED
EDISON TRADING S.p.A.
EDP ENERGIAS DE PORTUGAL SA
ELECTRABEL SA
ELECTRICITE DE STRASBOURG
ELEKTRIZITÄTS-GESELLSCHAFT LAUFENBURG (EGL)
EnBW TRADING GmbH
ENDESA GENERACION SA
ENDESA TRADING SA
ENECO ENERGY TRADE B.V.
ENEL TRADE S.p.A.
ENERG.IT
ENERGIE OUEST SUISSE SA (EOS)
ENIPOWER S.p.A.
ESSENT ENERGIE TRADING B.V.
FIRST HYDRO COMPANY
FORTIS BANK SA - NV
GAS NATURAL SDG SA
GASELYS
GREENSTREAM NETWORK LTD
HEMLOCK (LUX) SARL
IBERDROLA GENERACION SAU
IMC TRADING BV
ITALCEMENTI SPA
J. ARON & COMPANY

KALIBRA XE FRANCE
MAN FINANCIAL LTD.
MARCEAU TRADE SAS
MERRILL LYNCH COMMODITIES (EUROPE) LIMITED
MERRILL LYNCH COMMODITIES GmbH
MORGAN STANLEY & CO. INTERNATIONAL LIMITED.
MORGAN STANLEY CAPITAL GROUP INC.
NORDOSTSCHWEIZERISCHE KRAFTWERKE AG (NOK)
NORSK HYDRO ENERGIE AS
NUON ENERGY TRADE WHOLESALE N.V.
ORBEO SAS
ÖSTERREICHISCHE ELEKTRIZITÄTSWIRTSCHAFTS-AG (VERBUND)
PETRO CARBO CHEM GmbH
PETUM s.r.o.
POWEO
PRAVDA CAPITAL s.r.o.
RWE TRADING GmbH
SAGACARBON
SEMPRA ENERGY EUROPE LIMITED
SHELL ENERGY TRADING LTD
SHELL TRADING INTERNATIONAL LTD.
SIET SpA
SNET
SOCIETE GENERALE SA
SPE SA
STATKRAFT MARKETS GmbH
STX SERVICES (WALLICH & MATTHES BV)
TOTAL GAS AND POWER LIMITED
TOTSA TOTAL OIL TRADING SA
TRAFIGURA ELECTRICITY ITALIA S.p.a.
UNION FENOSA GENERACION SA
USINE D'ELECTRICITÉ DE METZ
VATTENFALL TRADING SERVICES GmbH
VEETRA (filiale de Dalkia, division Energie de VEOLIA Environnement)
VELCAN ENERGY
VICAT
VOLTALIA

3. Transmission network and system issues

Existing Interconnections (To Country, Type AC/DC, Voltage, Capacity);

FROM	TO	U [kV]	Cap* [MVA]
France	**United Kingdom**		
Mandarins	Sellindge	4*270 DC	2000
France	**Spain**		
Errondenia	*Irún*	*1*132*	*111*
Mouguerre	Arkale	1*220	290
Cantegrit	Hernani	1*400	1,110
Pragnéres	Biescas II	1*220	270
Lac D'Oo	*Benós*	*1*110*	*95*
Baixas	Vic	1*400	1,530
France	**Switzerland/Italy**		
Manbelin	Basse court (CH)	1*400	
Génissiat	Romanel(CH)	2*400	
Sierentz	Basse court (CH)	1*400	

Sierentz	Laufenbourg (CH)	1*400	
Sierentz	Asfart (CH)	1*400	
Génissiat	Verbois(CH)	2*225	
Cornier	Riddes (CH)	2*225	
Pressy	La Batiaz(CH)	1*225	
Albertville	Rondissonne (I)	2*400	
Praz-St André	Venaus (I)	1*400	
Trinité Victor	Camporosso (I)	1*225	
France	**Germany**		
Vigy	Uchtelfangen	2*400	
Mulhbach	Eichstten	1*400	
Sierentz	Kuhmos	1*400	
Vogelgrun	Eichstten	1*225	
Emile Huchet	Ensdorf	1*225	
France	**Belgium**		
Avelin	Avelgem	1*400	+1*400 in 2005
Lony	Achene	1*400	
Chooz	Jamiolle	1*225	
Mt-Saint-Martin	Aubange	1*225	

Following a European decision related to the capacity allocation on interconnections, the former priority given to long term contract was abolished on January 1, 2006 on all cross-border lines connecting France to the other EU countries (Switzerland excluded). The whole capacity allocation has been based since that date on market mechanisms,

This concerns the management of the following interconnections FR/SP, FR/I, F/B, F/UK, F/D,

The related auctions may be annual, monthly or daily
These auctions may be implicit or explicit
These auctions may be for imports, exports or both
These auctions may be coordinated between TSOs or unilateral
The related income is shared between the concerned TSOs

The capacities which have not been allocated on an annual base (optional) are available on a semester basis (optional), on a monthly basis and finally on a daily basis with the use of the total unused capacities (available capacities after the periodical auctions plus reserved but unused capacities based on the principle “Use it or loose it”)

On the F/GB interconnection (IFA) the auctions are open and based on a “pay as bid system”.
For the monthly, quarterly, semestrial and annual allocations, the capacities are awarded when the bids are stable for 2’ (no additional upward bid). Players are then paying what they have been bidding for.

The other auctions are closed and always based on the marginal bidding price and not on a “pay as bid” system.

If a capacity allocated on a monthly basis has to be reduced because of real time constrains, the concerned player is being reimbursed 110% of the price he has paid for this capacity.

<u>Case FR/SP</u>
Closed monthly explicit auctions (+ daily auctions from 31/01/2006)

<u>Case FR/D (RWE,EnBW)</u>
Closed monthly and daily explicit auctions
Each TSO deals with its exports

<u>Case FR/B</u>
Closed monthly and daily explicit auctions
Capacity allocation by RTE in agreement with ELIA

<u>Case FR/I</u>
Monthly auctions by each TSO on 50% of the capacities from France to Italy RTE. As regards the capacities from Italy to France, since there is no constrain there is no capacity allocation mechanism.

-Future Evolutions
A « market coupling » between F/B/NL (thus between Powernext, Belpex and APX) should be implemented. Through this mechanism, the explicit auctions will become implicit. The congestion costs on interconnections are given by the price differences between the concerned markets.

4. Electricity market structure

<u>Structure of the electricity market</u>

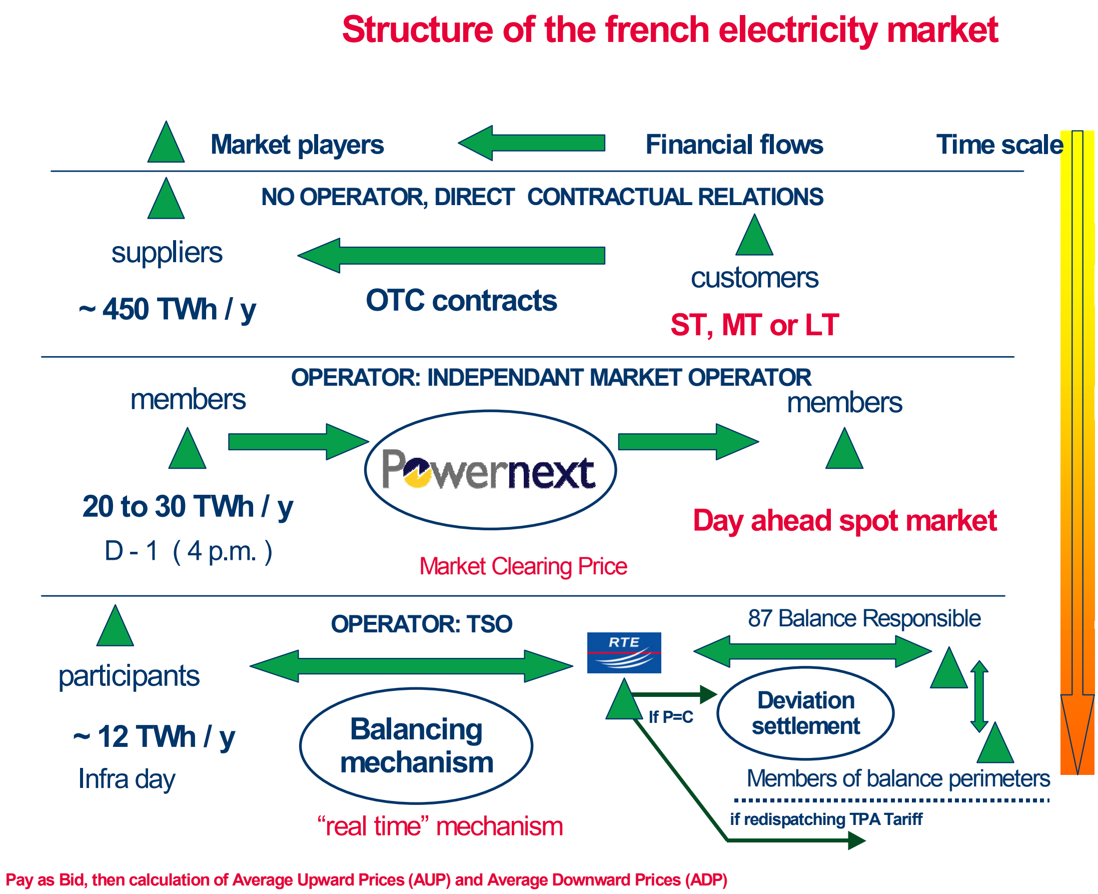


Figure: Structure of the Electricity Market

A market player has to belong to a balance perimeter. The global declared energy balance of a perimeter has to be zero. The balance responsible is financially liable for the settlement of unbalances

The 87 balance responsibility entities through the balance responsibility contract are paying ex-post the measured unbalances of their balance perimeter

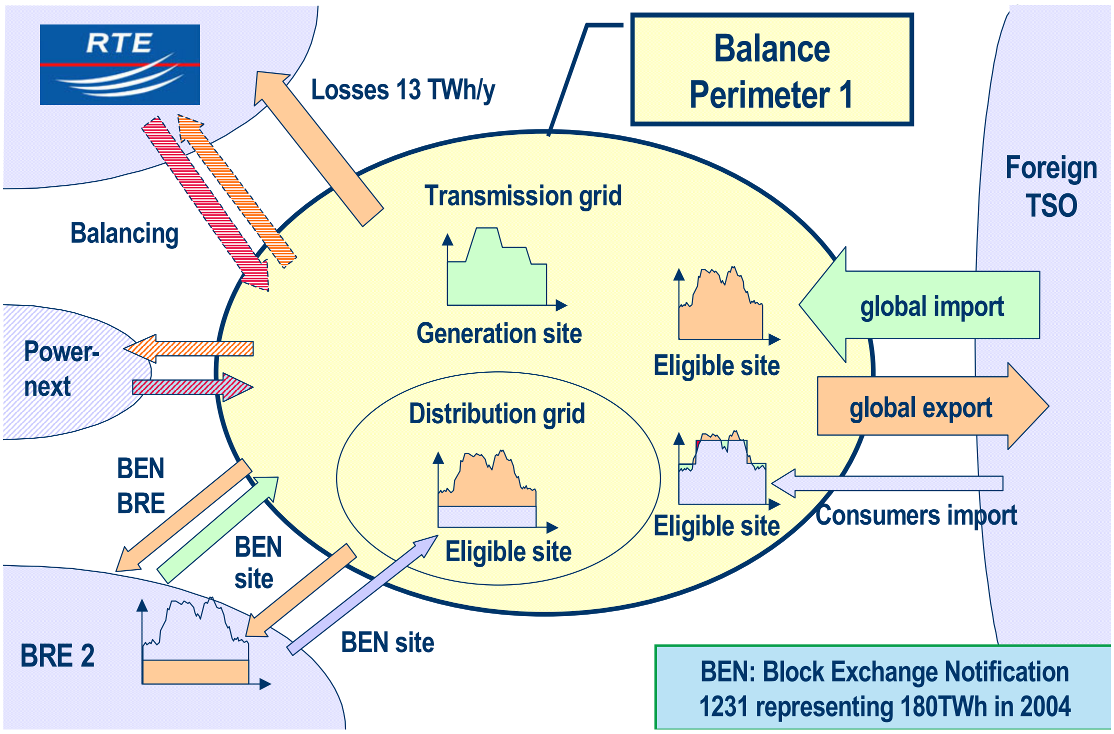
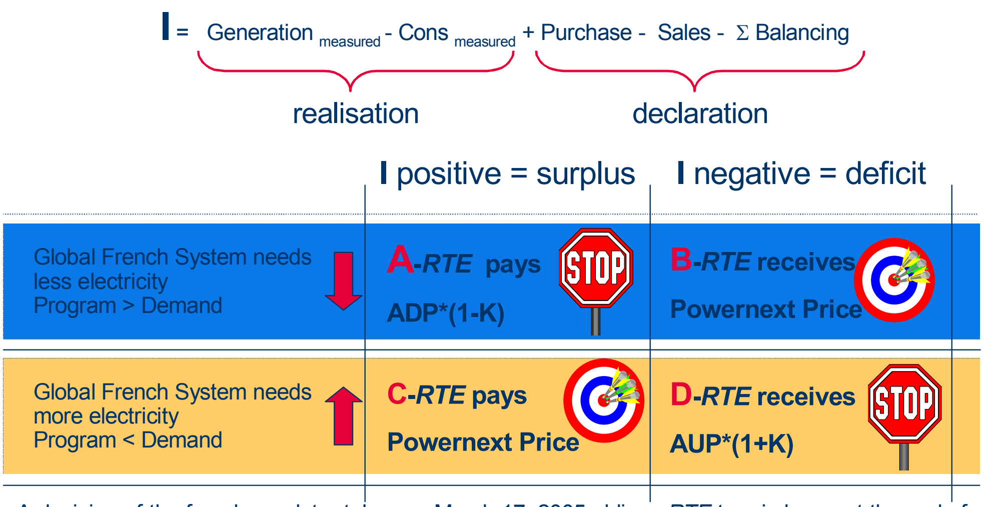


Figure: Structure of the Electricity Market from Balancing Perspective

Deviations in balance perimeters are settled ex-post between RTE and balance responsibilities.

The ex-post deviation settlement
For a given Balance perimeter



A decision of the french regulator taken on March 17, 2005 obliges *RTE* to reimburse at the end of the year to the balance responsible the credit balance of the global yearly consolidated balancing account .

Till 31/03/2005 K=0,18
From 01/04/2005 K=0,15
From 01/01/2006 K=0,05

Figure3: The deviation settlement price

The prices indicated in this figure are calculated every 1/2hour and depend on the real time load evolution and on 3 price references:

The Powernext day ahead market clearing price for the concerned ½ hour

The Calculated average price of upward bids on the balancing mechanism for the concerned ½ hour (AUP)

The calculated average price of downward bids on the balancing mechanism for the concerned ½ hour (ADP)

Financial and Energy Flows

The following figure shows the energy flows (in red and always through RTE), the financial flows (in green –direct between suppliers and customers when they concern OTC contracts or Powernext,- through RTE in all other cases). Financial flows are referring either to energy supply or to transmission services.

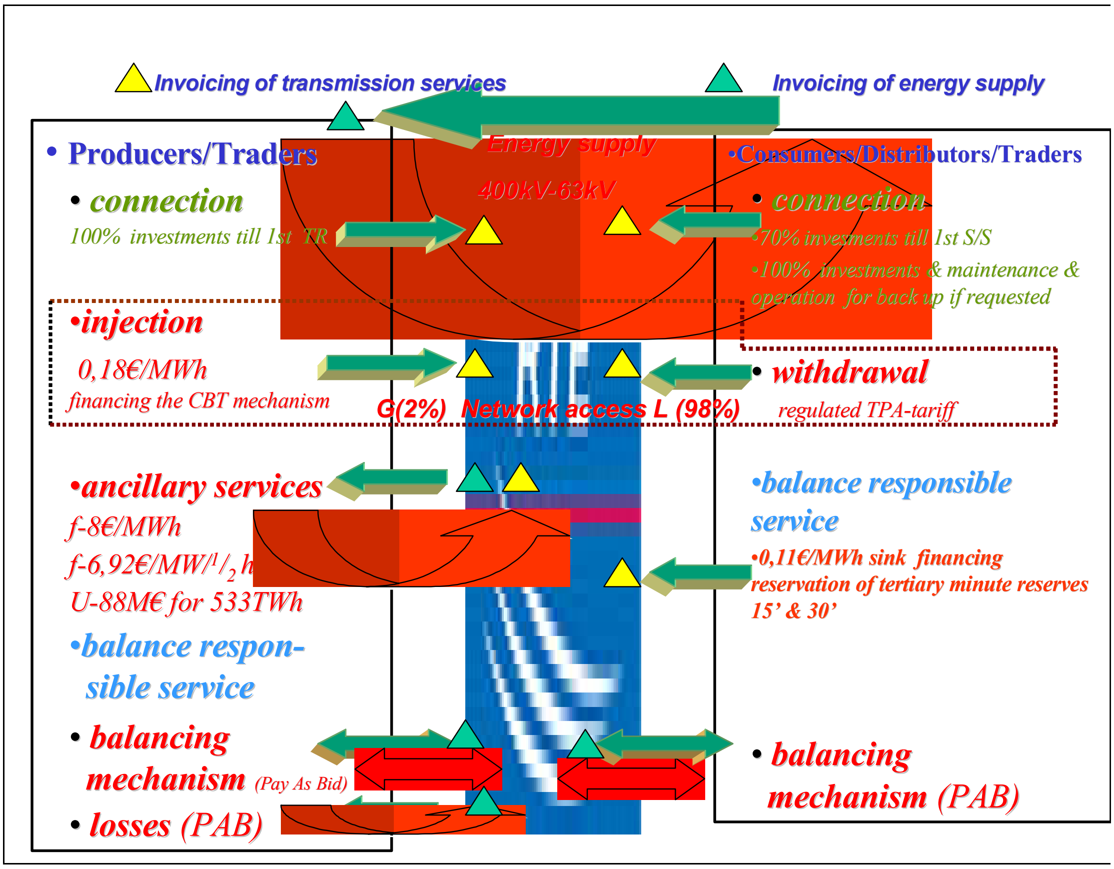


Figure: The Financial and Energy Flows on the French Electricity Market

Financial and Energy Flows – the case of distribution (below 63 kV)

There are several networks operators (GRDs). EDF-GRD is the main one.

An eligible customer connected at a voltage below 63kV may either contract directly with the GRD (option 1) or give a mandate to its supplier to deal with the grid operator (option 2).

As a consequence (in the case of option 2) the supplier may collect from its customer the network access fees on behalf of the GRD and repay the GRD. In this case there is one network access contract between the supplier and the GRD and one global contract (electricity supply + network access) between the supplier and the eligible customer.

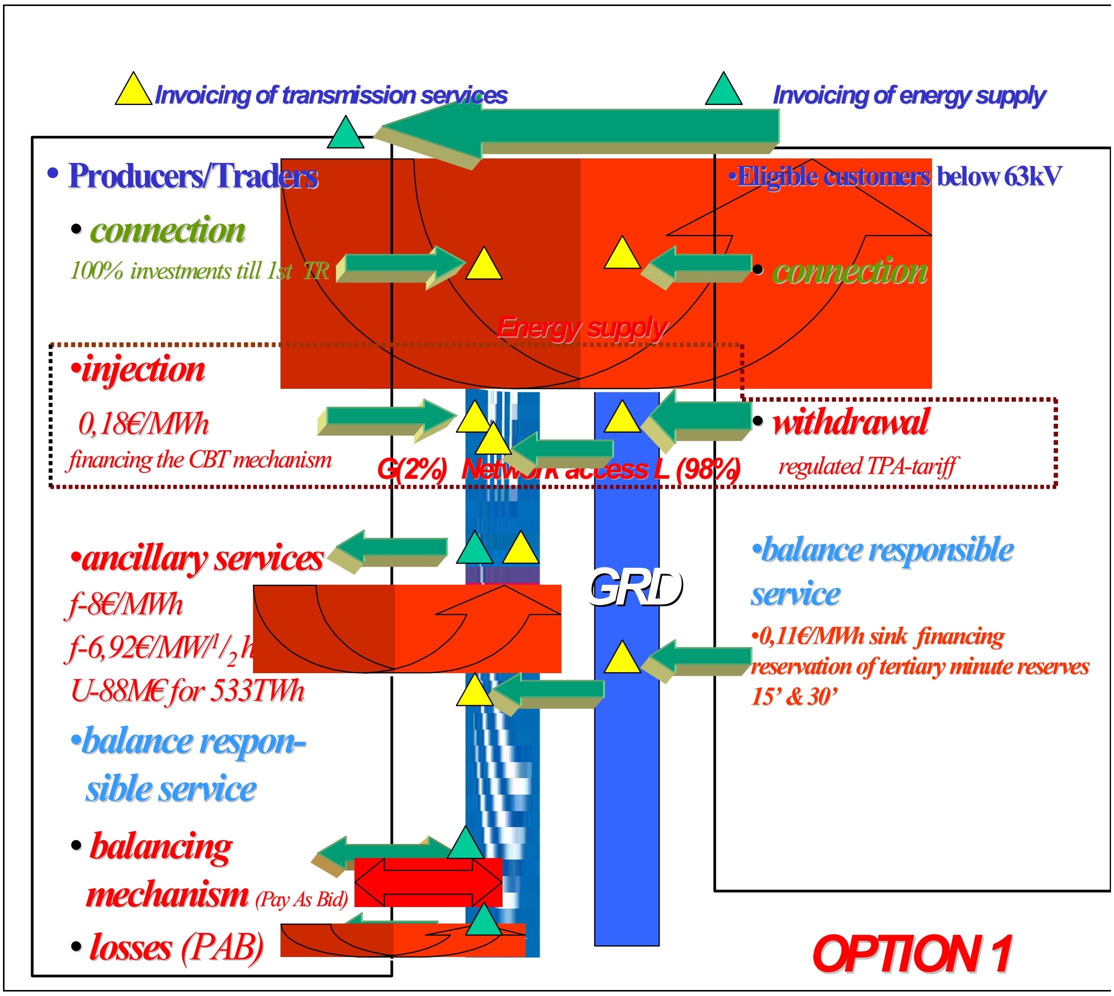


Figure: Financial and Energy Flows – the case of distribution (Option 1)

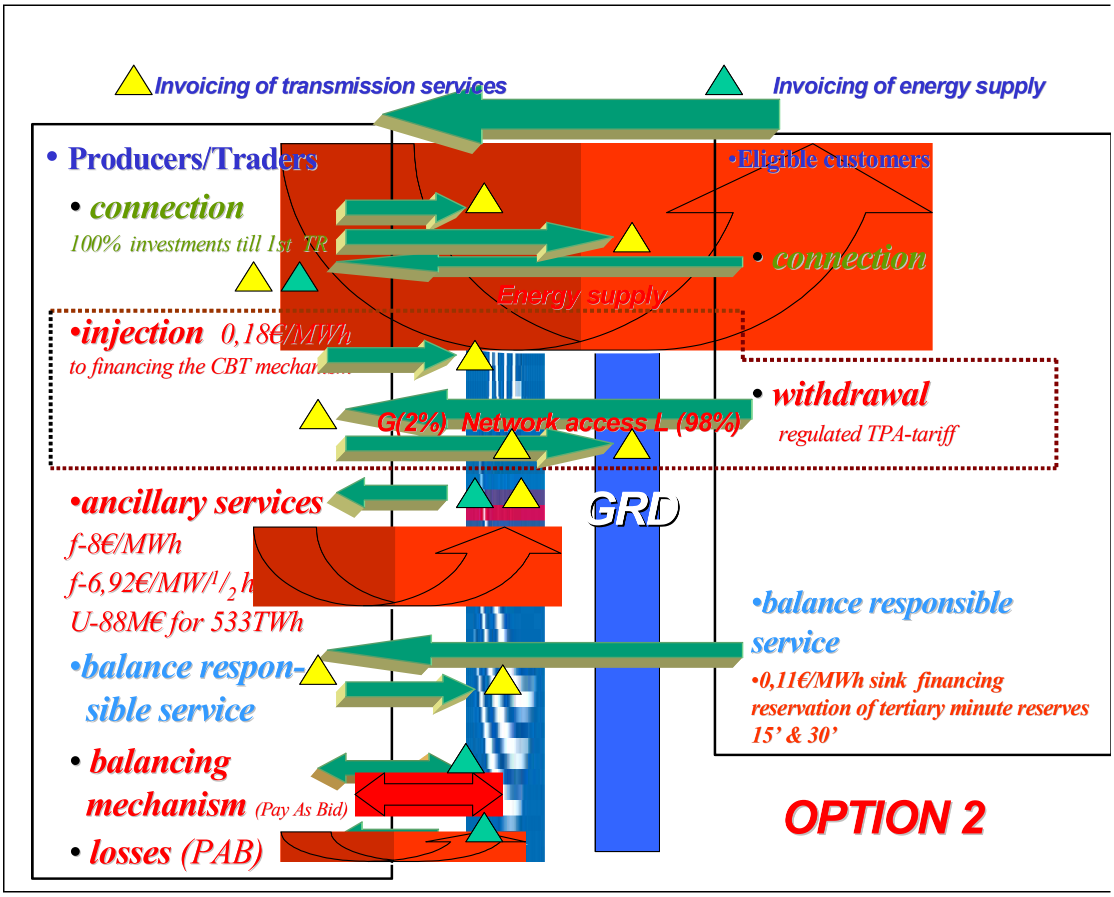


Figure: Financial and Energy Flows – the case of distribution (Option 2)

5. Other

Web sites and other contact information at national level, where further information can be found

Link	Company
http://www.ademe.fr/	**ADEME** (Agence pour le développement et la maîtrise de l'énergie)
http://www.cnr.tm.fr/	**CNR** (Compagnie Nationale du Rhône, liée à Electrabel)
http://www.cre.fr/	**CRE** (Commission de régulation de l'électricité)
http://www.edf.fr/	**EDF** (Électricité de France)
http://www.energiedurhone.fr	**EDR** (Énergie du Rhône)
http://www.electricite-strasbourg.fr	**EDS** (Électricité de Strasbourg)
http://www.energie-plus.fr	**Énergie Plus** (actualité sur l'énergie et l'environnement)
http://www.deroyer.fr/anroc/DataHtml/Organism/FNCCR.htm	**FNCCR** (Fédération nationale des collectivités concédantes et régies)
http://www.geg-grenoble.fr	**GEG** (Gaz et Electricité de Grenoble)
http://www.industrie.gouv.fr/accueil.htm	**Ministère de l'Industrie**
http://www.rte-france.com/	**RTE** (Réseau de transport d'électricité)
http://www.ferroviaire.f-g.fr/attente/act_shem.htm	**SHEM** (Société hydroélectrique du Midi, groupe SNCF)
http://www.snet-electricite.fr/	**SNET** (Société nationale d'électricité et de thermique, groupe Endesa)
http://www.uem-metz.fr/	**UEM** (Usine d'Électricité de Metz)
http://www.vialis.tm.fr	**Vialis** (Régie Municipale de Colmar)

GERMANY

1. Basic capacity, generation and consumption data (year 2005)

Installed capacity by fuel, MW (net) – Overall Supply		
	Thermal	80499
	Hydro (incl. pumping storage)	10390
	Nuclear	20343
	Renewables (excl. water)	21033
	Total	**132265**
Yearly generation fuel by fuel, TWh (net) Overall Supply		
	Thermal	358.9
	Hydro (incl. pumping storage)	27.7
	Nuclear	154.6
	Renewables (excl. water)	40.1
	Total*)	**581.3**
Annual consumption, TWh		**563.6**
Imports, TWh		**53.4**
Exports, TWh		**61.9**

*) *including network losses, but excluding the electrical energy consumed by the pumps of pumping storage stations.*

Source: VDEW, VDN

2. Industry structure

2.1. Recent key developments

- Liberalisation of the German electricity market has reached 100%. (Law dated April 25th, 1998)
- Legal unbundling of TSOs is implemented. Legal/management separation or accounting unbundling of DSO is nearly completed, where legally provided.
- On 13 July 2005, the former regulatory authority for telecommunications and postal services (RegTP) was renamed to Federal Network Agency (BNetzA). The regulatory authority under the guiding responsibility of the Federal Ministry of Economics and Technology (BMWi) is now responsible for representing the interest of market participants in the fields of electricity, gas, telecommunications, postal services and railways.

2.2 Main actors

Transmission system operator

4 German Transmission System Operators bear responsibility for their control areas and the German system (EnBW Transportnetz AG, E.ON Netz GmbH, RWE Transportnetz Strom GmbH, Vattenfall Europe Transmission GmbH).

Main generators

Main generating companies are RWE, E.ON, Vattenfall and EnBW. A growing number of IPPs enter into the German market.

Distributors

In Germany, there exist more than 900 Distribution System Operators.

Main traders & other players

Citiworks, E.ON Sales & Trading, EDF Trading, Electrabel Deutschland, EnBW Ges. für Stromhandel, Endesa Trading, Enercity Trade, EOS Avenis, GETEC Energie, MVV Energiehandel, NUON Energy Trade & Wholesale, RWE Trading, Trianel European Energy Trading, Vattenfall Trading Services

2.3 Main events

Due to temporary high load flows from North to South (strong feed in of wind energy in Northern/Eastern-Germany and high demand in the South of Europe), topology and re-dispatching measures (changes of power plant scheduling) have been implemented to comply with the n-1 criterion in the transmission grid.

3. Transmission network and system issues

3.1 Status of international interconnections

Existing interconnections
Existing interconnections (between countries, type AC/DC, voltage, capacity) are listed in the attached file as well as a figure of the German interconnected power system.

Ongoing studies in international/cross-border interconnections
Denmark – Germany interconnector: there are ongoing planning activities concerning higher transport capacity (e. g. with a new interconnector Kassö – Audorf). As a part of these activities, a joint study is currently being carried out by energinet.dk and E.ON Netz. The study elaborates and evaluates short-term measures to increase transfer capacity between the two grids.

Netherlands – Germany interconnector: feasibility Study on the possibilities for increasing the NTC-values.

Poland – Germany interconnector: there are ongoing planning activities. Both TSOs are studying possibilities for increasing the NTC-values.

Czech Republic – Germany interconnector: There are ongoing planning activities concerning a new interconnector between Czech Republic and Germany (Vitkov/CZ-Mechlenreuth or CZ – Pleinting). A first feasibility study of an additional 380-kV interconnection between Vitkov/CZ-Mechlenreuth was carried out. A more detailed common feasibility study by CEPS and E.ON Netz with involvement of VE-T is planned to start in October 2006.

Austria – Germany: there are ongoing planning activities concerning a replacement of the existing 220-kV-interconnector Altheim-St. Peter (AT) by a new 380-kV-interconnector St. Peter (AT) – Isar (DE) to increase the transport capacity between APG (A) and E.ON Netz (DE).

UCTE-IPS/UPS: Collaboration and data provision for the Feasibility Study. Synchronous Interconnection of the Power Systems of IPS/UPS with UCTE carried out jointly by UCTE and IPS/UPS under the responsibility of UCTE.

UCTE-Turkey: Collaboration and data provision for the UCTE Interconnection Study analysing the future synchronous interconnection of Turkey with the UCTE power system. The study is performed by UCTE.

Lines under construction or in authorisation process (internal and cross-border)

Route	Distance (km)	Type of work and Technical Information	In operation
Hamburg/Krümmel (DE) – Schwerin (DE) line	75	New OHL	2007
Halle/Saale (DE) – Schweinfurth (DE) line	210	New OHL + upgrading of existing OHL	2008/15
Hamburg Nord (DE) – Dollern (DE)	45	New 380-kV OHL	2010
Ganderkesee (DE) – Wehrendorf (DE)	80	New 380-kV OHL	2010

Study needs
The increasing construction of (particularly off-shore) wind power plants entails study needs relating to system technology and operational aspects.

Therefore, a general study (the "dena study") has been finalised in 2005. This study investigated the effect of an increased wind power production on the networks and conventional power plants until 2020. A second part of this study may be launched in 2006/07.

TSOs repeatedly addressed in recent years the necessity of a thorough examination of RES – and especially wind power- integration on European level. ETSO and UCTE launched the European Wind Integration Study (EWIS). A Consortium of 16 Transmission System Operators (TSO) from 14 countries, representing the four main synchronous electricity systems in Europe, will provide a specific support. External stakeholders will also be invited to join an Advisory Board based in the needs of the study and the respective commitments about an active participation .

The overarching goal of the present study project is to address especially the network issues arising from large scale wind power plants, particularly relevant to European TSOs and to make proposals for a generic and harmonized European-wide approach towards wind energy issues. The scope of the work covers all technical, operational and market / regulatory aspects related to the integration of wind power in Europe at a large scale. The final objective is to set up a model for the integration of the capacities of RES, and more specifically wind power within Europe, as forecasted in different scenarios to be covered by the study. The short term objective (2008) is to bring solutions to the problems identified in each synchronous power system. For long term goal is to bring common pan-European recommendations in order to avoid that the present concerns appear in other Europeans areas when wind power is introduced at a larger scale.

3.2 Network development plan

The TSO plans the development of its network in such a way to have at its disposal a transmission system which is adequately dimensioned for the projected transmission tasks, and which allows for secure and reliable system management and economical system usage at an adequate quality of supply.

The system reserve shall be dimensioned in accordance with the (n-1) criterion. Owing to forecasting uncertainties, observance of the defined minimum requirements at the planning stage is essential.

The TSO will draw up economic network plans on the basis of the current load and generation situation and the projected development of the facilities which are already connected or will be connected in the foreseeable future. Congestion occurring at short notice as a result of changing loop flows and transits cannot be taken into consideration in the network development planning.

The TSO will be responsible for initiating the public approval procedures required for the development of his network, and for launching the construction tasks upon the granting of approval.

4. Electricity market structure

Market situation
The German open energy market is the largest and most fluid market in Europe driven by competitive forces. In comparison to other EU Member States, the electricity market in Germany functions quite well[2].

Initially deregulation brought many new competitors into the market, which offered new products and services mostly at extremely low prices. The players being already in th market reacted to this situation with more attractive electricity payment scales and an improved customer service.

2 *Energy Sector Inquiry (Draft Preliminary Report), European Commission, 28 February 2006 – Chapter C (I3 and II1)*

In addition, for the first time the customer was placed to the centre stage of the corporate strategic planning.

Competition has caused companies to think in a more economic manner , which has allowed to increase efficiency and reduce costs. As far as possible, these cost savings have been passed on to the customers.

Electricity prices have dropped sharply since the market was opened up. Since the beginning of the deregulation, competition has led to powerful cuts in prices – accounting for up to 20% reductions in private customer bills and up to 40% for industrial customers. Unfortunately, however, the state has grabbed the gains our customers should have enjoyed from deregulation by radically increasing taxes and other charges.

At least two third of these can be allocated to the eco-tax and the concession fee. Additionally, the support for renewable energy increases the energy price and the support for cogeneration increases the network charges.

Company merging

The deregulation of the energy market was a catalyst, which set the process of concentration in motion. Driven by the unrestricted access to the networks and the lifting of local distribution limitations, the corporate trading situation in the energy industry has seen a radical and dynamic change.

Since 1998, two hundred new suppliers have come into the German market, many from abroad. The number of market players has increased particularly in the electricity sales and energy trading sectors.

Political aspects

On 13 July 2005, the former German RegTP (regulatory authority for telecommunications and postal services) was renamed to Federal Network Agency. The regulatory authority under the guiding responsibility of the Federal Ministry of Economics and Technology is now responsible for representing the interests of competitors and customers in the fields of electricity, gas, telecommunications, postal services and railways.

In the field of electricity, the BNetzA ensures that all market participants comply with the new German Energy Industry Act, which was implemented in July 2005 and its corresponding regulations. Focus is also put on undistorted competition in the electricity market and on the control of network charges. It ensures non-discriminatory access to electricity networks and controls the adequacy of use-of-system charges.

In relation to this issue, the German electricity system operators were required to deliver an application for their network fees to be checked and approved ex ante by the BNetzA - for the first time in October 2005. Another central issue of the Agency will be the conceptualisation of an incentive regulation of revenues to be implemented by 2009.

An important subject that concerns the entire German industry is the question of wind energy subsidies. However, as regards the planned expansion of wind energy – where for instance in Germany the plans are for capacity to increase from 18,400 megawatts at the end of 2005 to ca. 25,000 megawatts by 2010 – this area needs to be adjusted on a political level.

The long term effect of increasing electricity infeed wind mills was analysed in depth in the “dena study”.

Except for the subsidies for renewable energies, the German system operators are also facing difficulties resulting from the integration of wind energy and new conventional power plants. At the moment, 30 thermal power plants with an installed generation capacity of about 26 GW are projected or in process of construction. To ensure system stability and to contribute to develop competition in the German electricity markets, the 4 German TSO have spent 643 billion Euros in their grids in 2005 – an increasing amount compared to those of the last three years. Moreover, further investments of up to hundred million Euros will be required over the next ten years for the expansion of the network, such as transmission networks.

Another important area is the upcoming emissions trading issue. During the forthcoming shaping of the emission certificate trading in the so-called "National Allocation Plan", e climate protection efforts must be individually recognised in as so-called "early actions". This will ensure fair play and equal treatment.

However, the German market is going through a natural maturing process, previously observed in the Nordic market. The future shape of the market will be strongly dependent on the underlying political framework in Germany and the EU. Here the political forces must take up the challenge. Clear political decisions have to be made as this uncertain political framework has a disastrous effect on the ability to make long-term plans for the companies´ business.

The rapid development of the market has caused changes in the legal situation ("EC Regulations", UCTE-MLA, "German Energy Industry Act"). Considering this new legal framework into account, the "Transmission Code 2003" and the "Distribution Code 2003" are currently revised by the Association of the German Network Operators.

5. Other

Link	Company
www.vdn-berlin.de	Verband der Netzbetreiber – VDN – e.V. beim VDEW
www.strom.de	Verband der Elektrizitätswirtschaft – VDEW – e.V.
www.ucte.org	Union for the Co-ordination of Transmission of Electricity (UCTE)
www.etso-net.org	European Transmission System Operators
www.enbw.com	Energie Baden Württemberg AG EnBW Transportnetz Strom AG
www.eon-energie.com www.eon-netz.com	EON Energie AG E.ON Netz GmbH
www.rwe.com www.rwetransportnetzstrom.com	RWE AG RWE Transportnetz Strom GmbH
www.vattenfall.de www.vattenfall.de/transmission	Vattenfall Europe AG Vattenfall Europe Transmission GmbH

			Connection between						Voltage of the circuit		Conventional (thermal)* Transmission capacity (TC)		Limited by the transformers or the substations			
			From substation			To substation							of circuits		of lines	
Frontier-Point	Line	Circuit	Country	Name	Operated by	Country	Name	Operated by	Forecast	Present	Forecast	Present	at TC	(Voltage)	at TC	(Voltage)
Nr	Nr	Nr							kV	kV	MVA	MVA	MVA	kV	MVA	kV
11	1	1	D	Diele	E.ON Netz	NL	Meeden	TenneT		380		1382	1000			
11	1	2	D	Diele	E.ON Netz	NL	Meeden	TenneT		380		1382	1000			
13	1	1	D	Siersdorf	RWE Transportnetz Strom	NL	Maasbracht	TenneT		380		1645				
13	1	2	D	Rommerskirchen	RWE Transportnetz Strom	NL	Maasbracht	TenneT		380		1698				
15	1	1	D	Gronau	RWE Transportnetz Strom	NL	Hengelo	TenneT		380		1790				
15	1	2	D	Gronau	RWE Transportnetz Strom	NL	Hengelo	TenneT		380		1790				
71	1	1	D	Uchtelfangen	RWE Transportnetz Strom	F	Vigy	RTE		380		1790	-			
71	1	2	D	Uchtelfangen	RWE Transportnetz Strom	F	Vigy	RTE		380		1790				
71	2	1	D	Ensdorf	RWE Transportnetz Strom	F	St-Avold	RTE		220		282				
72	1	1	D	Eichstetten	EnBW Transportnetze	F	Vogelgrün	RTE	380	220		492	457	220		
72	1	2	D	Eichstetten	EnBW Transportnetze	F	Muhlbach	RTE		380		1790				
83	1	1	D	Asphard	Atel/NOK	F	Sierentz	RTE		380		1660				
102	1	1	D	Gurtweil	EnBW Transportnetze	CH	Laufenburg	EGL		220		492	457	220		
102	1	2	D	Gurtweil	EnBW Transportnetze	CH	Laufenburg	EGL		220		492	457	220		
102	2	1	D	Kühmoos	EnBW Transportnetze	CH	Laufenburg	EGL		220		492	457			
102	3	1	D	Kühmoos	EnBW Transportnetze	CH	Laufenburg	EGL	380	220		492	476	220		
102	3	2	D	Kühmoos	EnBW Transportnetze	CH	Laufenburg	EGL		380		1698	-	-		
102	4	1	D	Kühmoos	EnBW Transportnetze	CH	Laufenburg	EGL		380		1698	-	-		
102	4	2	D	Kühmoos	RWE Transportnetz Strom	CH	Laufenburg	EGL		380		1698	1580			
102	5	1	D	Tiengen	RWE Transportnetz Strom	CH	Laufenburg	EGL		380		1158				
103	1	1	D	Tiengen	RWE Transportnetz Strom	CH	Beznau	NOK		380		1158				
103	1	2	D	Tiengen	RWE Transportnetz Strom	CH	Beznau	NOK	380	220		335				

103	1	3	D	Tiengen	RWE Transportnetz Strom	CH	Klingnau	AWAG	380	110		58				
104	1	1	D	Kühmoos	EnBW Transportnetze	CH	Asphard	Atel/NOK		380		1659	-	-		
105	1	1	D	Engstlatt	EnBW Transportnetze	CH	Laufenburg	EGL		380		1790				
111	1	1	D	Obermooweiler	EnBW Transportnetze	A	Bürs	VIW		380		1369				
111	1	2	D	Obermooweiler	EnBW Transportnetze	A	Bürs	VIW		380		1369				
111	2	1	D	Hoheneck/Tiengen	RWE Transportnetz Strom	A	Bürs	VIW	380	220		389				
111	3	1	D	Dellmensingen	RWE Transportnetz Strom	A	Bürs	VIW	380	220		492				
115	1	1	D	Neuötting	E.ON Netz	A	Braunau	ÖBK		110		102			82	
115	2	1	D	Stammham	E.ON Netz	A	Braunau	ÖBK		110		102			82	
115	3	1	D	Neuötting	E.ON Netz	A	Ranshofen	APG		110		90				
115	4	1	D	Egglfing	E.ON Netz	A	Antiesenhofen	APG		110		102				
115	5	1	D	Altheim	E.ON Netz	A	St. Peter	APG		220		301				
115	6	1	D	Simbach	E.ON Netz	A	St. Peter	APG		220		301				
115	7	1	D	Ering	E.ON Netz	A	St. Peter	APG		110		152	137		114	
115	7	2	D	Ering	E.ON Netz	A	St. Peter	APG		110		152	137		114	
115	8	1	D	Egglfing	E.ON Netz	A	St. Peter	APG		110		105				
115	9	1	D	Pirach	E.ON Netz	A	St. Peter	APG		220		518	457			
115	10	1	D	Pleinting	E.ON Netz	A	St. Peter	APG		220		518	457			
115	11	3	D	Passau/Hauzenberg	E.ON Netz	A	Ranna	EAGOÖ		110		90				
115	12	1	D	Rosenheim	E.ON Netz	A	Oberaudorf	ÖBK		110		93				
115	13	1	D	Kiefersfelden	E.ON Netz	A	Oberaudorf	ÖBK		110		102				
116	1	1	D	Leupolz	RWE Transportnetz Strom	A	Westtirol	APG		380		1316				
116	2	1	D	Memmingen	RWE Transportnetz Strom	A	Westtirol	APG	380	220		762				
117	1	1	D	Oberbrunn	E.ON Netz	A	Silz	TIRAG		220		793	762			
117	1	2	D	Oberbrunn	E.ON Netz	A	Silz	TIRAG		220		793	762			
117	2	1	D	Oberaudorf	TIRAG	A	Kufstein	TIRAG		110		90				
117	2	2	D	Oberaudorf	TIRAG	A	Ebbs	TIRAG		110		127				
161	1	1	D	Flensburg	E.ON Netz	DK	Ensted	ELTRA		220		332	305			
161	2	1	D	Flensburg	E.ON Netz	DK	Kassø	ELTRA		220		332	305			
161	3	1	D	Audorf	E.ON Netz	DK	Kassø	ELTRA		380		1382	658			

161	3	2	D	Audorf	E.ON Netz	DK	Kassø	ELTRA		380		1382	658			
162	1	1	D	Bentwisch	VE Transmission	DK	Bjæverskov	Energienet.dk		400		600				
191	1	1	D	Niederstedem	RWE Transportnetz Strom	L	Vianden	SEO		220		490				
191	1	2	D	Niederstedem	RWE Transportnetz Strom	L	Vianden	SEO		220		490				
191	2	1	D	Bauler	RWE Transportnetz Strom	L	Vianden	SEO		220		732				
191	2	2	D	Bauler	RWE Transportnetz Strom	L	Vianden	SEO		220		732				
191	3	1	D	Bauler	RWE Transportnetz Strom	L	Flebour	CEGEDEL		220		492				
191	4	1	D	Bauler	RWE Transportnetz Strom	L	Roost	CEGEDEL		220		490				
192	1	1	D	Trier	RWE Transportnetz Strom	L	Heisdorf	CEGEDEL		220		492				
192	2	1	D	Quint	RWE Transportnetz Strom	L	Heisdorf	CEGEDEL		220		492				
321	1	1	D	Etzenricht	E.ON Netz	CZ	Hradec	CEPS a.s.		380		1639	1316			
321	1	2	D	Etzenricht	E.ON Netz	CZ	Prestice	CEPS a.s.		380		1645	1579			
322	1	1	D	Röhrsdorf	VE Transmission	CZ	Hradec	CEPS a.s.		380		1660	1320			
322	1	2	D	Röhrsdorf	VE Transmission	CZ	Hradec	CEPS a.s.		380		1660	1320			
323																
323																
401	1	1	D	Herrenwyk	E.ON Netz	S	Kruseberg	Sydkraft/Vattenfall		450		600	-			
501	1	1	D	Vierraden	VE Transmission	PL	Krajnik	PSE-O S.A.		220		460				
501	1	2	D	Vierraden	VE Transmission	PL	Krajnik	PSE-O S.A.		220		460				
502	1	1	D	Hagenwerder	VE Transmission	PL	Mikulowa	PSE-O S.A.		380		1660	1320			
502	1	2	D	Hagenwerder	VE Transmission	PL	Mikulowa	PSE-O S.A.		380		1660	1320			

*) *The conventional transmission capacity of cross-frontier tie-lines is based upon parameters standardised within UCTE for the calculation of the thermal load capability of each line. For aerial lines these are: ambient temperature of +35°C, wind velocity of 0.56 m/s at a right angle to the lines as well as the voltage value stated in column 7 or 8. The conditions relevant to system operation in various countries at various times of the year can strongly differ from those above.*
Because the real allowable load capability of the line depends on many other factors, such as load flow distribution, upholding of voltage, real ambient conditions, limits of stability, n-1 security, etc., the conventional transmission capacity has no relevance from the point of view of system operation or economics but allows just a comparison of the order of magnitude of the various lines. Adding together the conventional transmission capacity of several tie-lines does not allow to infer on the real total transmission capability and leads to irrelevant results from the point of view of system operation.

These are the German values. In publications of UCTE, the lower one of two country values will be used .

GREECE

1. Basic capacity, generation and consumption data (year 2005)

Installed capacity by fuel, MW*		
	Thermal	8172
	Hydro	3059
	Nuclear	-
	Renewables	644
	Total	**11875**
Yearly generation fuel by fuel, TWh		
	Thermal	43.3
	Hydro	5.4
	Nuclear	-
	Renewables	0.9
	Total	**49.6**
Annual consumption, TWh		**53.4**
Imports, TWh		**5.6**
Exports, TWh		**1.8**

* *Gross values*

2. Industry structure

2.1 Recent key developments

Officially, market deregulation in Greece started on 19.2.2001. The regulatory framework for the organisation of the electric sector was established by the law 1773/99. According to the provisions of this law:

A Regulatory Authority (RAE) was established. Its main functions include advise the Minister of Development and grant production licenses to new producers and supplier licenses to suppliers of electricity to eligible customers. Furthermore, RAE is also responsible for supervising the whole sector and for establishing rules for the proper functioning of the Market.

An Independent Transmission System Operator (HTSO) was also established. This is an independent company with 51% of its shares belonging to the State and 49% to producers. The HTSO is accountable for the system operation, planning new transmission assets, programming the transmission system maintenance as well as providing access to the system to new producers and HV consumers. In addition it is responsible for the functioning of the market and for allocating the capacity of the interconnection lines to users.

Eligible customers are able by law to choose their supplier. Eligible customers are all HV and MV consumers.

The energy producers by renewable sources of energy have the right to sell energy to HTSO at regulated prices, which are very advantageous. Furthermore, production is scheduled by priority.

There have been some recent changes in the energy deregulation legal framework which aimed at giving incentives to private producers to construct new power production assets.

The recently passed law 3468/2006 for RES provides considerable incentives for photovoltaic projects, regulates high fixed feed-in tariffs and simplifies environmental licensing procedures.

Currently, the HTSO is carrying out an on-going tender for the construction of a combined cycle unit of 400 MW.

A new Grid Code governing has been established (17/05/2005), which will gradually be applied by 2008.

- In December of 2005 a combined cycle unit in Thessaloniki was connected to the System by an IPP

(EN.THES), while in May of 2006 a similar unit was connected committed in Lavrio by PPC. Furthermore, three open cycle, gas turbine units of total capacity 148 MW were connected in December of 2004, providing reserve capacity to the system.

2.2 Main actors

Main generators:

- PPC:
  - Lavrion station, fuel-oil and Natural Gas (5 units) 1.572 MW
  - Kardia station, lignite (4 units) 1.250 MW
  - Ptolemaida station, lignite (4 units) 620 MW
  - Ag. Dimitrios station, lignite (5 units) 1.595 MW
  - Meliti station, lignite (1 unit) 330 MW
  - Megalopolis station, lignite (4 units) 850 MW
  - Liptol station, lignite (2 units) 43 MW
  - Komotini station, Natural Gas (1 unit) 495 MW
  - Aliveri station, fuel-oil (2 units) 300 MW
  - Ag. Georgios station, Natural Gas (2 units) MW
  - Hydro plants 3.059 MW
- EN.THES: Natural Gas Unit 395 MW
- HERON THERMOELECTRIKI: Gas Turbines (3 units) 148 MW

Foreseen/Ongoing projects for new generating units:

- The Regulatory Authority for Energy (RAE) has issued licenses to IPPs of about 5000 MW for thermal units. The commissioning date is not yet known. The HTSO has provided access to the Grid to about 3200 MW of thermal units.
- The Regulatory Authority (RAE) has issued licenses to IPPs of about 4500 MW for renewable energy projects. The HTSO has provided access to the Grid to about 2300 MW for RES.

Number of Distributors

Only one, PPC

Main traders & other actors (exchanges etc)

The following list includes the licensed by RAE traders of electricity:

- CINERGY GLOBAL TRADING LTD
- ATEL HELLAS S.A.
- ENEL TRADE S.P.A.
- EDF TRADING LIMITED
- E.ON SALES & TRADING GMBH
- RWE TRADING GMBH
- ENTRADE GMBH
- VERBUND AUSTRIAN POWER TRADING AG
- EDISON TRADING SPA
- HERON THERMOELECTRIKI
- NECO SA
- EFT HELLAS SA
- HELLENIC PETROLEUM SA
- EGL HELLAS SA
- ATHENS INTERNATIONAL AIRPORT
- MYTILINAIOS SA
- TERNA ENERGIAKI ABETE
- EUROPEAN TRADE OF ENERGY GKIOUZELIS – XATZIDIMITRIOU
- VERBUND - AUSTRIAN POWER TRADING ENERGA HELLAS SA

3. Transmission network and system issues

3.1 Status of international interconnections

Existing Interconnections

From (BG)	To	Type AC/DC Single/Double	V,kV	Thermal limits (MVA)
Thessaloniki	Blagoevgrad s/s (BG)	AC - Single	400	1400
Thessaloniki	Dubrovo (FYROM)	AC – Single	400	1400
Kardia	Elbasan (AL)	AC – Single	400	600
Aetos	Galatina (I)	DC – Single	400	500

Ongoing studies on international/cross-border interconnections:

From (GR)	To	Type AC/DC Single/Double	V,kV	Thermal limits (MVA)	Date of study completion	Expected date for commissioning the line under study
N. Santa	Maritza 3 (BG)	AC - Single	400	1400	Completed	Not defined yet
Arahthos	2nd DC link to Galatina (IT)	DC - Single	400	500	Not defined yet	Not defined yet

Main Lines under construction (internal and cross-border):

FROM	TO	Type AC/DC Single/Double	V,kV	Thermal limits (MVA)	Expected date for commissioning the line
Florina (GR)	Bitola (FYROM)	AC - Single	400	1400	2007
Philippi (GR)	N. Santa (GR)	AC - Double	400	2 X 1400	2008
N. Santa (GR)	Babaeski (TR)	AC - Single	400	2000	2008
Langada (GR)	Philippi (GR)	AC - Single	400	2000	2009
Korinthos (GR)	Koumoundouros (GR)	AC - Double	400	2 X 1200	2010
Rouf (GR)	Koumoundouros (GR)	AC - Double	400	2 X 1200	2011
Rouf (GR)	Aharnes (GR)	AC - Single	400	1200	2011
Megalopolis (GR)	Patras (GR)	AC - Double	400	2 X 1200	2011
Megalopolis (GR)	Korinthos (GR)	AC - Double	400	2 X 1200	2012
Korinthos (GR)	Patras (GR)	AC – Double	150	2 X 200	2007

3.2 Network development plans

PPC is the owner of the HV and EHV network, while the Hellenic Transmission System Operator (HTSO) has the responsibility of operation and planning of the grid. HTSO is also responsible for providing access to the network for new producers, new high voltage consumers and the distribution company (also PPC).

Each year, HTSO prepares the so-called “Development Study of the Transmission System”, a system planning study for the next 5 years. The study is submitted to the Regulation Authority (RAE), which makes the final proposal to the Minister of Development. After the Minister’s approval, the study becomes the official development program for the interconnected system which is realised by PPC/Transmission, the owner of the transmission assets.

An exception is allowed for the required assets for the connection to the Grid of Renewable Sources Producers. These can be constructed by any interested part. In any case, the owner of the transmission assets is PPC.

The cost of the new assets is incurred in the following way: the assets needed to connect a new user (producer, consumer, distribution s/s) - the connection assets - are paid by the user who is also liable for the maintenance. The cost of all other assets is paid through the Transmission tariffs. All users of the Grid (except RES plants) share the Transmission fees. The total cost estimate is calculated every year by HTSO, taking into account the maintenance cost, the assets depreciation cost, a return rate on the involved capital and the administration cost of the HTSO services. 30% of this budget is reimbursed by the producers and 70% by the consumers.

4. Electricity market structure

The entire operation of the Hellenic Interconnected Electrical Power System is governed by the System Operating Code issued in the Official Government Gazette, Issue B/ No 654/30.5.01 and modified in Issue B/ No 655/17.05.05. HTSO is responsible for the operation of the electricity market. The market is based on a pool model with the following acting entities:

- Producers, Auto producers
- Suppliers
- Importers
- Exporters
- Customers (captive, non-captive / eligible)

Producers and load representatives supply every day the TSO with their offers for the next day. The offers must reflect at least the variable production cost. TSO makes a sort list of the offers starting from the cheaper one, and decides on the schedule of the next day. The cost of the most expensive power unit scheduled defines the System Marginal Price (SMP). This price is used for the market settlement. With the gradual implementation of the new grid codes, the calculation of the System Marginal Price will also take into account bids for the provision on ancillary services, reserves as well as start-up and shut down costs. Furthermore, with the full implementation of the new grid codes, in cases of network congestion, a bi-zonal market will take place, where separate SMPs will be calculated for the North and South System.

The main concepts of the market settlement are the following:
- The cost of all exchanged energy is calculated every hour using the corresponding SMP.
- HTSO keeps an uplift account containing the cost of ancillary services, losses, differences between contractual imports/exports and real flows, special levy for producers from renewable sources, administration cost of TSO, etc. This account is settled by the consumers through the corresponding suppliers and directly by them when they import energy for their own use.

As for the cash flows every month:
- The conventional producers are credited for the energy produced, the ancillary services they procure to the system and a special payment when they are obliged to operate some units even if their offer price is higher than the SMP.
- The renewable producers are paid for the energy produced by a fixed tariff, which is usually higher than SMP.
- The suppliers are debited for the energy absorbed by their customers and the corresponding amount in the uplift account.
- The consumers importing energy for their own use are debited for the corresponding uplift account.
- All players except renewable producers are debited for the Transmission fees.

Furthermore, with the implementation of the new grid codes, a capacity market is established. Through this capacity assurance mechanism, capacity availability contracts are signed between producers and load representatives. HTSO is responsible for calculating the System Available Capacity, monitoring of Capacity Availability Ticket (CAT) issued by producers, as well as calculation and monitoring of the appropriate Capacity Availability Contract (CAC) required by Load Representatives to comply with their Capacity Adequacy Obligation. Load representatives who do not comply with their capacity obligations are fined by HTSO. The collected fines are used to finance reserve capacity when necessary. The payments relating to the capacity contracts are made directly from the load representatives to the producers. However, during the transitional period up to the full implementation of the new grid codes, HTSO is responsible for charging the load representatives according to their calculated Capacity Adequacy Obligation and reimbursing producers for their issued Capacity Availability Tickets.

Finally, recent changes in the legislature have allowed HTSO to issue tenders for new capacity, in order to ensure system adequacy. In this framework, HTSO procured a tender for reserve gas turbines, which were installed in 2004 and is currently holding a tender procedure for a combined cycle unit of 400 MW.

5. Other

Web sites and other contact information, where more information can be found

Link	Company
www.rae.gr	Regulatory Authority
www.desmie.gr	Hellenic Transmission System Operator

HUNGARY

1. Basic capacity, generation and consumption data (year 2005)

Installed capacity by fuel, MW		
	Thermal	5844
	Hydro	48
	Nuclear	1755
	Renewables	953
	Total	**8600**
Yearly generation fuel by fuel, TWh		
	Thermal	19.8
	Hydro	0.2
	Nuclear	13.8
	Renewables	2.1
	Total	**35.7**
Annual consumption, TWh (excluding losses)		**34.6**
Imports/Exports saldo, TWh		**6.2**

2. Industry structure

2.1 Recent key developments

Hungarian power utility MVM Rt and its subsidiaries are among the most important players in the Hungarian electricity sector.

The primary task of MVM Rt is to purchase electricity from Hungarian power stations and abroad, and sell it on to the distribution companies via its supply network.

The group is active in the generation of electrical energy, international trade, the development and operation of the national grid and dispatch. The operation and development of the power transmission network is the task of transmission lines operator OVIT Rt. The MVM group includes Hungary's only nuclear power station (Paks Nuclear Power Plant) and a coal-fired power station (Vértes Power Plant). It is also MVM's responsibility to ensure security of supply through the secondary reserve gas turbines operated by subsidiary GTER Kft. Operational management of the Hungarian power system and load distribution for all Hungary's power stations is carried out by MAVIR Rt.

As the most important nationally-owned corporate group in the Hungarian electricity sector, MVM is an active participant on the international electricity market, and an associate member of the Union for the Coordination of Transmission of Electricity (UCTE) in Western Europe, with which it has formed complex and ever expanding network connections. MVM carries out its duties in compliance with the regulatory system in force, electricity laws and other related legislation. Operation meets ISO 9001 quality standards, and MVM is also preparing to launch an integrated environmental management system.

State-owned MVM takes maximum advantage of the opportunities on the emerging Hungarian market, as well as the international one, in order to make both its supply and trading activities competitive. Alongside its core activity, MVM Rt aims to become an active player on the telecommunications and heat-services market, and is jockeying for position in the energy markets of neighbouring countries, as a strategic investor. In the interest of attaining all these goals, MVM plans to fully exploit the synergies and diversification opportunities inherent in the group's member companies, and achieve strong strategic and financial management at holding level.

Energy policy is based on the principles accepted in 1992 by the Government and in 1993 by the Hungarian Parliament. The most important objective is to fulfil the conditions required by the European Union.

The main items of the energy policy are as follows:

- To maintain and improve security of supply
- Energy conservation, energy efficiency
- Environmental issues at the existing power plants as well as in the future developments
- Least cost planning within operation and development of the power system with extension step by step of elements of competition
- Creation of market oriented organisational, ownership, economic and legal regulations
- To solve problems of the coal mining industry
- To increase the role of publicity in the decision making processes in the power industry

The Hungarian administration will transpose and implement EU Directive on Electricity (Directive 2003/54/EC) into the Hungarian law. Hungary shall designate the Transmission System Operator (TSO) in order to fulfil the requirements of the Directive.

In Hungary there are two legally separate undertakings for operating the transmission network. There exists the transmission company, the authorised network operator, MVM Rt., and the independent system operator - ISO (MAVIR Rt.), which operates the electric power system. At the moment, neither MVM Rt. nor MAVIR Rt. are able to meet the requirements of TSO as determined by the Directive. Discussions are in progress among the concerned parties (Hungarian Energy Office, MVM Rt. and MAVIR Rt.) and a study on the alternatives of the Hungarian TSO has been already accomplished. The most important difference between the Directive and the Hungarian legislation is arising from the responsibilities of the two market players (operation, maintenance, development of the transmission network).

In order to fulfil the EU Directive, it is necessary to amend the Act No. CX of 2001 on electricity (VET).

2.2 Main actors

<u>Transmission system operator</u>

- Transmission Company: MVM Rt.
- Independent system operator: MAVIR Rt.

<u>Main generators</u>

- Paks Nuclear Power Plant Ltd.
- Dunamenti Power Plant Company Ltd.
- AES Tisza Power Plant Company Ltd.
- Mátra Power Plant Ltd.

<u>CCGT power plants:</u>

- Csepel II.: 389 MW (investment of PowerGen, to be commissioned in 2000)
- Power plant Debrecen: 110 MW (investment of the TITASZ supply company, to be commissioned in 2001))
- The Budapest Power Plant Ltd., also CCGT at the site of the Power Plant Újpest, with installed capacity 110 MW to be commissioned in 2004
- Reconstruction, retrofit

Distributors

- East Hungarian Electricity Supply Company Ltd. (TITÁSZ Rt.)
- South Hungarian Electricity Supply Company Ltd. (DÉMÁSZ Rt.)
- North-West Hungarian Electricity Supply Company Ltd. (ÉDÁSZ Rt.)
- South-West Hungarian Electricity Supply Company Ltd. (DÉDÁSZ Rt.)
- North Hungarian Electricity Supply Company Ltd. (ÉMÁSZ Rt.)
- Budapest Electricity plc. (ELMŰ Rt.)

3. Transmission network and system issues

3.1. Status of international interconnections

Existing interconnections

FROM	TO	Type AC/DC Single/Double	U,kV	P,MVA
Sándorfalva	Subotica	AC - Single	400	996
Sándorfalva	Arad	AC - Single	400	497
Hévíz*	Zerjavinec	AC - Double	400	1385
Győr**	Vienna	AC - Double	400	996
Győr	Vienna	AC - Double	220	205
Tiszalök	Munkachevo	AC - Single	220	380
Kisvárda	Munkachevo	AC - Single	220	366
Sajószöged	Munkachevo	AC - Single	400	2350
Albertirsa	Zahidnoukrainskaja	AC - Single	750	1500
Győr	Gabcikovo	AC - Single	400	996
Göd	Levice	AC - Sinlge	400	996

* *temporarily double line*
** *only on the Hungarian side*

Ongoing studies in international/cross-border interconnections

From	To	Type AC/DC Single/Double	U,kV	P,MVA	Date for study completion	Expected date for commissioning the line under study
Sajóivánka	Rimaszombat	AC - double	400	1385	end of 2004	2010
Hévíz	Cirkovce	AC - Single	400	1385	middle of 2004	2008
Pécs	Ernestinovo	AC - Double	400	1316	middle of 2007	2010
Békéscsaba	Oradea	AC - Single	400	1177	end of 2004	2008
Győr*	Vienna	AC - Double	400	996	it is up to the Austrian partner	200?

* *(2nd circuit) on the Hungarian territory it is a double line but from the border it is a single line (it will be form a Szombathely-Vienna line after finalisation)*

Lines under construction (internal and cross-border)

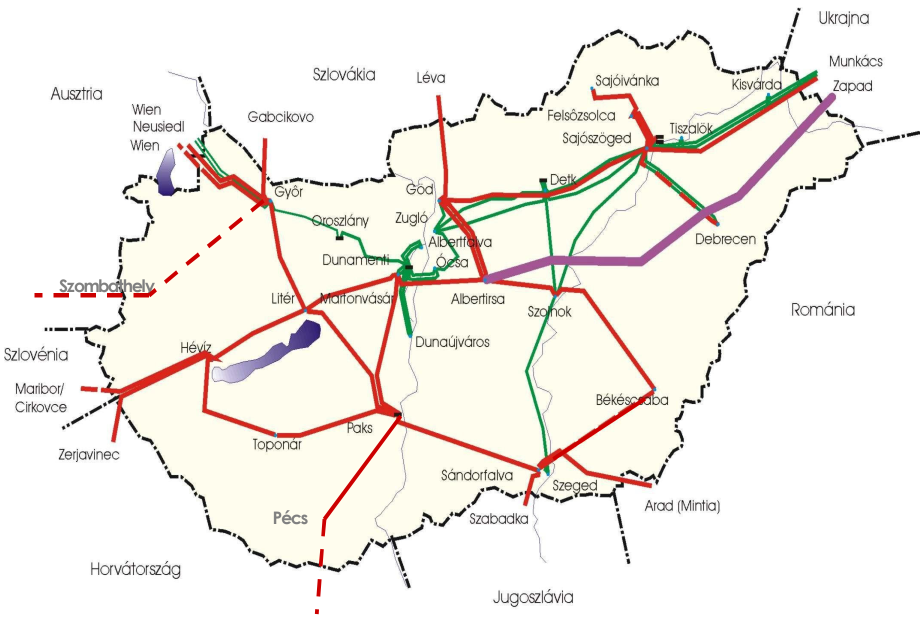
From	To	Type AC/DC Single/Double	U,kV	P,MVA	Expected date for commissioning the line
Győr	Szombathely	AC – Double	400	1843	2006

* *it is constructed as a double line but as a single line will be used between Győr-Szombathely, the 2nd circuit will be used as a Szombathely-Vienna line after the 2nd circuit will be mounted on the existing Győr-Vienna line on Austrian territory.*

Future projected interconnections

From	To	Type AC/DC Single/Double	U,kV	P,MVA	Expected date for commissioning the line
Szombathely	Hévíz	AC - double	400	1385	2010
Békéscsaba	Arad	AC - single	400	1177	2013
Albertirsa	(Békéscsaba)-Szolnok	AC - single	400	800	2014
Szombathely	Südburgenland	AC - double	400	1385	2015

Transmission and distribution network of the Hungarian Electric Power System (2005)



3.2 Network development plan

State of Play (at end of 2005)

In Hungary there are two legally separate undertakings for operating the transmission network. There exists a transmission company, the authorised network operator, Hungarian Power Companies Ltd. (MVM Rt.), as the owner of the transmission grid. The Hungarian Power Companies Ltd. has decision–making rights with respect to maintain, operate and develop the transmission network.

Besides the Hungarian Power Companies Ltd., there exists an independent system operator - ISO (MAVIR Rt.), which operates the electric power system of Hungary, including the power flow management on the system and it is responsible for ensuring a secure, reliable and efficient electric power system in the short, medium and long term.

Developing the Planning Directives

For the safe and effective operation of the power system, network development plans are need to be made by the transmission company and distribution companies for 120 kV network. The independent system operator is developing the principles of Network Development, which has to contain the minimum technical requirements of the network development. This directive must be followed by the authorised network operators when making the network developing plans for the transmission network (400 kV, 220 kV), and the 120 kV part of the distribution network.

Network Development Plans

Companies owning the licenses of transmission and distribution (authorised network operators are required to elaborate development plans for the networks they are operating. Minimum technical requirements of the Network Development Directive must be taken into consideration when elaborating their own plans. Transmission and distribution companies and companies owning public network elements are required to elaborate and publish the plans at least twice a year and send it to the independent system operator (MAVIR).

The Independent System Operator is responsible for harmonising the development plans of the transmission and distribution companies in order to fulfil the security requirements of the system. After examination, the ISO returns to the companies the network elements which have to be constructed for fulfilling the required security level. If there is a plan, which has not been proposed but is considered necessary by the ISO and is of high importance for the system, the ISO shall initiate the improvements at the concerned authorisation operator. In the event an authorisation operator fails to implement the necessary network improvements requested by the independent system operator, the ISO can launch a tender for improvements in the electricity transmission network and the distribution system specified in the Grid Code that affect the operation of the transmission system. (It is the ISO's responsibility to evaluate the bids and send the results to the Regulator for approval before the results are announced.) If the tender is unsuccessful, the ISO is required to undertake the required network development at the initiative of the Regulator.

The network development initiatives considered necessary by the independent system operator, accepted by the Hungarian Energy Office, have to be carried out by the transmission and distribution companies.

Any party shall be entitled to set up a direct line or a new network element at its own business risk, but it shall obtain the prior consent of the Commission - granted in agreement with the independent system operator and the competent authorised network operators of the area - and shall notify the independent system operator upon completion in the manner specified in the Grid Code.

With due regard to the development plans and proposals of authorised network operators, the independent system operator prepares a development plan for the grid at least one time every second year. The installation of lines specified in the Grid Code, but not included in the development plan or in proposal, must be reported to the ISO.

The operational and network development costs of the transmission network are covered by the transmission tariff. Transmission tariff also contains the costs paid by the transmission company for the transmission network elements not owned by the transmission company. Authorised transmission network operator shall share the income of the transmission tariffs with the owners of the transmission network elements.

Authorised network operators shall, as agreed with the independent system operator, maintain the necessary technical conditions for supplying electricity to the consumers connected to them at a connection point.

An authorised transmission operator, the competent distributor of a specific area or an authorised public utility supplier, shall provide information on the technical and financial criteria related to satisfying consumer demand and cooperate with the customers in specifying the most favourable manner of receiving electricity. If a connection is established under financial and technical conditions specified in specific other legislation, authorised network operators may claim the connection cost specified therein.

3.2 Main events

There was no important event in the Hungarian power system in 2005.

4. Electricity market structure

The reform of the electricity industry commenced in 1994-95, when Act No. XLVIII of 1994 on the Production, Transportation and Supply of Electricity was formulated and came into effect, the Hungarian Energy Office was established and, in 1995, the privatisation of the public concerns in the sector began.

Privatisation took place in several phases. At present, the majority of power stations and 100% of the electricity suppliers (today called network and service provider companies as a result of privatisation) are privately owned.

The endeavours of the European Union to establish a uniform internal market have included the liberalisation of the energy sector. As a result, Act No. CX of 2001 on Electricity came into effect on 1 January 2003.

The Hungarian electricity market has a large number of mutually independent market players. They are as follows:

- the power stations;
- the network companies (MVM Rt., which operates the transmission network)
- distribution companies
- the independent systems operator (MAVIR Rt.);
- public service wholesale and public service retail service providers;
- electricity traders;
- consumers (authorised and public service consumers);
- small power stations
- other users of the system.

The producers produce the electricity and feed it into the transmission or distribution networks. At present, there are 18 licensed producers in the electricity sector. As regards licensing, the built-in production capacity of the power stations is the decisive factor; power stations with built-in capacity of at least 50 MW require licences.

The transmission and distribution network licence holders are responsible for the "transportation" of electricity, its transmission and distribution from producers to consumers. These market players are obliged to provide free access to the networks without discrimination.

The systems controller plans and controls the operations of the electricity system. It is independent of producers, traders and consumers. Its tasks comprise system level operative control, resource planning, preparation for network operations, the settlement of electricity and the provision of system-level services.

From the perspective of consumers, the electricity system may be divided into two parts. The first one is the public service segment supplying public service consumers. In that segment, public service wholesaler purchases electricity from the producers, generally under long-term contracts, then sells it to the public service providers, who resell it to public service consumers at an officially set price.

As the first step towards the liberalisation of the market, the Government decided on a 30-35% authorisation level in order to facilitate partial liberalisation of the market (that corresponds to the above-mentioned 6.5 GWh/year limit). Thereafter, tracking the liberalisation of the market in the EU was the objective. In the meantime, the EU reviewed its Directive 96/92/EC (concerning common rules for the internal market in electricity) and adopted a policy of accelerating the opening of the market. This means that as from 2004, all consumers other than household consumers shall be authorised consumers in the Member States of the EU, while from 2007, households shall also be authorised, i.e. the market shall be 100% liberalised.

From 1st of January 2006 a real Transmission System Operator was created in Hungary, in the frame of a daughter company of MVM, and it is MAVIR, the former ISO. The transmission system assets were imported into the system operator, and the transmission license with the concerning knowledge and practice was restructured from MVM to MAVIR for the more efficient operation.

5. Other

Link	Company
www.mvm.hu	Hungarian Power Companies Ltd.
www.mavir.hu	Hungarian Power System Operator Company
www.eh.gov.hu	Hungarian Energy Office
www.apvrt.hu	Hungarian Privatisation and State Holding Company
www.gkm.hu	Ministry of Economy and Transport
www.energiainfo.hu	Useful link about everything that is power
www.centrel.org	CENTREL

ITALY

1. Basic Capacity, Generation and Consumption Data (year 2005)

Installed capacity by fuel, MW		
	Thermal	59797
	Hydro	21139
	Nuclear	-
	Renewables (*)	2356
	Total	**83292**
Yearly generation fuel by fuel, TWh		
	Thermal	253.1
	Hydro	42.9
	Nuclear	-
	Renewables (*)	7.7
	Total	**303.7**
Annual consumption, TWh		**309.8**
Imports, TWh		**50.3**
Exports, TWh		**1.1**

(*) Geothermal, wind and photovoltaic

2. Industry Structure

2.1 Recent key developments

The year 2005 and 2006 saw rapid legal consolidation of the organisation and liberalisation rules for the energy sector in compliance with the Directive 54/2003/ECand the Regulation 1228/2003/EC, for the electricity sector, and Directive 55/2003/EC for the gas sector.

The most important legal provisions which affected the main changes in the energy sector in year 2005 and 2006 are entrenched into the following legislative acts:

- Law 290/2003, establishing emergency rules for the security of the national electricity system, providing for, among other issues, the unification between the ownership and the management of the national transmission grid;
- Law 239/2004 concerning the "reorganisation of the energy sector, and enabling authority to government to review the provisions currently into force in energy matters". The main objective of this law was, among others, to clarify the relationships between the central Government and the regional and local authorities for the energy sector and to set rules on demand and supply side such as, for instance:
  - the application of the opening market rules to all customers until July 2007 as provided into the Directive 2003/54/EC;
  - the promotion of investments for the realisation of new power plants
  - the promotion to build new transmission electricity lines through simplified authorisation procedures.

On the basis of the Italian Law 239/04, the Government issued on 11 May 2004 a Prime Minister's Decree in order to establish the criteria and conditions for the unification between the ownership and the management of the national electricity transmission grid. Linked to those rules, the Prime Minister Decree establishes also the definition of two fundamental acts:

- The grid transmission, dispatch, development and safety code (called: Grid Code)
- the new concession to manage the electricity transmission and dispatching activity by the new independent transmission system operator.

On 1 November 2005, coinciding with the date of transfer of the TSO business segment sold off by GRTN Spa, TERNA Rete Elettrica Nazionale S.p.A., becomes the concession holder for the transmission and dispatching activity.

During 2005 and at the beginning of 2006, the following legal acts were issued with an impact on the energy sector, and in particular on the Transmission System Operator activity:

- the Italian Decree of the Minister of Productive Activities dated 12 December 2005 containing the "Review of the emergency procedures for dealing with the lack of coverage of natural gas requirements, in the event of unfavourable climatic events" On the basis of these rules, TERNA adopts the reference role of the entire national electricity sector for the purposes of operational management of emergency procedures;

- the Italian Decree Law 19 dated 25 January 2006 containing the "Transitory provisions for the reduction of natural gas consumption in the thermo electric sector", which aimed at reducing the consumption level of natural gas in the thermo electric sector in order to deal with critical situations within the national energy system. According to the provisions of this law, TERNA shall acknowledge the dispatching priority of the fuel oil plants;

- the Italian Decree Law 152 dated 3 April 2006 containing "Rules on Environmental Issues", consists of a code to harmonise national environmental rules with EU Directives. Among the most important provisions, the law sets the application of the Strategic Environmental Assessment (SEA) to the Plan for the Development of the National transmission electricity network issued by TERNA;

- the Italian Ministerial Decree dated 21 October 2005 containing the "Formalities and criteria for the issue of exemption for the discipline of the right of third parties to access new power lines". The Decree, issued on the basis of the Italian Law 290/2003, in compliance with the Regulation 1228/2003/EC, sets the conditions for issuing the exemption to third party access rules by private parties (so called Merchant lines).

During 2005 and at the beginning of 2006 the Italian regulator consolidated its regulatory rules. The most important events that the Regulator faced came from the increase of energy costs during 2005, partly due to severe gas shortage which made difficult to foresee increases of energy prices and tariffs.

The most important issues for the Italian regulator in year 2005 are related to:
- the promotion of the competition and the liberalisation of the energy market, through reinforced actions in order to reduce the power of the main generators in the electricity market;
- the economic and technical rules to reinforce the legal and management unbundling of electricity and gas companies;
- the introduction of an incentive regulation for the management of dispatching activity.

A brief summary of the main regulatory resolutions issued by the Electricity and Gas Authority (AEEG), follows:
- Resolution 15/05 which confirmed the criteria and rules for the coverage of costs related to the transmission sector after the unification between the ownership and the management of the national transmission network;
- Resolution 79/05 and 49/06 which favourably assessed the Grid Code and its following updated version issued by TERNA and containing the technical requirements to access the grid as well as the general criteria for the development of the network;
- Resolution 226/05, which aimed at issuing the provisions for the transmission and dispatching of electricity within the structure for the unification of the ownership and management of the national transmission network. By means of this rules, the Regulator introduces the concept of incentive regulation for the dispatch activity managed by the TSO.
- Resolution 269/05 concerning the rules and conditions for imports of electricity for the year 2006 on the basis of the criteria envisaged by the decree of the Minister of Productive Activities dated 13 December 2005. The Resolution, on the basis of the congestion management criteria set forth in the

Regulation 1228/2003/EC, establishes the market mechanism for handling congestions via implicit auction through the day ahead energy market of the electricity exchange, and the rules for the allocation of the coverage from the risk associated with the differential of prices between imports and exports. Those rules are applied to assign the 50% of the total import capacity available for the year 2006 on the Italian borders. The remaining 50% is assigned according to the regulations laid down by the neighbouring countries;

- Resolutions 281/05 concerning the economic conditions for connection to electricity grids (with voltage over 1 kV) by electricity generating plants using conventional and/or renewable sources.

2.2 Main actors

Transmission system operator

TERNA Rete Elettrica Nazionale S.p.A. - is the company in charge of electricity transmission and dispatching activity over the high-voltage (HV) and extra-high voltage (EHV) grid throughout Italy.

Its current structure is the result of the acquisition implemented in November 2005 of the branch of business of GRTN as defined by Prime Minister's Decree of 11 May 2004.

TERNA is a listed company. Its shares were first traded on the Stock Exchange on June 2004.

Currently, its relative majority shareholder is "Cassa Depositi e Prestiti", with a stake of 29,99% of TERNA's share capital. The other Shareholders are: Retail market (26,76%), Institutional investors (33,06%), Insurances (5,04%), ENEL (5%).

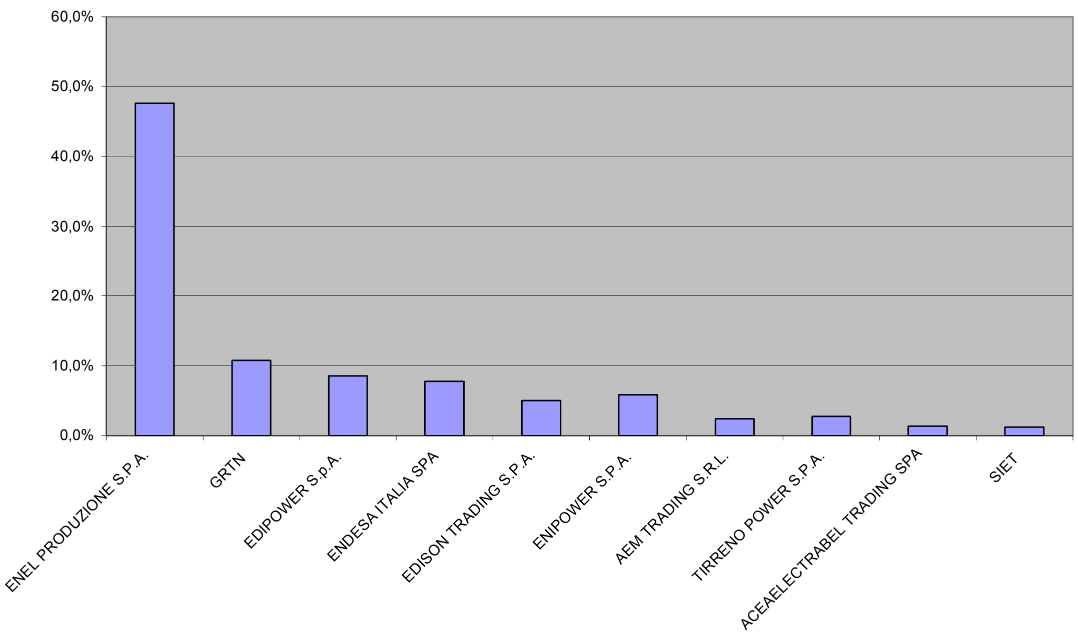
In August 2005, TERNA started the process for completing the acquisition of the other portions of national transmission HV and EHV owned by other parties.

In August 2005, TERNA acquired the Transmission assets owned by ACEA Trasmissione and in November 2006, it began the acquisition of the assets owned by EDISON and AEM Trasmissione. As of today, TERNA is the owner of more than 96% of the national transmission network throughout Italy.

TERNA owns two subsidiary companies in Brazil: Transmissora Sudeste Nordeste S.A: (TSN) and Novatrans Energia S.A.

Main generators

The figure below shows the market share of the main generators until September 2006:



Generator	Market Share (%)
ENEL PRODUZIONE S.P.A.	47,6%
GRTN	10,8%
EDIPOWER S.p.A.	8,5%
ENDESA ITALIA SPA	7,8%
EDISON TRADING S.P.A.	5,0%
ENIPOWER S.P.A.	5,9%
AEM TRADING S.R.L.	2,4%
TIRRENO POWER S.P.A.	2,8%
ACEAELECTRABEL TRADING SPA	1,4%
SIET	1,2%

Distributors
In Italy there are almost 200 distribution companies. The most important are :
- Enel Distribuzione
- AEM Milano
- ACEA Roma
- IRIDE Energia
- ASM Brescia
- AGSM Verona

Main traders
The main trading companies operating in Italy are:

- Enel Trade
- Edison Trading
- EGL Italia
- Aare Ticino SA di Elettricità
- Sorgenia
- Endesa Trading
- EDF Trading
- AEM Trading

Other players
- The Electricity and Gas Regulatory Authority (AEEG)
- The Ministry of Economic Development
- The Ministry of Economy and Finance

3. Transmission Network and System Issues

3.1 Status of international interconnections

Existing international interconnections

From	To	Type AC/DC Single/Double	U,kV
Italy	**France**		
Venaus	Villarodin	AC single circuit	380
Rondissone	Albertville	AC double circuit	380
Camporosso	Le Broc-Carros	AC single circuit	220
Santa Teresa	Bonifacio	AC single circuit	150
Italy	**Switzerland**		
Musignano	Lavorgo	AC single circuit	380
Bulciago	Soazza	AC single circuit	380
S. Fiorano	Robbia	AC double circuit	380
Avise	Riddes	AC single circuit	220

Valpelline	Riddes	AC single circuit	220
Pallanzeno	Moerel	AC single circuit	220
Ponte	Airolo	AC single circuit	220
Mese	Gorduno	AC single circuit	220
Italy	**Austria**		
Soverzene	Lienz	AC single circuit	220
Italy	**Slovenia**		
Redipuglia	Divaccia	AC single circuit	380
Padriciano	Divaccia	AC single circuit	220
Italy	**Greece**		
Galatina	Arachthos	DC single circuit	200

Ongoing studies in international/cross-border interconnections

From	**To**	***Type AC/DC* Single/Double**	**U,kV**	**P,MW**	**Date for study completion**	**Expected date for commissioning the line under study**
Italy	Slovenia	AC double circuit	380		2007	
Italy	Austria	AC single circuit	380		2006	
Italy	France	AC single circuit	380		2007	

Lines under construction (internal and cross-border)

From	**To**	***Type AC/DC* Single/Double**	**U,kV**	**P,MW**	**Expected date for commissioning the line**
Matera	Santa Sofia	AC single circuit	380		starting operation in 2007
Sardegna (Fiumesanto)	Penisola Italiana (Latina)	Bipolar DC	500	1000	starting operation in 2008

3.2 Network development plan

On an annual basis, TERNA draws up the National Transmission Development Plan on the basis of the general criteria set by the Italian Regulatory Authority and subject to the approval of the Ministry of Economic Development. The Network plan contains the criticalities of the grid and the main development measures to be realised over a short and long term period.

Main events

As far as the operation of the national transmission network, the main events which occurred in 2006 in the Italian transmission systems are:

11 January: outage Power line 380 kV Rumianca-Sarlux. Energy not supplied: 66 MWh
17 July: outage Power line 380/220 kV Chiaramonte Gulfi. Energy not supplied 748 MWh.
25, 26, 27July: load shedding procedure of interruptible clients
4, 5 November: load shedding procedure of interruptible clients and not interruptible clients

As far as the development of the national network, during the course of 2005, TERNA completed the technical and administrative procedures for the authorisations of the following projects:

- connection between Sardinia and Italian mainland (SAPEI) 500 kVcc line;
- Matera- Santa Sofia 380kV line;
- Sardinia - Corsica (SARCO) 150kV cable.

4. Electricity Market Structure

GME (Gestore del Mercato Elettrico - Market Operator) is responsible for organising and managing the electricity market, an electronic marketplace where the clearing price is obtained from the intersection of electricity demand bids with supply offers submitted by market participants. The electricity market is also a physical market, where the schedules of electricity injections into and withdrawal from the power grid are defined under the economic merit-order criterion.

The electricity market consists of:

- Day-Ahead Market - MGP(energy market);
- Adjustment Market - MA (energy market);
- Ancillary Services Market - MSD.

In particular:

- Day –Ahead Market (MGP): it closes at : 9:00 a.m. of the day proceeding the day to which offers/bid refer; this market hosts the majority of electricity purchase and sale transactions. Offers/bids may also be submitted in the days preceding the MGP session to which they refer, i.e. up to 9 days before.
- Adjustment Market (MA): it opens at 10:30 a.m., after the notification of the MGP results, and closes at 2:00 p.m.; in this market, participants may revise the schedules defined in the MGP, by submitting additional supply offers or demand bids;
- Ancillary Services Market (MSD): it opens at 2:30 p.m., after the notification of the MA results, and closes at 4:00 p.m. In the MSD, TERNA S.p.A. procures the resources required for managing, operating and controlling the system (intra-zonal congestion relief, creation of reserve capacity, real-time balancing).

5. Other

Link	Company
www.terna.it	TERNA website
www.mercatoelettrico.it	GME website
www.autorita.energia.it	Electricity and Gas Authority

LUXEMBOURG

1. Basic capacity, generation and consumption data

Installed capacity by fuel, MW		
	Thermal	480
	Hydro	1128
	Nuclear	-
	Renewables	66
	Total	**1675**
Yearly generation fuel by fuel, TWh		
	Thermal	3.105
	Hydro	0.872
	Nuclear	-
	Renewables	0.107
	Total	**4.084**
Annual consumption, TWh		**6.231**
Imports, TWh		**6.401**
Exports, TWh		**3.151**

2. Industry structure

2.1 Recent key developments

8 November 2004: Creation of Cegedel Net S.A. Cegedel Net’s corporate purpose is the management of electricity transmission and distribution networks in the Grand Duchy of Luxembourg. Accordingly, since 1 January 2005, Cegedel Net has been managing the Cegedel Group’s transmission and distribution networks. This is because the European Directive of 26 June 2003 on the deregulation of the electricity market requires the legal separation of electricity transmission and distribution activities from other sector activities such as the generation and supply of electricity. Although this directive is still being transposed into national legislation, Cegedel, in accordance with the spirit of the directive, set up Cegedel Net S.A., a wholly owned subsidiary of Cegedel S.A. on 8 November 2004. Cegedel Net’s corporate purpose is the non-discriminatory operation of transmission and distribution networks in the Grand Duchy of Luxembourg. It was on this basis that it was charged with managing the parent company Cegedel’s networks. The new grid operator is responsible for the planning, building, development, maintenance and operation of these networks. Under service contracts, Cegedel Net assigns the technical staff - who remain employed by the parent company – the responsibility for the construction, operation, maintenance and repair of its networks, except for the high-voltage networks whose construction and operation remains under the responsibility of Cegedel Net. This subcontracting arrangement means that the grid operator employs only 103 people.

The electricity market is opened:

- All non domestic clients are actually eligible.
- 100% opening will be achieved by 1 July 2007, but the new law could even specify an earlier date for this opening.
- Legal unbundling of TSO/DSO and commercial activities.

2.2 Main actors

<u>Transmission system operator</u>
CEGEDEL NET S.A., the public transmission and distribution system operator.

SOTEL, a cooperative society of steel industry with overhead lines between factory plants.

Main generators
SEO, pump storage 1.100 MW
TWINERG, thermal cogeneration 385 MW

Distributors
Own distribution by the following Municipalities :
Ville de Luxembourg
Ville d'Esch-sur-Alzette
Ville de Diekirch
Ville d'Echternach
Ville d'Ettelbruck
Steinfort
Vianden
Private Distributors:
Mersch

Main traders & other players
CEGEDEL Trade and supplier
SOTEL
SOTEG

3. Transmission network and system issues

3.1 Status of international interconnections

Existing interconnections

FROM	TO	Type AC/DC Single/Double	U,kV	P,MW
Luxembourg	**Germany**			
Heisdorf	Trier	AC single circuit	220	490
Heisdorf	Quint	AC single circuit	220	490
Flebour	Bauler	AC single circuit	220	490
Roost	Bauler	AC single circuit	220	490
Vianden	Niederstedem	AC double circuit	220	2 x 490
Vianden	Niederstedem	AC single circuit	220	730
Vianden	Bauler	AC single circuit	220	730
Luxembourg	**Belgium**			
Belval	Aubange	AC double circuit	220	2 x 358
Belval	Aubange	AC double circuit	150	2 x 157

Ongoing studies in international/cross-border interconnections;
On behalf of CEGEDEL NET, a study is to be prepared in order to determine the *pros* and *cons* of future interconnections to neighbouring TSOs.

Network development plan
Network development and needs for new transmission lines under responsibility of TSO/DSO CEGEDEL NET S.A..
The Ministry for Economic Affairs/Energy will watch over the grid development and the interconnections.

4. Electricity market structure

According to the new law, operation and practical rules will be defined in a "Grid Code".
Access to the grid is granted to all suppliers, producers, and clients that conform with the opening criteria. Consumers, traders and suppliers will build individual balancing groups.
Schedules must be given before 14h30 of the day ahead of the consumption. The energy bought by a balancing responsible (production or import from another balancing group) is injected in the balancing group. Consumption of energy or export to another balancing group is debited to the balancing group. Settlement of a balancing group will be done on a ¼ hour base by the TSO and the needed regulation energy is charged to the balancing group.

Since Luxembourg (CEGEDEL NET) has no frequency regulation responsibility inside UCTE, the regulation energy is bought by the TSO CEGEDEL NET from the zone regulation responsible (RWE NET) at the same conditions as this party will procure it in the market.

Network users have to pay for the use of the grid. This will include costs for investments, capital costs, operational costs, losses, and system services as well as international interconnections.

All prices for the use of the network are agreed by the Ministry/Regulatory and published. Producers will not have to pay for the network (G=0)

5. Other

Link	**Company**
www.cegedel.lu www.cegedelnet.lu	CEGEDEL CEGEDEL NET
www.ilr.lu	Regulatory Authority

MONTENEGRO

1. Basic Capacity, Generation and Consumption (year 2005)

Installed capacity by fuel, MW		
	Thermal	210
	Hydro	658
	Nuclear	0
	Renewables	**0**
	Total	**868**
Yearly generation fuel by fuel, TWh		
	Thermal	890
	Hydro	1.834
	Nuclear	0
	Renewables	0
	Total	**2.724**
Annual consumption, TWh (losses included)		**4.543**
Imports, TWh		**1.819**
Exports, TWh		**0**

2. Industry structure

2.1 Recent key developments

After the Energy Law came into force in June 2003, the conditions for the organisational restructuring of Electric Power Industry of Montenegro (Elektroprivreda Crne Gore, hereinafter referred to as EPCG-AD Niksic) and the liberalisation of electricity market were created. In January 2004, Energy Regulatory Agency was established in compliance with the Energy Law as autonomous, functionally independent and non profit organisation. In October 2005 Montenegro accepted the Treaty on Establishment of Energy Community of South Eastern Europe, which came into force on 1 July 2006.

According to new "Internal Organisation of EPCG-AD Niksic" (published on 29 July, 2005), EPCG-AD Niksic is a vertically integrated and functionally unbundled undertaking, with clearly unbundled responsibilities and management at all levels. There are four Functional Entities (FC): Transmission, Supply, Distribution, Generation, and one organisational entity Elektrogradnja, plus the Head Offices of the Company.

All laws and bylaws were harmonised with the Directives issued by the European Parliament and the Council of the European Union. Montenegro has been an active participant of Athens Forum and signed the Athens Memoranda of Understanding for the establishment of an Energy Community for South Eastern Europe.

Functional Unit Transmission is an independent transmission, control system and market operators. Regulatory Agency issued licenses to these operators on 1 January 2006. The market operator has created market rules, which are, after the adoption procedure within the Electric Power Industry of Montenegro, submitted to Regulatory Agency for adoption.

2.2 Main actors

Transmission system operator

Transmission FC consists of Elektroprenos, National Dispatching Center and Market Operator. Each of those is a relevant license holder.

Elektroprenos deals with the maintenance, modernisation, upgrading and development of the transmission system of Montenegro.

National Dispatching Center (NDC)-TSO controls the electric power system of Montenegro, power flows in the network and towards other interconnected systems, contracts ancillary services, guarantees reliability and efficiency of system operation, provides and maintains electricity metering, etc.

Main generators

There are three power plants (Generation FC): Perucica HPP, Piva HPP and Pljevlja TPP, and 7 small HPPs (installed capacity – 9 MW).

Main power plants owned by EPCG are:

Perućica HPP	307 MW
Piva HPP	342 MW
Pljevlja TPP	210 MW

Foreseen/outgoing projects for new generating units

In Montenegro:

Koštanica HPP	552 MW	and 1120.4 GWh yearly production
Morača HPP:	357,2 MW (with 3 units)	and 1053.9 GWh yearly production
	or 238 MW (with 2 units)	and 693.7 GWh yearly production
Pljevlja TPP	210 MW	and 1000 GWh yearly production
Komarnica HPP	168 MW	and 231 GWh yearly production
Ljutica HPP	224 MW	and 553.6 GWh yearly production

Distributors

Distribution FC consists of 16 local distributions which maintain, develop and manage 35 kV, 10 kV and 0.4 kV grids.

Main traders

According to Draft Market Rules, the Regulatory Agency issues licenses to trades, but traders in Montenegrin market currently do not have the licenses. There are 8 traders at the moment, and it is expected that the number will increase once the 400 kV Podgorica – Elbasan line is completed.

Other players

Supplier

The only privileged supplier for tariff customers is Supply FC (regulated sector).

Eligible customers

There are 3 eligible customers in Montenegro and their consumption represent 50% of the total consumption in Montenegro. They procure one third of their consumption in the free market, at contracted prices.

3. Transmission network and system issues

3.1 Status of international interconnections

Existing international interconnections

From	To	Type AC/DC Single/Double	U, kV	Thermal capacity, MVA
Podgorica	Trebinje(BiH,RS)	AC-Single	400	1330
Ribarevine	Kosovo(Sr)	AC-Single	400	1330
Perucica	Trebinje(BiH,RS)	AC-Single	220	275

Piva	Buk Bijela(BiH,RS)	AC-Single	220	380
Podgorica	Vau Dejes(Alb)	AC-Single	220	275
Pljevlja	Bajina Basta(Sr)	AC-Single	220	275
Pljevlja	U.Pozega(Sr)	AC-Single	220	380

Ongoing studies in international/cross-border interconnections

From	To	Type AC/DC Single /Double	U, kV	Thermal capacity, MVA	Date for study completion	Expected date for commissioning the line under study
Podgorica	Elbasan(Al)	AC-Single	400	1300	2007	2009

Future projected interconnections

From	To	Type AC/DC Single/Double	U, kV	Thermal capacity MVA	Expected date for commissionig the line under study
Pljevlja TPP	Buk Bijela HPP (BiH R.Srpska)				

3.2 Network development plan

Elektroprenos, as license holder, is responsible for development of transmission network (400 kV, 220 kV and 110 kV). According to the Energy Law and Grid Code, there are short-term (one year) and medium-term (5 years) development plans.

Distribution FC is responsible for distribution network development plans and distribution network development itself.

Transmission FC and Distribution FC must harmonise their development plans.

3.3 Main events

8 old 110/35 kV power transformers, 8 220 kV circuit breakers and 20 400 kV disconnectors have been replaced with new ones. New 110 kV Podgorica – Cetinje line was put in operation on 31 December 2004.

4. Electricity market structure

Electricity Market is managed by the Market Operator in accordance with Law, License and Rules. The Market Operator organises and manages the electricity market for the benefit of the electricity market participants and all transmission network users. The Market Operator has no right to participates in the electricity market as a market participant for its own need.
According to the Energy Law, Transmission FC shall apply to the Agency for the Market Operator License.
According to the Energy Law, the Market Operator, as holder of "Electricity Market Operator License", submits to the Agency for approval rules that establish:

- the rules and regulations governing participation in the electricity market in Montenegro; and
- a framework and timetable for the creation of an energy supply market.

The Market Operator shall:

- maintain records, that include all legally binding obligations of Suppliers and Contract Customers;
- establish rules and procedures in order to ensure that such procedures are objective, transparent and non-discriminatory;
- receive bids for the supply of electricity;
- oversee, maintain and improve the system of economic dispatch;
- coordinate with the Transmission System Operator (TSO);
- organise a financial wholesale electric energy settlement in Montenegro;
- coordinate with the Transmission System Operator concerning the annual maintenance of transmission facilities;
- preserve the confidentiality of commercially sensitive information;

- define the procedure for resolving disputes occurred in electricity market;
- coordinate electronic software development and organise training for market participants;
- establish Rules for submitting and creating programs, and other rules defining in detail certain segments related to electricity market. According to Draft Rules it is foreseen that the major part of trade will be performed through bilateral contracts between electricity market participants. It is foreseen that there will be an Intraday Market for the purpose of balancing electric power system of Montenegro, as well as the ancillary services market which will be based on principle of bilateral contracts between TSO and ancillary services provider.

5. Other

Link	Company
www.epcg.cg.yu	Elektroprivreda Crne gore-Electric Power Industry of Montenegro
www.regagen.cg.yu	Regulatory Energy Agency
www.vlada.cg.yu/eng/minekonom/	The Ministry of Economy
www.tso-epcg.com	TSO-Montenegro

NETHERLANDS

1. Basic capacity, generation and consumption data (year 2005)

Installed capacity by fuel, MW		
	Thermal	19475
	Hydro	37
	Nuclear	449
	Renewables	2016
	Total	**21977**
Yearly generation fuel by fuel, TWh		
	Thermal	88.6
	Hydro	0.1
	Nuclear	3.8
	Renewables	3.9
	Total	**96.4**
Annual consumption, TWh		**114.7**
Imports, TWh		**23.7**
Exports, TWh		**5.4**

2. Industry structure

2.1 Recent key developments

As from 1 July 2004 the entire electricity market is open. For green energy, it was already open for all customers as from 1 July 2002.

Three out of the five biggest producers were privatised and got foreign owners after the liberalisation in 1998. One owner has already left and the generation was bought by a distributor. Privatisation of suppliers (distributors) is still under discussion. A law is being discussed in Parliament for the unbundling the activities of network operators and suppliers. Network operators will not be allowed to be privatised (at least not in the coming years). Suppliers will receive permission to privatise once they have separated their network activities.

The TSO, TenneT, is fully unbundled from market parties. Since the end of 2001, the shares are in the hands of the national authorities.

2.2 Main actors

Transmission system operator
TenneT is since 1998 acting as TSO for the Netherlands. It is responsible for providing system services for the whole system and transmission services on the 220- and 280 kV-level in the whole country.

Transmission services on lower voltage levels are provided by some 20 network operators. In 2004 TenneT has taken over the transmission service of a regional network company and its aim is to become the transmission operator for all voltages above 110kV. During 2005 the operational activities of the regional control-centre of the acquired network were integrated in the national-control centre of TenneT.

Main generators
The main locations for generation are:
- Eemshaven 2400 MW
- Maasbracht 1300 MW

- Geertruidenberg	1250 MW
- Hemweg	1200 MW
- Maasvlakte	1050 MW
- Velsen	850 MW
- Borssele	850 MW

One big power plant (850 MW) came in operation in 2004 near Rotterdam along with some smaller units and several wind power installations. Some new industrial units are foreseen in 2007 (300 MW) and in the period up to 2010, 2400 MW new generating capacity might be connected to the grid. For the years after that, several initiatives are taken but it is still unclear which projects will have priority. Some older generating plants may be decommissioned if the market circumstances become unfavourable for their economic operation.

<u>Distributors</u>

There are a large number of suppliers of electrical energy. However, some merging has taken place among the distributors. The biggest suppliers on the moment are NUON, Essent and Eneco

<u>Main traders & other players</u>

A very important player is the Amsterdam Power Exchange, which operates a day-ahead market and an adjustment market. Furthermore, some brokers are active and all producers and suppliers may act as trader, directly or via the APX.

3. Transmission network and system issues

3.1 Status of international interconnections

<u>Existing international interconnections</u>

FROM	TO	Type AC/DC Single/Double	U,kV	P,MVA
Meeden (Nl)	Diele (D)	AC double + PSTs	380	2 x 1000
Hengelo (Nl)	Gronau (D)	AC double	380	2 x 1790
Maasbracht (Nl)	Rommerskirchen/Siersdorf (D)	AC double	380	2 x 1710
Maasbracht (Nl)	Gramme/Meerhout (B)	AC double	380	1 x 1350/1 x 1420
Geertruidenberg (Nl)	Zandvliet (B)	AC single	380	1 x 1645
Borssele (Nl)	Zandvliet (B)	AC single via 380/150 kV transformers	380	1 x 450

The total sum of the capacity is 14 865 MVA. Taking into consideration the actual flows in Germany, Belgium and the Netherlands, the (N-1) reserve margin and the TRM (300 MW) a total cross-border capacity of 3850 MW (ATC) is available for the market.

<u>Ongoing studies in international/cross-border interconnections;</u>

FROM	TO	Type AC/DC Single/Double	U,kV	P,MW	Date for study completion	Expected date for commissioning the line under study
Maasvlakte (Nl)	UK	DC single	?	?	2007	2010

<u>Lines under construction (internal and cross-border)</u>

FROM	TO	Type AC/DC Single/Double	U,kV	P,MW	Expected date for commissioning the line
Eemshaven (Nl)	Feda (N)	DC single	$\pm$ 450	700	Begin 2008
Maasvlakte	Bleijswijk	AC double	380	2 x 2750	2010
Bleijswijk	Beverwijk	AC double	380	2 x 1900	2012

<u>Future projected interconnections</u>
Studies are regularly performed with the Belgian and German TSOs in order to study the weak points in the transmission and interconnection system. As a result, the Belgian TSO is installing Phase shifters on the Netherlands-Belgian border.

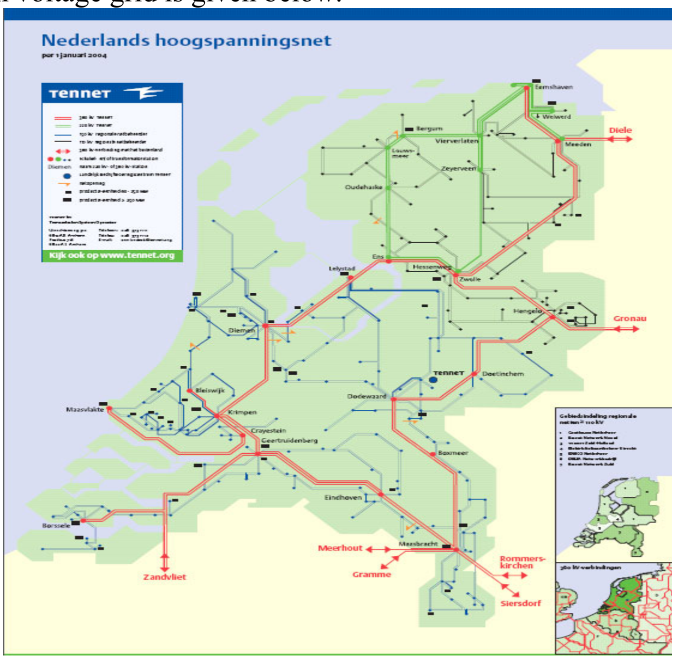
<u>Study needs</u>
The optimal settings of the 6 Phase shifting transformers which will be present in the future on the border with Germany and Belgium needs further attention.

3.2 Network development plan

In accordance with the Electricity Act, the network operators must draw up every other year a so-called Capacity Plan in order to aggregate the future capacity requirements, to identify possible bottle-necks and adapt the system to the future needs of system users. The capacity Plan is submitted to the Regulator, who examines it and who gives advises about the content to the Minister.

The capacity plan identifies future needs for transmission and estimates a more exact approximation (over a 7-year period) of the resulting flows in the grid. All network operators collaborate in performing the necessary studies and inquiries and the measures to solve bottlenecks have to described.

A map of the existing high voltage grid is given below.



3.3 Main events

In some periods of the year there were extensive flows along the Dutch grid because of huge wind power generation in the Northern part of Germany and a strong demand in the Southern part of Germany, Belgium and France. These transit flows caused that, over ten days, the ´(N-1) security level´ on the border with Germany was overstepped for a total of about 8 hours. In order to enhance the manageability of these transit flows, consultations began with German, Belgian and French TSOs and authorities. As a result, by the end of the year, detailed operational arrangements have been agreed upon, in which each of the involved TSOs is committed to take counter-measures to reduce these transports when jeopardising network security. On the 25 November 2005, storms in combination with heavy snowfall in the North-Western part of Europe caused ice-deposits on overhead lines which resulted in line-galloping and damage on several lines, mainly in the regional grids. The earthing-conductors of the 380 kV interconnections with Belgium

´Borssele/Geertuidenberg-Zandvliet´ were seriously damaged. Total loss of interconnection with Belgium could be avoided, but the (N-1) security was nevertheless endangered during some hours.

4. Electricity market structure

In the Netherlands the 1997 EU Directive has been implemented in the Electricty Act 1998, which provided for a gradual liberalisation to 100% over the period until 1 July 2004. At the same time a Regulator (Dte) was established to supervise compliance with this Act and to implement guidelines and codes for a proper and efficient functioning of the system.

A whole range of electricity supply functions were unbundled when the Electricity Act 1998 came into force. Trading of electricity and separately keeping balance are the major new aspects in the current set-up of electricity supply.

The function of transmission remained more or less the same but the environment in which the network operators and network managers have to operate has changed completely. The market parties, generators and consumers, trade their goods and the network has to facilitate their wishes.

Rather than the power balance being preserved by the generating companies using central dispatch, as it was before, it is now the system operator, which is in charged with preserving the balance. In order to be able to acquit itself of this responsibility, TenneT, in its role of the Dutch Transmission system operator, has introduced a system of Programme Responsibility through which the balance between demand and supply is secured in advance by approval of the energy programmes submitted by the Programme Responsible Parties.

The need to maintain the power balance has also prompted the establishment of a special market for regulating and reserve power. Any current discrepancies between planned and actual supply and demand are offset and settled using the market. TenneT makes contracts with market parties for a portion of the regulating and reserve power requirement, so as to ensure a minimum supply of regulating power and reserves.

The current trade has prompted virtually all electricity companies to set up strong trading and risk management organisations. This has been a major operation as prior to liberalisation most of these companies had no involvement in trading and volume and price risks were hardly an issue.

The organisational set-up of the electricity market predominantly consists of trade via public exchanges and contractual trade. Both types of trade have become increasingly internationally oriented in recent years.
This process of internationalisation has already caused significant changes to occur in the load flows across the European grid and this phenomenon has required the expansion of the capacity of the cross-border interconnections between the Netherlands, Germany and Belgium. An auction of cross border capacity has been set up to deal with shortage on international exchange capacity.

5. Other

Link	Company
www.tennet.org	TSO for the Netherlands
www.apx.nl	Amsterdam Power exchange (daughter company of TenneT)
www.tso-auction.org	TSO Auction (daughter company of TenneT)
www.nma-dte.nl	Dienst uitvoering en toezicht Energie (regulator)
www.energiened.nl	EnergieNed (association of energy companies)
www.minez.nl	Ministry of Economic Affairs

POLAND

1. Basic capacity, generation and consumption data (year 2005*)

Installed capacity by fuel, MW		
	Thermal	29724
	Hydro	2245
	Nuclear	0
	Renewables	108
	Total	**32077**
Yearly generation fuel by fuel, TWh		
	Thermal	140.18
	Hydro	3.55
	Nuclear	0
	Renewables	0.22
	Total	**143.95**
Annual consumption, TWh		**130.06**
Imports, TWh		**5.00**
Exports, TWh		**16.19**
Load of pump storage power plant		*2.16*

* *The Energy Market Agency data (netto)*

2. Industry structure

2.1 Recent key developments

The PSE-Operator S.A. company has been separated from the organizational structure of PSE SA. As of July 1, 2004 the Company acts as the Polish Transmission System Operator.

On December 27, 2006 General Assembly of PSE SA made a resolution to transfer (not later than December 31, 2006) PSE-Operator S.A. (as material dividend) to the Ministry of the Treasury. From that moment PSE-Operator SA is no longer part of PSE Capital Group.

Currently, involved parties, are working on solution of transferring the transmission assets from PSE SA to PSE-Operator S.A.

<u>Renewable energy</u>

In August 2001 the Polish Parliament adopted .Strategy for renewable energy. The goal of the strategy is to achieve 7,5 – 9 % of total electric energy production from renewable energy sources (RES) in total end-users consumption up to 2010 (increase a 1,5 % with relation to resolution from 2003). Detailed information on this subject provided Resolution of Minister of the Economy of 19 December 2005 on the detailed scope of the duties to purchase electricity and heat from renewable energy sources and electricity co-generated with the production of heat.

In May 2003 a secondary legislation to the Energy Law concerning the obligation to purchase electricity and heat from renewable energy sources and electricity generated in combined heat and power units, was amended. The modification combines details of calculation of RES shares and technical specifications of the energy sources. In 2005 this purchase obligation amounts to 3,1 % in total annual sale of electricity of the specific energy company.

Under the provisions of amended the Energy Law to the extent pertaining to renewable sources of energy all power companies dealing with generation of electricity or its trade and selling such energy to the end-users on the territory of Poland are obliged to obtain and submit to the President of Power Sector Regulatory Office the certificates of origin confirming that energy has been generated at renewable sources of energy for the purposes of their cancellation.

The task of running a register of green certificates and organisation of trade in proprietary rights under the green certificates was commissioned to the Towarowa Giełda Energii S.A., as the sole entity in Poland running a commodity exchange in the understanding of the Commodity Exchanges Act dated October 26, 2000.

2.2 Main actors

Transmission system operator

PSE-Operator S.A. – performing the tasks of transmission system operator in Poland within the scope and in the manner stipulated in valid legal regulations and in the condition for the decision of the President of the Energy Regulatory Office.

On 15 April 2004 PSE-Operator S.A. was granted a license for transmission and distribution of electric energy and it started its operation on 1 July 2004.

PSE-Operator S.A. is not the owner of the transmission assets, but use the assets, on the basis of a 'Leasing Agreement' concluded with PSE SA.

Main generators
Main generators (for the end of 2005) are as follows:

Bełchatów TPP	4430 MW	Pątnów TPP	1200 MW
Kozienice TPP	2880 MW	Łaziska TPP	1155 MW
Połaniec TPP	1800 MW	Siersza TPP	805 MW
Rybnik S.A. TPP	1775 MW	Łagisza TPP	710 MW
Dolna Odra TPP	1742 MW	Ostrołęka TPP	626 MW
Turów TPP	2106 MW	Siekierki CHP	619 MW
Jaworzno III S.A. TPP	1345 MW	Adamów TPP	600 MW
Opole S.A. TPP	1519 MW	Skawina	575 MW

In 2005 the rated power of the Pumped-Storage Power Plants amounted to 1708,5 MW. The most important PSPP are as follows:

Żarnowiec PSPP	716 MW	Solina PSPP	206,5 MW
Porąbka – Żar PSPP	540 MW	Dychów PSPP	90 MW
Żydowo PSPP	156 MW		

Foreseen/Outgoing projects for new generating units;
- Bełchatów II TPP 833MW (2009)
- Pątnów 464 MW (2008)
- Łagisza 460 MW (2009)

Distributors
The distribution sub-sector covers 14 distributive enterprises holding the concessions from the President of the Energy Regulatory Authority for the distribution and turnover of electricity energy. They are responsible for the distribution of electric energy through 110 kV lines and medium voltage network, supplying energy to final consumers and commercial turnover of energy.

Main traders & other players
The following entities play an active role on the electricity market: generators, distribution companies (main buyers of energy), wholesale electricity traders, big end customers (using TPA rules), Towarowa Giełda Energii SA as the Polish Power Exchange and PSE SA (since July 2004 PSE Operator SA) as a TSO. Over 200 companies have concession for the turnover of electric energy.

There are also companies offering the purchase of electric energy via Internet: Platforma Obrotu Energią Elektryczną as the Electricity Trading Platform, Kantor Energii as the Electricity Shop or Trade Operator and Internetowa Hurtownia Energii (The Internet Energy Wholesale).

3. Transmission network and system issues

3.1 Status of international interconnections

Existing international interconnections

From (PL)	To	Type AC/DC Single/Double	U, kV	Thermal capacity*), MVA
Krajnik	Vierraden (Germany)	AC- Double	400, operating on 220 kV	914
Mikułowa	Hagenwerder (Germany)	AC- 2*Single/Double[1)]	400	2772
Dobrzeń	Albrechtice (Czech Republic)	AC- Single[2)]	400	1205
Wielopole	Nosowice (Czech Republic)	AC- Single[2)]	400	1205
Kopanina	Liskovec (Czech Republic)	AC- Single[2)]	220	412
Bujaków	Liskovec (Czech Republic)	AC- Single[2)]	220	412
Krosno Iskrzynia	Lemesany (Slovak Republic)	AC- Double	400	1662
Słupsk	Starno (Sweden)	DC	±450	600 MW
Zamość	Dobrotwór (Ukraine)	AC- Single	220	385
Białystok	Roś (Belarus)	AC- Single	220	Disconnected
Rzeszów Widełka	Khmelnitskaya (Ukraine)	AC- Single	750	Disconnected

1) *on Polish side two single-circuit line, on Germany side double tower double circuit line.*
2) *lines are constructed as one double circuit*
*) temperature below 10^0 C (data for 2006)

Ongoing studies on international/cross-border interconnections (data for 2006);

From (PL)	To	Type AC/DC Single/Double	*U, kV*	P,MW	Date for study completion	Expected date for commissioning the line under study
Rzeszów Widełka	Khmelnitskaya (Ukraine)	AC-Single	750	1200 back-to-back	*, **)	Not defined yet
Poland (3rd interconnection)	Germany	AC- Double	400	Not defined yet	*, **)	Not defined yet
Byczyna	Varin (Slovak Republic)	AC – Double	400	Not defined yet	*, **)	Not defined yet

*) *Prefeasibility study was completed in 2001.*
**) *New study have been/ will be initiated*

Lines under construction (internal and cross-border) (data for 2006):

From (PL)	To (PL)	Type AC/DC Single/Double	U, kV	Thermal capacity, MVA	Expected date for commissioning the line
Olsztyn Mątki	Olsztyn	AC-Single	220	492	2006
Ostrów	Plewiska *)	AC-Single (on double tower)	400	1871	2007
Rogowiec	Ostrów	AC-1st circuit of double line	400	1358	2008
Trębaczew	Ostrów	AC- 2nd circuit of double line	400	1358	2008
Pątnów	Kromolice	AC- Double	400	3742	2009
Pasikurowice	Wrocław	AC-Single	400	1871	2011
Świebodzice	Wrocław	AC-Single	400	1871	2011

**) It's planned to introduce 400 kV line Plewiska – Ostrów to new Kromolice substation in 2009*

Couplings under construction (internal) (data for 2006):

Station	U/U, kV/kV	Expected date for commissioning
Olsztyn Mątki	400/220	2006
Gdańsk I *)	400/220	2007
Byczyna **)	400/220	2009
Morzyczyn	400/220	2009

*) *The existing 400 kV line Żarnowiec – Gdańsk Błonia will be introduced to Gdańsk substation*
**) *The existing 400 kV line Tarnów – Tucznawa will be introduced to Byczyna substation.*

Future projected interconnections

From (PL)	To	Type AC/DC Single/Double	U, kV	Thermal capacity, MVA	Expected date for commissioning the line
Krajnik	Vierraden (Germany)	AC- Double	Switch over to 400 kV	3242	Not defined yet
Ełk	Alytus (Lithuania)	AC - Double	400	1000 MW back-to-back converter station	After 2010

Study needs

Feasibility study on technical means for the elimination of the transmission grid “bottle necks” for East - West and West - East electricity transfer:

- Switching over the existing line Krajnik – Vierraden (Germany) from 220 kV to 400 kV level – The technical analysis have been initiated by the bilateral (VE-T and PSE-Operator) working group,
- Installation of the phase shifting transformers on existing and future 400(380) kV interconnection lines between Poland and Germany or Poland – Germany 3rd interconnection - new analysis by the bilateral working group VE-T and PSE-Operator will be eventually decided to be done as the next phase of the previous studies,
- New 400 kV Poland – Slovakia line will be analysed by the bilateral (PSE-Operator S.A. and SEPS a.s.) working group.

Feasibility study on activating the existing 750 kV Rzeszów Widełka – Khmelnitskaya international line by means of back-to-back converter station in Rzeszów Widełka substation.

3.2 Network development plan

Development Plan

In compliance with the Energy Law and licenses obtained from the Energy Regulation Authority (ERA), PSE-Operator S.A. periodically elaborates “Development plans for covering current and future electricity demand” (Similar plans are being prepared by distribution companies).

These documents refer to the area of regulated activity and are subject to an agreement with the President of the ERA. The draft of the Development Plan for the period 2006 – 2020 was sent to the President of the ERA for approval at the middle of July 2006.

The Development Plan contains the following information:

- on the current status of the transmission system, in terms of the requirement for power and electricity, sources of generation, the state of the transmission network, including the transmission bottlenecks in it and their consequences, the reliability of introducing power from the power station and the supply to customers, as well as on the capability of providing transmission services to the participants of the electricity market and also the assessment of the investment activities to date,
- on the scopes of electricity supply that are forecast for the coming years, together with demand forecast for power and electricity, and also on the expected way of covering that demand,
- on the directions of the required development of the transmission infrastructure of the TSO (modernisation and new investments), together with the timetable for their implementation over the coming years, as the result of the technical and economic analyses that have the purpose of

minimising the negative effects of the transmission bottlenecks that have also been forecasted for future years, and also the assessment of the economic effectiveness of investment activities,

- the TSO's financial analysis for the coming years, taking into account the costs, sources of income and the funding for the planned investment outlay.

In line with the PSE-Operator S.A. Development Plan, PSE SA's medium term investment plans for 5 year periods are prepared according to the principle of progressive planning that is a plan which is prepared each year for the forthcoming 5-year period.

3.3 Main events

Due to extreme cold weather in January, the peak demand in Polish power system reached its highest ever level since 1988 with 24640 MW (gross value). However, the generation reserves were still sufficient despite some generating companies had to limit their output due to extremely low temperatures (e.g. difficulties in lignite transport).

Also in the summer, Poland experienced extraordinary weather conditions, this time long lasting heat wave with extraordinary high temperature (the highest for the latest 227 years, i.e. since temperature has been recorded in Poland) and low rainfall (25% of average rainfall). These unusual weather conditions led to very difficult operational situation beginning with voltage instability incident on 26.06.2006 and further shortage of available generation capacity during the most of July. On 26.06.2006 the combination of several circumstances - among others - demand significantly higher then expected (especially for reactive power), forced outages of several generating units, including two must run ones combined with the long term overhaul of the important pump storage power plant resulted in serious voltage instability in north-east part of Poland. To prevent further spreading of voltage decrease and to return power system to normal operation PSE-Operator S.A. had to undertake several extraordinary remedial actions, including the load shedding of 110 MW. The extraordinary weather conditions continued in the next five weeks leading to operation of Polish power system close to its limits. Power system demand significantly increased by 10% comparing to the last year, mainly due increased usage of air-conditioning and cooling devices. On the other hand this long lasting heat wave caused significant limitations of generating capacities available in power plants due to deterioration of their cooling conditions as well as increase of network constraints in their vicinities. In order to balance the system PSE-Operator S.A. had to undertake extraordinary remedial actions by calling-up all available generating units usually non-dispatchable by TSO and curtailing on certain days the transmission capacities in export direction already allocated in monthly and yearly auctions. Furthermore, in two cases PSE-Operator S.A. had to use the support from the neighbouring TSOs in the form of emergency energy deliveries to maintain necessary generation reserves. Moreover, to manage difficult network operating conditions in the northern part of Poland PSE-Operator S.A. used in most working days of July emergency deliveries from Swedish TSO SvK. All these actions allowed secure operation of the Polish power system until August when the weather came back to normal conditions.

4. Electricity market structure

Organisation of the electricity market

The power market comprises three elements, which function as complementary markets:

- active power market - the subject of trade is active power, delivered in specific volumes, at specific price, time and supply point,
- technical market - the subject of trade are ancillary services, as well as electricity generated by specific generation units forced by technical constrains of the power system and its reliability and quality conditions,
- financial market - the subject of trade are financial contracts concerning supply of electricity.

The active power market in Poland is composed of the bilateral transactions (contractual) segment, the exchange segment and the balancing segment. The balancing segment administrated by the PSE-Operator S.A. is used for covering balance-adjusting actions and settlements which are necessary to execute electricity sale contracts concluded on the first two segments.

Contractual segment

In this segment, direct contracts with distribution companies are also executed, as with generators and trading companies, including a daughter company PSE-Electra SA. A contractual segment covering long-term contracts made between PSE SA and generators that are then transferred to distribution companies and end users via the wholesale tariff.

Exchange segment

The exchange segment covers exchange trades between market participants.

The exchange segment covers contracts for supplying electricity within a given period of time, and the price is worked out on the basis of equalising the supply and the demand for electricity.

On the exchange market trades is carried out by means of contracts concluded at Polish Power Exchange. Polish Power Exchange (Towarowa Giełda Energii S.A.) operated The Day Ahead Market from June 2000 and Future Market from October 2002.

Balancing segment

In 2005, 74 entities participated in the balancing market, including 19 generators, 19 buyers, 34 trading companies, the Energy Exchange and PSE-Operator S.A. itself as the Transmission System Operator. Technical and commercial data was reported by 39 market operators, referring to 283 scheduled units. Market players provided 14.2 TWh of balancing energy to the balancing market.

Financial and Energy Flows

Providing transmission services constitutes the main source of revenues from activities of PSE-Operator SA.

As part of non-tariff trading, PSE SA sold electricity to three power companies:

- PSE-ELECTRA SA – market sales; in 2005 it reached 12.2 TWh, which means an increase of about 86% from the 2004 volumes;
- Pumped Storage Power Plants (ESP SA); electricity sold for pumping purposes totalled 2 TWh, which represents 98.7% of the 2004 performance;
- PSE - Operator SA; 1.9 TWh (101.2% of plan) was sold to cover the balance gap in the transmission network.

Total export of electricity in 2005 amounted to 14 315,5*) GWh (within the confines of trade exchange 14 290,3 GWh).Total import of electricity in 2005 amounted to 3 129[*]) GWh (within the confines of trade exchange 3 118,6 GWh).

[*] *In comparison with value in the table from the paragraph 1., this value doesn't contain amounts of electricity coming from loop flows crossing the Polish transmission system.*

Cross-border electricity trade

In 2005 three transmission system operators: PSE-Operator S.A., CEPS (the Czech Republic) and VE-T (Germany) launched coordinated auctions for cross-border transmission capacities which initiated the development of regional electricity market in the Central and Eastern Europe. In the middle of April 2005 the first daily auction for transmission capacity on Polish borders place. The prepared and agreed with regulators at the end of 2005 auction rules became a basis for functioning of the auction system providing transmission capacities for the year 2006. The annual auction for 2006 took place in November 2005 and the first monthly auction for January 2006 took place on 13 December 2005. The most important changes in the auction rules for 2006 include:

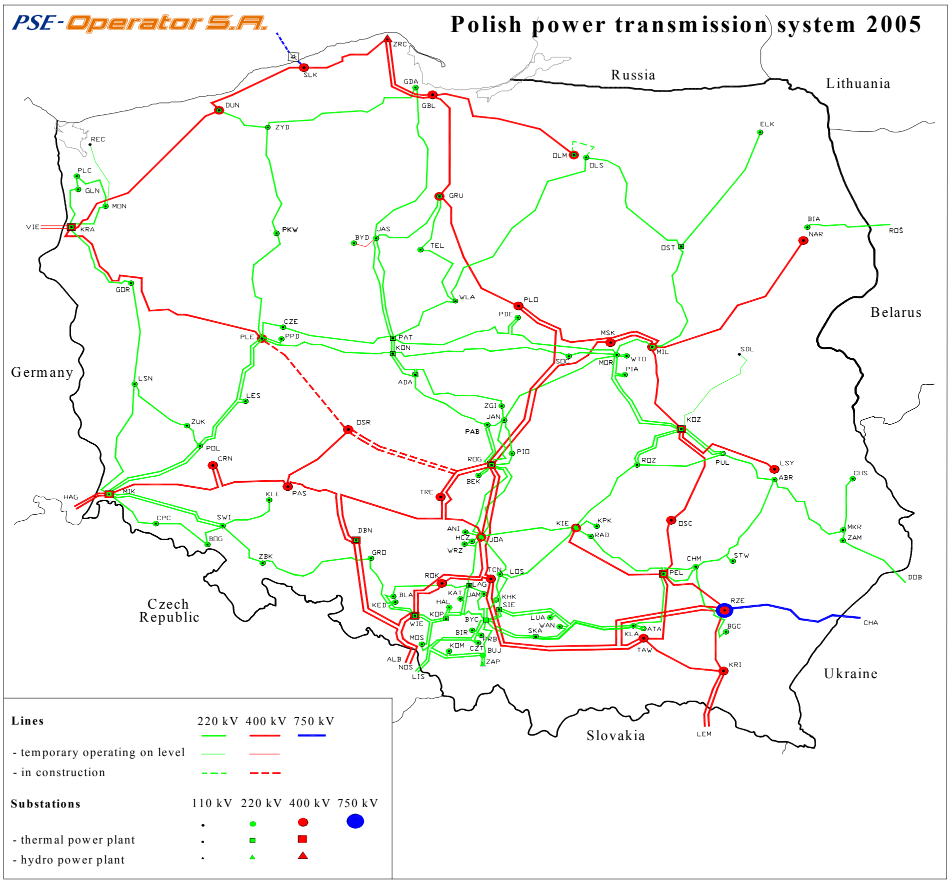
- extension of the co-ordinated mechanism of auctions for transmission capacities to additional two TSOs (E-ON and SEPS),
- making the auction definition and rules more precise, among others within the area of compliance with EU regulations, including transparency, securities, accounting procedures, reduction of transmission capacities,
- limitation of single bid made by a single auction participant to 50 MW,
- introduction of so-called bound bids (made for several cross-sections which may, in the course of auction process, be accepted or rejected as a whole).

Since 2005 PSE - Operator S.A. publishes forecasts of cross-border transmission capacity-determined with taking into consideration security standards, rules of power system operation and operation planning.

Total Transfer Capacity is published on PSE-Operator SA website www.pse-operator.pl

5. Other

Institutions/companies	**Links**
PSE-Operator SA	www.pse-operator.pl
Polish Power Grid Company	www.pse.pl/
PSE – ELECTRA SA	www.pseelectra.pl
Energy Regulatory Authority	www.ure.gov.pl/
Ministry of the State Treasure	www.msp.gov.pl /
Ministry of Economy	www.mg.gov.pl
Energy Market Agency	www.are.waw.pl/
Information Centre on the Electricity Market	www.cire.pl /
Polish Power Exchange	www.polpx.pl/
Electricity Trading Platform	www.poee.pl
Electricity Shop	www.jac-entra.pl
Internet Energy Wholesale	www.ihe.com.pl


PSE-Operator S.A.
Polish power transmission system 2005
Russia
Lithuania
Belarus
Germany
Czech Republic
Slovakia
Ukraine
Lines
220 kV
400 kV
750 kV
- temporary operating on level
- in construction
Substations
110 kV
220 kV
400 kV
750 kV
- thermal power plant
- hydro power plant

PORTUGAL

1. Basic capacity, generation and consumption data (net values, year 2005)

Installed capacity by fuel, MW		
	Thermal	6561
	Hydro	4915
	Nuclear	
	Renewables	1347
	Total	**12823**
Yearly generation fuel by fuel, TWh		
	Thermal	33.3
	Hydro	4.9
	Nuclear	
	Renewables	3.5
	Total	**41.7**
Annual consumption, TWh		**47.9**
Imports, TWh		**9.6**
Exports, TWh		**2.8**

2. Industry structure

2.1 Recent key developments

Regulation
The key issues in the evolution of the Portuguese electrical sector towards the liberalisation are:

1989 - Generating market opening to Small Independent Producers

1995 - Legislation setting a new framework for the Electricity Sector, which imposes the legal unbundling of Generation, Transmission and Distribution and imposes the obligation of a tendering process for new generating capacities:
- Decree Law 182/95
- Decree Law 183/95
- Decree Law 184/95
- Decree Law 185/95
- Decree Law 185/95
- Decree Law 187/95

1996 - Establishment of a Regulatory Entity

1997 - Legal Framework for the privatisation of a full vertically integrated Electricity Sector under the EDP Group.

1999 - Beginning of the final consumers Electricity Market liberalisation

2000 - Ownership and management separation of REN (transmission) from EDP group. Decree Law 198/2000

2003 - Definition of the conditions for the participation of external agents and traders in the Portuguese market.
Legal framework for the termination of the PPA´s (Power Purchase Agreements within the Public System), for the organised market and for the agents that operate in the Portuguese market.
- Decree Law 184/2003
- Decree-Law 185/2003

2004 - Total market opening. All low voltage clients are free to choose alternative suppliers.
- Decree-Law 36/2004

- Decree-Law 192/2004

2006 Legislation setting a framework for the Electricity Sector fully compatible with Directive 2003/54/EC:

- Decree-Law 29/2006
- Decree-Law 172/2006

2.2 Main actors

TSO

REN - Rede Eléctrica Nacional, S. A., the Portuguese TSO, is the sole company responsible for the system and market operation in mainland Portugal. It holds the concession of the transmission network – lines and substations of 150, 220 and 400 kV – including the interconnection with Spain.

Main generators

Main generating companies in Portugal are EDP Produção, Tejo Energia and Turbogás.

The main generating plants are of the thermal type. In the following table are selected those plants with installed capacity greater than 180 MW:

Alto Lindoso	630 MW
Aguieira	336 MW
Vila Nova II (Frades)	196 MW
Miranda	369 MW
Picote	195 MW
Bemposta	240 MW
Pocinho	186 MW
Valeira	240 MW
Régua	180 MW
Carrapatelo	201 MW
Alqueva	240 MW
T. Outeiro CC	990 MW
Ribatejo	1176 MW
Pego	584 MW
Carregado	710 MW
Setúbal	946 MW
Sines	1192 MW
Tunes	197 MW

Foreseen/Outgoing projects for new generating units

In the following table are indicated the expected new generation:

a) Conventional

Year	Name	Type	Ratted power (MW)
2006	Tunes	Thermo Fuel Decommissioned	-32
2006	Pego or Sines	Thermo CC	800
2008	Carregado	Thermo SC	250
	Tunes	Thermo Fuel Decommissioned	-166
2009	Baixo Sabor	Hydro	138
2010	Picote II	Hydro	232
	Barreiro	Thermo Fuel Decommissioned	-56
2011	Salamonde II	Hydro	160
	Ribatejo (group 3)	Thermo CC	392
	Barreiro	Thermo Fuel Decommissioned	-710
2012	Sines	Thermo CC	400
2013	Sines	Thermo CC	400
	Venda Nova III	Hydro	424
	Setúbal	Thermo CC	400

b) Renewable (wind)

5000 MW of wind power generators are expected by 2010. In 2005 a maximum value of 746 MW was achieved, currently representing 14% of the daily demand of Portugal, and in 2006 (September, 21st), 1124 MW. The installed capacity of wind power is bigger than 1500 MW and more than 55 MV are currently under construction. It is foreseen that in 2010, 39% of the country's demand will be met through renewable sources of different types.

Number of distributors

In mainland Portugal there is one distribution company (EDP Distribuição) that operates the grids of 60 kV and below and there are ten small low voltage distributors that represent less than 1% of the total electricity delivered.

Main traders and other players

At the end of 2005, there were two producers (EDP Comercialização and EDP - Energias de Portugal) representing 1493 MW of the installed capacity, one trader (EDP Comercialização) and six external agents, acting as traders through the international interconnections, operating in the Non Binding System. The external agents fulfilling the conditions to participate in the non biding System were:

- Endesa Energia, S. A.;
- Iberdrola, S. A.;
- Unión Fenosa Generación, S. A.;
- EDP Energia Ibérica, S. A.;
- Unión Fenosa Comercial, S. L.;
- Viesgo Generación, S. L.

3. Transmission network and system issues

3.1 Status of international interconnections

Existing Interconnections

All existing interconnections are of the AC type, single circuit, with Spain. They are indicated in the table below from north to south. The interconnections in *italics* support local demand and are exploited by the distribution company:

Name	U (kV)	Capacity (MVA) (winter values)
Alto Lindoso-Cartelle 1/2	400	2 x 1330
Conchas-Lindoso	132	131
Aldeadávila-Bemposta	220	384
Aldeadávila-Pocinho	220	384
Saucelle-Pocinho	220	384
Cedillo-Falagueira	400	1 386
Santa Marina-Elvas	*60*	*50*
Alqueva-Balboa (1/2)	400	1x1 386 (*)

(*)Double line- one circuit installed

Lines under construction

Name	U (kV)	Winter Capacity (MVA)	Foreseen date
Bodiosa-Paraimo	400 a)	827	2007
Ferro-Castelo Branco 1 & 2	220	2 x 384	2006
Batalha-Pego	400	1386	2006
Rio Maior-A. Mira	400 b)	1386	2006
Fanhões-Trajouce	220	768	2007
Sines-Portimão 3	400 c)	520	2006
Sines-Portimão 1 & 2 Portimão-Tunes 1 & 2	150 d)	2 x 195 2 x 195	2006

a) Initially at 220 kV.
b) Prolongation to Alto de Mira of previous Rio Maior-Fanhões.
c) Initially at 150 kV.
d) Opening at Portimão of previous Sines-Tunes 1 & 2.

Foreseen cross-border interconnections

Name	U (kV)	Winter Capacity (MVA)	Type of action	Foreseen date
Minho-Galiza	400	1386	New interconnection at north of country	2010 *
Macedo de Cavaleiros-Pueblo de Sanabria	220	500	New interconnection at north of country	2010 *
Douro Internacional- Aldeadávila 1	220	910	Upgrading of one line in this region to 400 kV double circuit, initially at 220 kV	2008
Douro Internacional- Aldeadávila 2	220	910		
Douro Internacional- Aldeadávila	400	1 386		2009
Algarve-Andaluzia	400	1386	New interconnection at south of country	2010 *

** - Under study.*

3.2 Network development plans

The Portuguese Transmission System Operator (REN - Rede Eléctrica Nacional, S.A.) is the sole entity responsible for the elaboration of the transmission network (150, 220 and 400 kV) development plan.

The plan is elaborated every two years and covers a period of six years plus the four ahead, the latter being included merely as a reference. The Portuguese Regulator shall approve this plan. To elaborate the plan, the TSO takes into account the established security rules (Grid Code), the evolution of the power in the transmission substations, the demand forecast, the producers' requests, the Electricity Market, especially the Iberian one, and the plans of the distribution company.

The operational and network development costs of the transmission network are covered by the transmission tariffs.

3.3 Main events

- On 7 July 2005, the tripping of the line 220 kV Urrô-Recarei due to a forest fire, caused disturbances in the power grid and, consequently, the thermal plant of Turbogas (three generators of 330 MW each) lost about 640 MW.
- On 8 November 2005, the tripping of the line 220 kV Recarei-Canelas due to thunderstorm caused disturbances in the power grid and, consequently, the thermal plant of Turbogas lost about 650 MW (one generator had tripped and the other two had lost some power generation) as well as a loss of approximately 150 MW of wind power.
- Due to an uncommon concentration of algae, the thermal power plant of Sines faced technical problems which caused simultaneous tripping of three generators (900 MW), three generators (900 MW), four generators (1200 MW) and three generators (900 MW)on 4 April 2005, 4 April 2005, 8 April 2005 and 28 March 2006 respectively.

These events have caused considerable unbalances between generation and demand with immediate repercussion on the cross-border power flow.

4. Electricity market structure

<u>Organisation</u>
The needed arrangements to end the Power Purchase Agreements (PPA's) between several generators and REN are currently under revision.

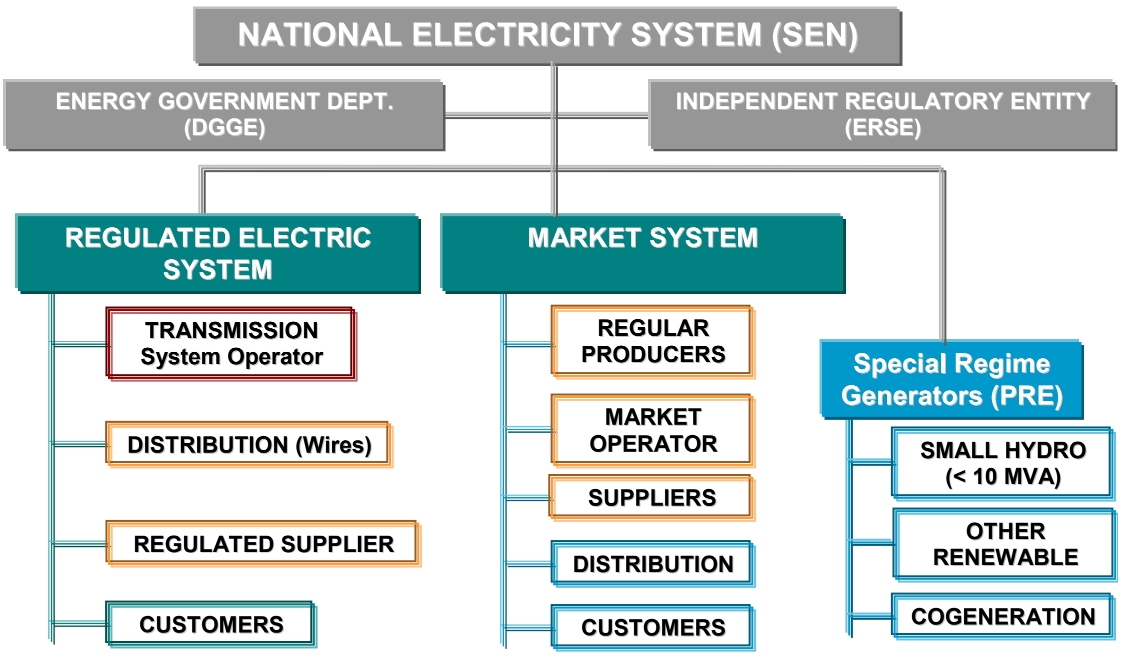
For the time being, PPA's costs are included in the energy tariff of the last resource supplier.

Surplus costs of renewable and co-generated electricity are included in an access tariff paid by all customers.

All the Portuguese consumers are allowed to change to the Market System. The infrastructure to control customers switching is fully operational. However, for the being, regulated final tariffs of the last resource supplier do not reflect actual costs. Many customers supplied in previous years by alternative suppliers are returning to the last resource supplier.

In October, 2002, the Portuguese and Spanish governments decided to establish an Iberian Power Market Operator, composed of two poles: one in Portugal, responsible for the medium and long term markets and one in Spain, responsible for the spot market. The company that operates the Portuguese Pole is starting its operation. Several agreements between the Portuguese and the Spanish governments are still needed to enable the Spanish Daily Power Market to become the Iberian Power Spot Market.

For the time being, power market operation is essentially based on bilateral contracts, some of them resulting from Spanish Daily Power Market transactions.



5. Other

Link	Companies
<u>www.ren.pt</u>	REN - Rede Eléctrica Nacional, S. A. (Portuguese TSO and unique transmission company)

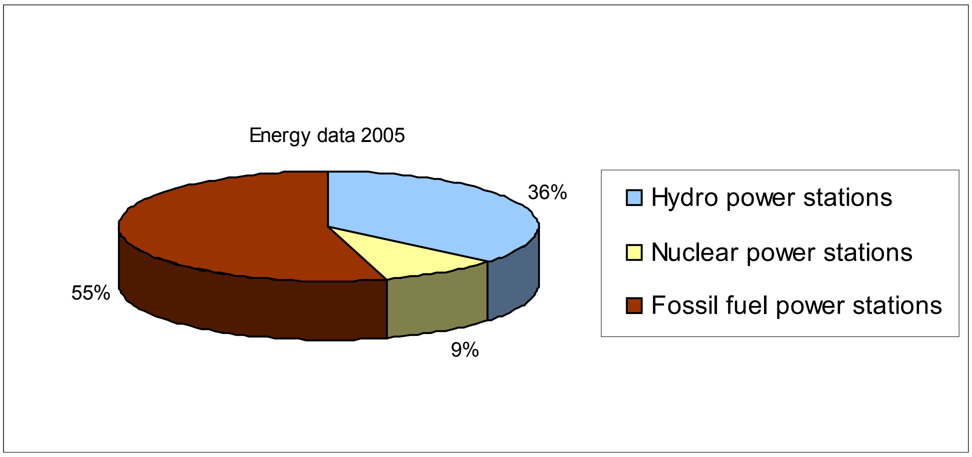
www.erse.pt	Entidade Reguladora do Sector Energético (The Portuguese Regulator for gas and electricity)
www.dge.pt	Direcção Geral de Geologia e Energia (The General Directorate for Geology and Energy)

ROMANIA

1. Basic capacity, generation and consumption data (year 2005)

Installed capacity by fuel, MW		
	Thermal	10176
	Hydro	6245
	Nuclear	655
	Renewables	1
	Total	**17077**
Yearly generation by fuel, TWh		
	Thermal	29.764
	Hydro	19.908
	Nuclear	5.132
	Renewables	0
	Total	**54.804**
Annual consumption, TWh		**51.889**
Imports, TWh		**1.605**
Exports, TWh		**4.520**

Net values



Government policy was to encourage the use of renewable resources. For 2005 they represent under 1% of the energy generation (425 MWh wind)

2. Industry structure

2.1 Recent key developments

Romanian Power Sector restructuring process
Liberalisation, privatisation, TSO unbundling

The restructuring process of the power sector towards unbundling, privatisation and a competitive electricity market, started in 1998 and to date it has undergone several stages during which different separate joint stock companies and subsidiaries were created:

- National company NUCLEARELECTRICA SA, (nuclear generation), (1998);
- National Power Grid Company CN TRANSELECTRICA SA (2000), TSO;
- Generation company TERMOELECTRICA SA , reorganised in 2004, now includes 3 subsidiary commercial companies and 4 subsidiaries for electricity and heat generation, and 12 subsidiaries for maintenance and servicing (Termoserv).
- Energy Complex commercial companies Rovinari, Turceni, Craiova (2004);
- Generation company HIDROELECTRICA SA, organised into 12 subsidiaries (2000-2003); it also includes subsidiaries for maintenance and servicing (Hidroserv);
- other producers and self producers;
- the distribution and supply group ELECTRICA SA , initially organised in 8 regional subsidiaries (2000-2003) and now including 4 subsidiaries.

To date, 4 regional subsidiaries (Dobrogea, Banat, Craiova, Moldova) of the state-owned electricity distribution and supply group Electrica S.A. were privatised (acquired by ENEL(2), CEZ, EON), and the privatisation of a 5$^{\text{th company}}$ is in the final stages (it will be acquired by ENEL).

The Privatisation of distribution companies will continue. A hydropower privatisation process was initiated. This included:

- agreements with foreign partners regarding completion of some hydropower objectives;
- sale by tender of 150 micro HPPs. with the purpose of rehabilitation and modernisation; 18 micro HPPs were sold by the end of 2004.
- organisation of Hidroserv overhauling subsidiaries for privatisation.

The maintenance and servicing subsidiaries Termoserv of TERMOELECTRICA were also organised in view of privatisation.

Until 2006 Transelectrica remained a joint - stock 100% state-owned company, its shares being held by the Ministry of Economy and Commerce.

Actions were taken during 2005 towards privatisation of Transelectrica Shares:

- Government Decision 184/28 March 2005: the Strategy on accelerating the privatisation and attracting investments stipulated for Transelectrica :
  - a primary initial public offer of up to 15% of the company shares, followed by floatation on the Bucharest Stock Exchange;
  - privatisation by restitution of a Transelectrica's stake, based on Law 10/2001on the legal regime of some buildings abusively taken over between March 1945-December 1989.
- Government decision 708/19 July 2005 :
- Primary initial public offer: 10% of Transelectrica shares, followed by floatation on the Stock Exchange in Bucharest. Preliminary Prospectus finalised to be submitted to National Securities Commission (CNVM) for approval.
- Privatisation by restitution: 5%.
- Law 247/19 July 2005: participation to Ownership Fund with 15% of Transelectrica shares.
- Conclusion on future ownership: 15% Ownership Fund, 10% IPO, 5% privatisation by restitution; 70% Transelectrica (state ownership).

The primary initial public offer of Transelectrica's shares took place between 14-28 June 2006. After the successful closure of the public offer (over subscribed, allocation pro-rata), Transelectrica shares were listed for trading on the Bucharest Stock Exchange in August 2006.

After the participation to Ownership Fund and the public offer , the stake of State ownership, through the Ministry of Economy and Commerce, was reduced to 76.49%.

ICEMENERG, ICEMENERG Service and FORMENERG are scheduled to be launched for privatisation.

Regulatory framework

The domestic primary legislation for the Romanian electricity industry is the comprehensive Energy Law no.318/2003, adopted in July 2003 by the Romanian Parliament.

The secondary legislation consists of regulations issued by the Romanian Electricity and Heat Regulatory Authority (ANRE) and include:

- Licenses and authorisations
- Technical Transmission Grid Code (2004 version)
- Technical Distribution Grid Code
- Wholesale Electricity Market Commercial Code (2004 version, the new version in currently under discussion)
- Tariffs and tariff methodology
- Framework contracts for trading arrangements

The European Union legislation is a relevant part of the Romanian legislative framework.

Another document related to energy policy is the "Road Map for Energy Field in Romania", issued by the Ministry of Industry and Resources and approved with the Government Decision no. 890/29 July 2003.

2.2. Main actors

Transmission system operator

TRANSELECTRICA S.A. - The National Power Grid Company is the Transmission System Operator (**TSO**) and is responsible for the transmission and system operation, including management functions of the electric energy market and the interconnection with the neighbouring power systems**.**Transelectrica owns transmission assets, ensuring a non-discriminatory and regulated network access.

Transelectrica operates according to the Transmission and System Operator Licenses and the Transmission Grid Code. Transelectrica key functions are:

- Transmission and System Operator of the Romanian Power System ; operates / manages:
  - the grid infrastructure
  - the dispatching infrastructure (EMS/SCADA – Energy Management System/Supervisory Control and Data Acquisition)
  - capacity allocation on interconnections
  - green certificates.
- Balancing Market Operator -OPE ; operates the balancing market platform
- Commercial Operator of the electricity market through OPCOM, a legal subsidiary ; operates:
  - trading platforms
  - green certificates trading platform
- Metering operator of the wholesale electricity market through its branch OMEPA; operates the metering system.
- Telecommunication and IT operator, through TELETRANS, a legal subsidiary; operates the optic fibre, digital telecom system

Transelectrica's main responsibilities are:

- Technical and operational management of the Power System, to ensure the safe and stable operation of the system. Provides the real time control of the power system, by using the ancillary system services acquired in the ancillary services market and the balancing market;

- Management of interconnected operation within UCTE and electricity transits with neighbouring countries; takes part in DACF, congestion management, CBT;
- Non-discriminatory access and grid connection to all grid customers in a transparent manner;
- Market administration through its legally independent subsidiary OPCOM and metering service through OMEPA
- Operation, maintenance and development of its assets;
- Planning of National Power System and transmission network development, including the EMS/SCADA system .

Transelectrica does not trade electricity, except to cover its own technical transmission losses and for ancillary services.

Transelectrica fulfils the dispatching system functions through its National Power Control Operational Unit including the Central Dispatching Centre and five Regional Dispatching Centres. It provides the control of all dispatchable units within the Romanian Power System (342 units at present).
Transelectrica fulfils its functions related to power transmission services through eight territorial transmission branches in Bacau, Bucuresti, Cluj, Constanta, Craiova, Pitesti, Sibiu and Timisoara.
Transelectrica is the asset manager and operates the high voltage transmission grid.
The national transmission system managed by Transelectrica provides public services and cross-border services in co-operation with foreign electric power systems, undertaken by the **National Power Control Operational Unit**

Romanian Transmission Network

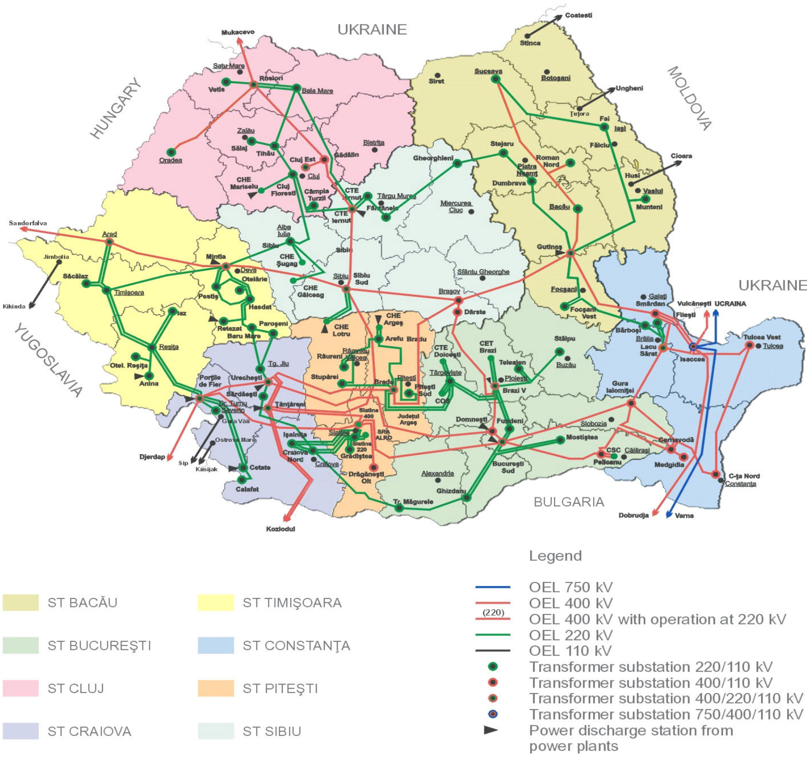
Network Voltage	**Substations**			**OHL**	**OHL**
		Units (T, AT)	Unit power	by construction voltage	by operating voltage
kV	nr.	Nr.	MVA	km	km
750	1	2	1250	154.6	154.6
400	32	2 20 22 23	500 400 250 200	4794.7	4201.6
220	44	63 2 1	200 400 100	3944.8	4537.9
110				41.4	41.4
TOTAL	78	134	34900	8935.5	8935.5

The technical parameters of the equipment, as well as its operating and maintenance methods are based on the European IEC standards, made even more rigorous by the technical standards adopted by Transelectrica.

Transelectrica group has a market-focussed structure, including a number of 100% owned legal subsidiaries:

- **OPCOM,** the Romanian Electricity Market Operator;
- **SMART,** provides grid maintenance services to Transelectrica.
- **TELETRANS,** provides IT and communications services for the administration of electrical transport networks;
- **FORMENERG,** provides vocational training services for all power industry;
- **ICEMENERG,** provides scientific research, technological engineering and design, technical assistance and support service;
- **ICEMENERG Service,** provides service in the field of equipment production for electricity distribution and control.

Transelectrica became an ETSO member in November 2004.



Romanian Transmission network

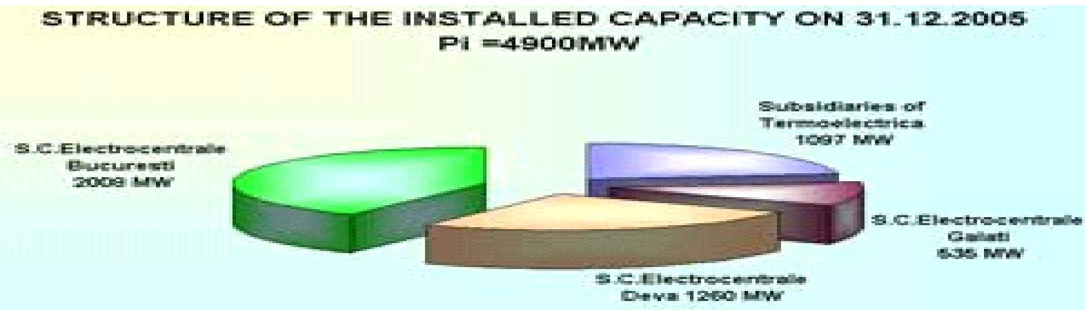
<u>Main generators</u>

SC TERMOELECTRICA S.A.

Joint stock commercial company, 100 % state-owned generating company, under the authority of the Ministry of Economy and Commerce, Termoelectric has , as main object of its activities, the generation of electricity and heat by the firing of the fossil fuel. In parallel it performs also a number of complementary and support activities, such as technical revisions, overhauls, planning and pursuance of repairing and maintenance activities, rehabilitation and modernisation works, etc.

After an ample restructuring aimed-at-efficiency programme, at the end of 2005 Termoelectrica SA underwent the following organisational structure:

- 3 subsidiaries – joint stock commercial companies for electricity and heat generation, with legal personality : Electrocentrale Bucuresti, Electrocentrale Deva and Electrocentrale Galati;
- 4 own subsidiaries for electricity and heat generation :Borzesti, Braila, Doicesti, Paroseni;
- 1 branch for the valorisation of the assets;
- 12 subsidiaries – joint stock commercial companies for maintenance and servicing (Termoservs), with legal personality, established with a view to privatisation in a relative short period of time.



ELECTROCENTRALE BUCURESTI SA

Joint stock, 100 % state-owned generating company, has in operation cogeneration TPPs Bucuresti Sud (gas and fuel-oil, 550MW), Bucuresti Vest, Progresu, Grozavesti, Titan, Palas and TPP Iernut (gas, 800MW).

ELECTROCENTRALE DEVA SA
Joint stock, 100 % state- owned generating company, has in operation TPP Mintia (coal, gross installed capacity 1270MW, 3 units retrofitted-modernised.

ELECTROCENTRALE GALATI SA
Joint stock, 100 % state- owned generating company, has in operation TPP Galati, gas, 375MW.

On 31 December 2005, the installed capacity of Termoelectrica amounted to 5520 MW.

ENERGY COMPLEX COMMERCIAL COMPANIES
100% state owned, including TPPs and lignite mines:

Rovinari: includes TPP Rovinari, lignite, gross installed capacity 1320 MW (4x330MW, units retrofitted/modernised).

Turceni: includes TPP Turceni, lignite, gross installed capacity 1650MW(5x330MW, units retrofitted/modernised). ; one more unit is in modernisation process.

Craiova: includes TPP Isalnita, lignite, gross installed capacity 630MW (2x315MW, control systems modernised), and TPP Craiova Nord, lignite,300MW.

HIDROELECTRICA S.A.
At present the largest generating state-owned company, it supplies electricity and water system management services by using the country's hydropower resources. It manages almost all Romanian hydropower plants and has 12 regional branches.

Hidroelectrica administer 326 hydropower plants (including water pumping stations and 205 small&micro hydropower stations), for a total installed capacity of 6335 MW**.**

The largest HPPs are :

- HPP Portile de Fier : installed capacity 970MW (5x194MW modernised units); one more unit in modernisation;
- HPP Lotru : installed capacity 510W (3x170MW).

Hidroelectrica supplies over 90% of the secondary regulation reserve and 100% of the rapid tertiary reserve.

NUCLEARELECTRICA
Since July 27, 1998 **Nuclearelectrica S.A**. was set up as a 100% state owned generating company, under of the authority of the Ministry of Economy and Commerce, with the main mission to produce nuclear-generated electricity, heat and nuclear fuel. The company has also an active participation in the nuclear power development program in Romania.

Nuclearelectrica includes three branches, no legal person:

- **CNE PROD** is operating the Cernavoda unit no.1 NPP (706,5 MW, CANDU 6 type).
- **FCN - Pitesti**, the nuclear fuel fabrication plant, with an initial capacity of 90 tons per year, sufficient to provide all the necessary fuel for the Cernavoda NPP unit no. 1 operation.
- In 2004 the production capacity was increased in order to ensure the necessary fuel supply for the second unit in Cernavoda.
- **CNE INVEST** includes at present unit no. 2 to 5 of Cernavoda NPP. For the time being, its main tasks are the completion of unit no. 2 and the preservation of the work carried out in units no 3 to 5.

The second unit (708MW) will be commissioned in 2007; after a testing period beginning in April, it is expected to that commercial operation will commence in July 2007.
A mixed company will be constituted to finalise works on units 3 and 4; work will begin in 2008 and the units are expected to be commissioned by 2013 and 2014 respectively (2x720MW) .

Other independent producers including 2 wind generation companies.

Self producers

Distributors

ELECTRICA. S.A
Electrica S.A. is a state-owned group of distribution and supply companies, operating the distribution network (110 kV and below) and providing electricity supply services.

It was organised initially as a group of 8 regional electricity distribution and supply subsidiary companies defined as commercial companies, with 100% state-own stock , but 4 regional subsidiaries were privatised in 2004-2005. As a result, at present it includes:

- ELECTRICA MUNTENIA NORD S.A.
- *ELECTRICA MUNTENIA SUD S.A.*
- ELECTRICA TRANSILVANIA NORD S.A.
- ELECTRICA TRANSILVANIA SUD S.A. .

Privately own Electricity Distribution& Supply Companies:

- ENEL ELECTRICA BANAT S.A.
- ENEL ELECTRICA DOBROGEA S.A.
- EON ELECTRICA MOLDOVA S.A.
- CEZ ELECTRICA OLTENIA S.A.

Privatisation of ELECTRICA MUNTENIA SUD S.A. to ENEL is being finalised.

There are also corresponding regional energy services subsidiary companies, which provide for the maintenance and overhauling services on a contractual basis.

The distribution and supply subsidiaries and companies are also distribution operators, through the specialised units of distribution power dispatchers that are under the National Power Control Operational Unit authority and carry out the distribution network operations.

While performing the electricity distribution services, the distribution & supply subsidiaries and companies act as a natural monopoly on a license base having the obligation to provide a public service and a non-discriminatory access to its networks to all electricity customers in Romania and to all generators that may request it.

Main traders
Romanian Trade Companies: ROMENERGO, ROMELECTRO, GRIVCO, UNICOM, etc.

3. Transmission network and system issues

3.1 Status of international interconnections

Existing international interconnections

From	To	Type AC/DC Single/Double	U,kV	P,MW *
Portile de Fier (RO)	Djerdap (Serbia Montenegro)	AC single	400	1108
Tantareni (RO)	Kozlodui (BG)	AC double	400	2x1108
Isaccea (RO)	Dobrudja (BG)	AC single	400	831
Isalnita (RO)	Kozlodui (BG)	AC single	220	305
Arad (RO)	Sandorfalva (HU)	AC single	400	1108
Rosiori (RO)	Mukacevo (W-UA)	AC single	400	1108
Isaccea (RO) **	Vulkanesti (MD)	AC single	400	734
Husi (RO) **	Cioara (MD)	AC single	110	50
Tutora (RO) **	Ungheni (MD)	AC single	110	50
Stanca (RO) **	Costesti (MD)	AC single	110	50
Gura Vaii (RO) **	Sip (SM)	AC single	110	92

Jimbolia (RO) **	Kikinda (SM)	AC single	110	57
Ostrovu Mare (RO) **	Kusijak (SM)	AC single	110	114
*Isaccea (RO)****	*Ukraina Sud (UA)*	AC single	750	4540

** including equipment limits*
*** island operation*
**** problems at some towers*

Ongoing studies in international/cross-border interconnections and internal lines

From	To	Type AC/DC Single/Double	U,kV	P,MW *	Date for study completion	Expected date for commissioning the line under study
Nadab (RO)	Bekesksaba (HU)	AC double	400	2x1205	2005	2008
Suceava (RO)	Balti (MD)	AC single	400	1205	*Discussions with MD*	2015
Timisoara(RO)	Vrsac (SM)	AC single	400	1205	will begin end 2007	2015
Internal						
Oradea	Nadab	AC single	400	1205	2005	2008
Arad	Nadab	AC single	400	1205		2008
Ostrovu Mare	Cetate	AC single	220	331	2007	2010
Portile de Fier	Cetate	AC single	220	331		2010
Portile de Fier	Ostrovu Mare	AC single	220	331		2010
Suceava	Gadalin	AC single	400	1205	will begin end 2007	2015
Internal upgrading from 220kV to 400kV						
Portile de Fier	Resita	AC single	400	1205	2007	2010
Resita	Timisoara	AC single	400	1205	will begin end 2007	2010
Timisoara	Arad	AC single	400	1205		2010
Gutinas	Bacau	AC single	400	1205	2006	2010
Bacau	Roman	AC single	400	1205		2010
Roman	Suceava	AC single	400	1205		2010

** Thermal limit*

Lines under construction (internal and cross-border)

From	To	Type AC/DC Single/Double	U,kV	P,MW	Expected date for commissioning the line
Isaccea (RO)	Varna (BG)	AC single	400	831*	2007 works finalised in 2004 on RO side
Nadab (RO)	Bekesksaba (HU)	AC double	400	2x1205	2008
Oradea(RO)	Nadab(RO)	AC single	400	1205	2008
Arad(RO)	Nadab(RO)	AC single	400	1205	2008

** including equipment limits*

Future projected interconnections

In June 2005 Transelectrica and its counterpart Turkish Company TEIAS signed a Memorandum of Understanding with a view to jointly elaborate a system study on the opportunity to build a high voltage DC submarine cable to interconnect the power systems of Turkey and Romania.

The project will be performed by Transelectrica SA, Romania and TEIAS, Turkey. The 400 km long cable, with a forecasted capacity 600MW, will connect the power systems of the two countries by means of the 400 kV substations in Constanta (Romania) and in Pasakoy (Turkey) below the Black Sea level. The pre-feasibility system study was completed in June 2006.

Other network information

- In 2005 works for installation about 4000 km of optical fibre were completed.
- The new EMS/SCADA system furnished by AREVA was commissioned in May 2005; the migration to the new system was finalised in April 2006.
- An ETSO node at the National Power Control Center was commissioned in 2005, insuring access to the ETSO server and easy participation to DACF on the EH.

3.2 Network development plan

According to the responsibilities stated in the energy Law no.318/2003, the Transmission Grid Code and the power transmission license, The National Power Grid Company Transelectrica SA, as the Romanian TSO and manager of the transmission system, has the obligation to carry out and report about a long-term development plan for the transmission network.

The "Long Term Development Plan for the Electricity Transmission Grid" has a time horizon of 10 years and it is elaborated every 2 years. It is submitted for notification to ANRE (Romanian Electricity and Heat Regulatory Authority) and for approval to the Ministry of Economy and Commerce, and it is a public document. The Plan last update includes the period 2004-2014.

The TN planning activity includes :
- establishing the investment and major rehabilitation programs for the considered time frame;
- identifying the opportunities for installing new capacities;
- foundation and forecast of transmission tariffs evolution.

Transelectrica undertakes planning studies and construction of the necessary transmission installations in order to prevent system security problems. The cost of new transmission assets is paid through transmission tariffs.

To comply with the technical and operational regulations of the RPS and UCTE, and based on strategic documents such as the long term development plan and the business plan (last update for 2004-2013), Transelectrica has initiated from 2001 a wide modernisation/rehabilitation program focused on the following major projects:
- Modernisation of the dispatching control EMS/SCADA and building the wholesale electricity market infrastructure, the remote control and telecommunication included.
- Development of the existing cross-border interconnection capacity .
- Modernisation of the transmission grid substations with the latest technologies (primary equipment and modern digital command-control-protection systems) meant to enable reduced maintenance and remote control. International interconnection substations and those connecting the vital power plants have been included in the first class of priority.

The synthesis of the major investment projects 2001-2015:

1st vector – construction and development of the electricity market infrastructure

Phase 1 - Rehabilitation and modernisation of the transmission-dispatch system, launched in 2001, financed by EBRD, EIB, PHARE:
- optic fibre telecommunication system (commissioned in 2005),
- new EMS-SCADA facilities (commissioned in 2005),
- new metering system (commissioned in 2004-2005)

Phase 2 - Balancing market (step) and new trading platform (power exchange) (Commissioned in 2005);
- Balancing market (step II) (commissioned in 2006) and infrastructure for regional market

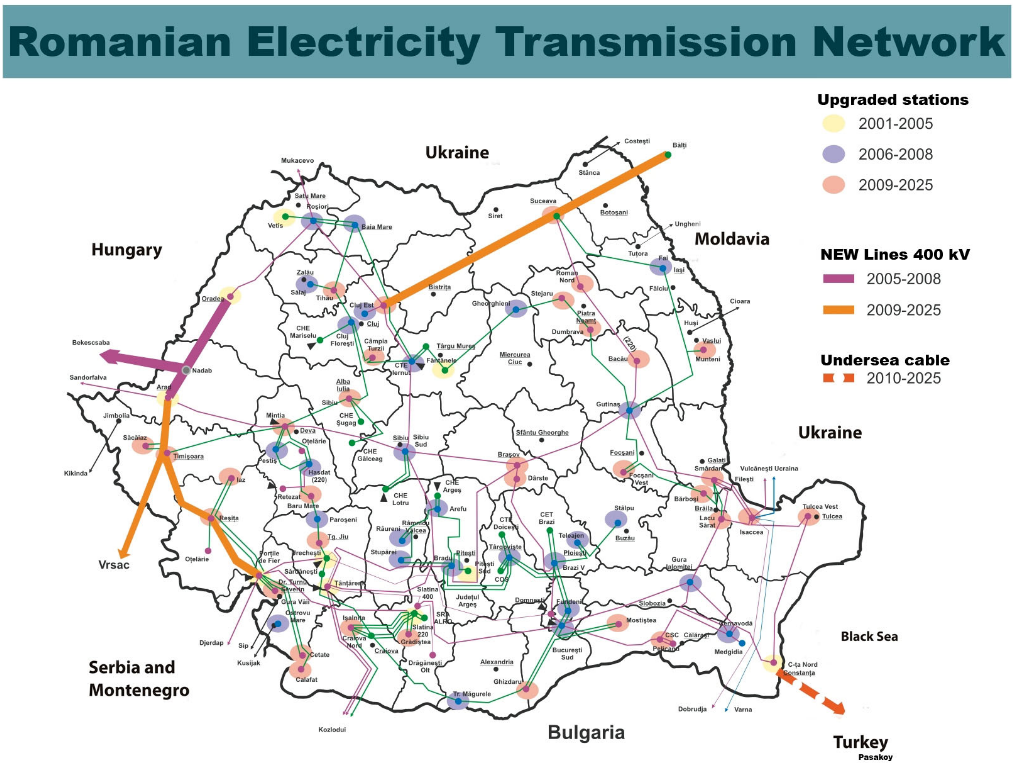
2nd Vector – Rehabilitation and modernisation of the HV grid (UCTE compliance) substations

Phase 1 11 substations: Constanta, Oradea (commissioned in 2005) , Slatina, Rosiori,, Iernut 400/220kV (commissioned in 2006)/110kV, Sibiu, Bucuresti Sud, Fundeni, Gutinas, Brazi, Cernavoda (underway).
Phase 2 11 substations CCP modernisation, Paroseni, AT& shunt reactor (launched/underway)
Phase 3 Isalnita, Gura Ialomitei, Lacu Sarat, Brasov, Mintia (feasibility studies stage)

3rd Vector – Development of HV grid (UCTE compliance) –interconnection OHLs

Phase 1 400 kV Oradea-Nadab-Bekescsaba (Hungary) and Nadab-Arad (launched)
Phase 2 400 kV Upgrading on Moldova axis (Gutinas -Bacau Sud -Roman Nord -Suceava) (launched)
400 kV Gadalin-Suceava-Balti (Moldova) (feasibility studies stage)
Phase 3 400 kV upgrading on Banat axis and 400 kV Ohl Timisoara-Vrsac (Serbia) (feasibility studies stage);
Submarine DC cable connection Romania – Turkey (pre-feasibility study completed 2006)

The projects can be identified on the map bellow.



Distribution development plans are elaborated separately by distribution responsible parties. Transelectrica provides the necessary data about the transmission network. There is no direct connection between transmission and distribution plans. Specific studies are undertaken by Transelectrica (or sub-contracted to specialised companies), regarding the development of some 110kV areas with an impact on the transmission network operation (usually with significant generation).

3.3 Main events

February 2005: Transelectrica and the TSOs from Albania, Bosnia-Herzegovina, Bulgaria, Macedonia, Serbia and Montenegro under the ETSO umbrella, agreed to carry out the cross-border trade mechanisms (CBT) for 2005, following the principles of 2005 ETSO mechanism applied in the European Union. The mechanism facilitates the cross-border electricity trades in South-Eastern Europe.

April 2005: During the simultaneous rehabilitation in the northern area of 400/220kV substation Rosiori and 400kV substation Iernut, and operation with temporary long line Gadalin-Mukacevo, a combination of night import coupled with maintenance on 400kV Arad-Sandorfalva led to durable overload on the 400/110kV transformer Gadalin, with impact on the transformer integrity. The maintenance proceeded with the tie-line Arad-Sandorfalva reconnected during the night. The Gadalin transformer had to be switched off for several days for repairs. NTC calculation was readjusted to better take into consideration North to South parallel flow on 400kV Mukacevo-Gadalin due to outside transactions; Romanian import NTC was reduced until 2006.

May 2005 : contract was signed between Transelectrica and Magyar Villamos Muvek Rt (MVM Rt) to construct the 400 kV Oradea (RO) –Bekescsaba (HU) interconnection line. In Romania, the investment projects includes the interconnection line, the new 400 kV Nadab interconnection substation and the installation of a shunt reactor within the 400 kV Oradea substation.

June-August 2005: Romania was confronted with severe floods and several electric lines were extensively damaged. For instance, it was necessary to disconnect 400kV line Portile de Fier-Slatina in order to allow for strengthening works on a tower foundation.. In spite of the difficulties caused by the bad weather, Transelectrica specialists managed to put again in operation all the affected lines.

November 2005: MOU signed between Transelectrica and JP "Elektromreza Srbije" –EMS – Serbia for the construction of the new interconnection line Timisoara (RO) – Vrsac (Serbia).

In 2005 the Romanian power system operated without any dysfunction, at quality parameters, in accordance with the requirements of the Technical Grid Code.

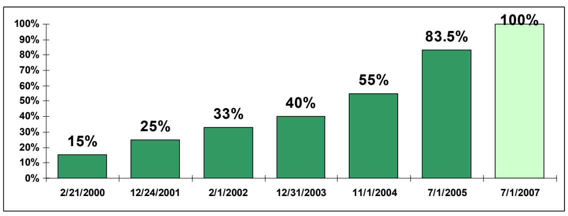
4. Electricity market structure

Romania has chosen to implement the European liberalised market model where the producers and suppliers are free to conclude transactions with electricity.

The structure and model of the electricity marked were oriented towards a full competitive market. The Romanian Electricity and Heat Regulatory Authority issued secondary legislation in line with this purpose (new Commercial Code and related procedures for market operation).

During the period March 2005 – September 2006 new trading platforms were developed according with the Road Map provisions. These new trading platforms ensure the competitive electricity purchase and sale for different time horizons by implementing the multi - market concept trough bilateral contracts, day ahead and balancing markets, associated with the self scheduling principle.

Since July 2005, the market opening degree increased to 83.5% meaning the freedom to choose the supplier for all end consumers except households; 100% market opening expected by 2007.

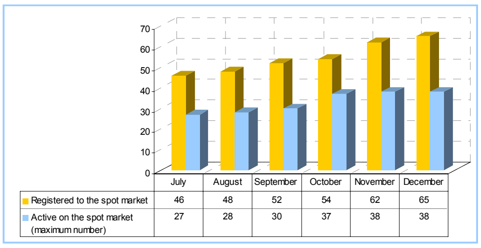


Evolution of Romanian Electricity Market Opening

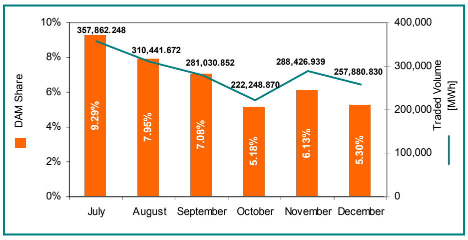
The electricity market operator OPCOM is operating:

a) Day Ahead Market covering up to 8% of the transacted energy (yearly average 7%), in ongoing a process to become a full operational power exchange.

Participation to this market is voluntary. It is based on simple price-quantity bids for each trading interval of the next day, expressing the willingness to buy or sell, no matter if the participant is a generator or supplier. Consequently, a better matching of spot trading product with the market participant's expectations was achieved, encouraging the participant to undertake daily opportunities.



Participant Number Development. Registration and interest in DAM.



Trades Evolution. DAM Share in Domestic Consumption.

The number of market participants grew from 45 in the 1st stage (July 2005) up to 65 at the end of 2005, with an average of 30 participants trading every day. The volumes place it in the medium liquidity area of the European power exchanges.

It is expected that OPCOM will take actions to capture more of the Romanian wholesale market volume and to extend the trading area by attracting the interest of other neighbouring countries for the existing day ahead market

b) Centralised bilateral contracts market, where almost 3% from net consumption is traded, with public auctions. The establishment of this bilateral contracts market aims at creating a transparent framework to conclude electricity selling/purchase contracts. These contracts comprise both the general terms and the specific extension with related clauses that must be proposed by the seller and agreed by the purchaser, intended to be further improved based on the standard frame contracts issued by EFET (European Federation of Energy Trades).

c) Centralised Green Certificates Market. The quota system combined with trading of green certificates was established by a Romanian Government decisions as a support scheme for RES. There is a mandatory yearly quota fixed by Regulatory Authority that is applied for all suppliers to final consumers. The green certificates price is market based set: either bilateral contracts concluded between producers and suppliers or centralised auction within the market operated by OPCOM. There is a scale for offer prices between a lowest price limit, to protect the E-RES generators, and a highest price limit to protect the consumers. At the beginning of 2006 the number of green certificates traded through the centralised market reached 5997.

Transelectrica as **TSO** operates:
d) Balancing Market, representing up to 4% from internal consumption; trial operation began in January 2005. Until now, 74 Romanian Balance Responsible Parties (including EON which applied for a Romanian license) and 7 foreign Balance Responsible Parties and 21 producers are registered as active participants in this market. The balancing market is controlling:

- exchanges between Balancing Market Participants;
- energy offers provided for each dispatchable unit (139 dispatchable units);
- dispatchable units physical notification and availabilities;

The data flow is controlled by three software:

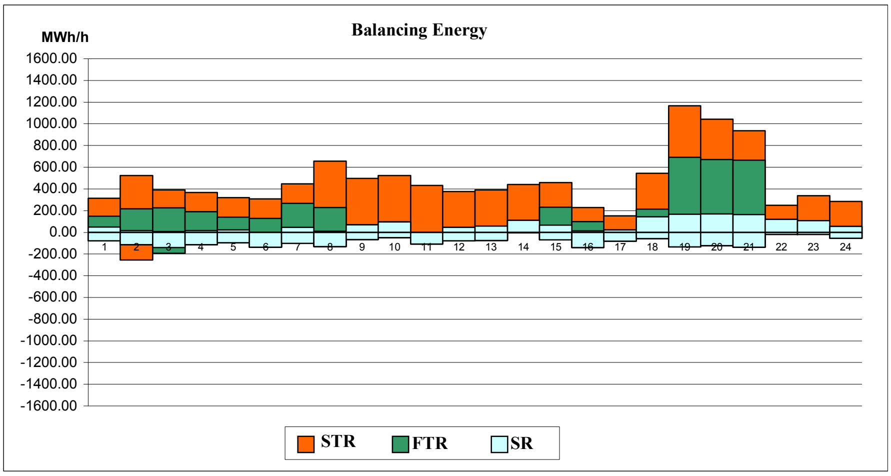
- Scheduler Software: capable to take over all the energy transactions between the BRP (and also to signal eventual mismatches between the transactions or imbalances), Physical Notifications and availabilities by dispatchable units);
- Balancing Market Offer software: capable of taking over the offers coming from the Producers and displays dispatch orders by Dispatch Units and energy type;

- Balancing Market clearing order software: a tool which loads all dispatch orders by energy type for each dispatchable unit.

Three products are acquired in this market: Secondary Regulation, Fast Tertiary Regulation (max. start-up time of 15 minutes) and Slow Tertiary Regulation (start-up time of more than 1 hour).

After the daily scheduling process, Balancing Market participants are obliged to offer their entire capacity to the TSO. All production capacity that is declared as being used in the Physical Notifications, is offered as Downward Regulation, while all unused capacity is offered as Upward Regulation. In contrast to the first stage, all offers specify energy prices and individual units.

Balancing Energy for Winter Wednesday by type is represented below:



Varianta 1: valori orare adunate in modul

A special feature of the Romanian Balancing Market is the use of single unit-based offers, which can be flexibly used for different types of regulation in a cost-minimising way: when capacity is not used for one type of regulation, it is automatically made available for other types.

e) Ancillary Services Market is the first stage of reserve procurement through reserve tenders. Monthly reserves are tendered about a week before the start of the relevant month. Accepted offers are paid the market clearing price under a reserve capacity contract which includes an obligation to offer a corresponding amount of capacity during the second stage of the procurement, i.e. the Balancing Market.

f) Cross-Border Capacity Allocation Market

The common agreement of European associations towards hybrid solution for market based cross border capacity allocation as both explicit and implicit auctions is being implemented.

The Romanian TSO is promoting explicit auctions as current solution.

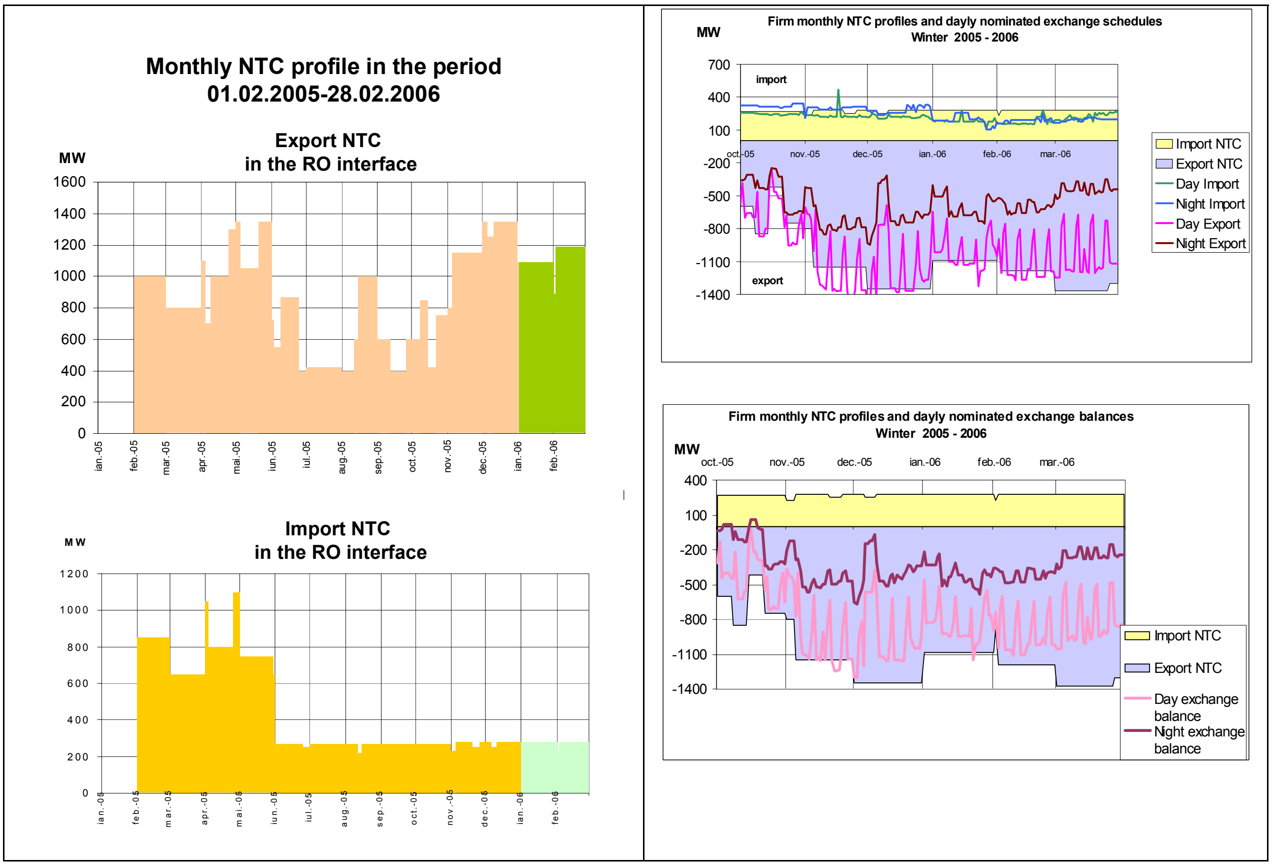
At the end of 2004 and at the beginning of 2005, bilateral agreements were concluded with neighbours (HU,BG,CS) for yearly & monthly NTC calculation and allocation. ATCs are split 50% / 50% between partners and allocated according to their own practice. Since February 2005, the allocation of the Romanian quota is calculated by yearly and monthly explicit auctions (price for congestion).

In order to maximise trade volumes:

- a monthly NTC profile is calculated, considering several monthly sub-periods if necessary, depending on the simultaneous / successive maintenance programs during the month (see figure bellow).
- a restricted netting is allowed at monthly level for exchanges controlled by the same commercial agent on the same border.

The degree of usage of available transfer capacity has increased from less than 50% at the beginning of 2005 up to 100% at the end of 2005, showing the dynamic behaviour of the market.

As can be seen from the figures below, between November 2005 and February 2006 export/import schedules exceeded the export/import NTC, due to accepted netting. The working days exchange balance represented 80-100% of the export transfer capacity.



Transelectrica participates in the virtual coordinated auction test pilot in the former 2nd zone initiated in February 2005 (exchanges of monthly forecasts and monthly calculation of border capacities and PTDFs), and from the beginning of 2006, it takes part in dry-run implementation of Coordinated Auctions in SEE region.

Both Transelectrica and OPCOM are also proposing the implementation of market splitting in cluster to be progressively expanded to a regional dimension by collecting the available border capacity remaining in day ahead term after the monthly explicit auctions allocation and eventually not used physical transmission rights.

As the physical market matures, chances to establish a financial market will increase. The OPCOM IT trading platform can support the trading of MBI such as CO2 allowances and efficiency certificates.

Regarding the retail market, an opening extension to 100% is expected by mid 2007. This will enhance the real opening degree and the supplier's activity in wholesale market. The suppliers' existence and activity required by 54/03/EC Directive is a welcomed specificity of the Romanian market within SEE framework.

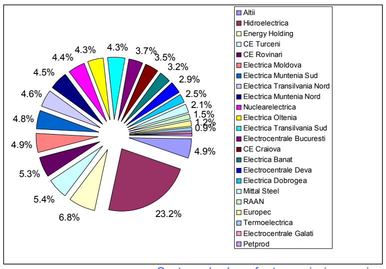
Transelectrica provides for power market participants:

<u>Transmission services</u> : to market participants who are injecting or extracting power in/from the system. The transmission tariffs are regulated by ANE according to a "revenue-cap" methodology and are published in the Official Journal. The transmission tariffs are also divided in zonal G and L components, depending on the geographical location of the injection/extraction points. The generators pay the G-component and the distributors/eligible customers pay the L-component of the transmission tariff.

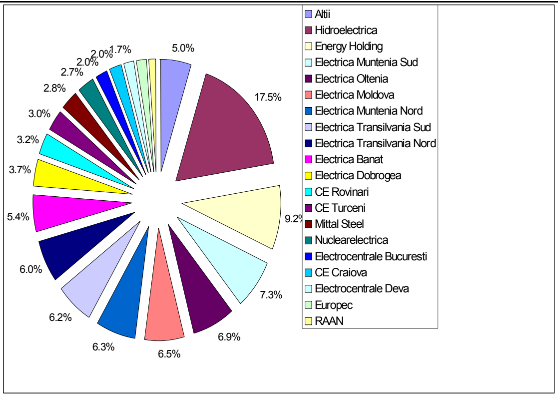
Transelectrica is a contracting party of the South-East European Inter TSO Compensation (SETSO ITC) mechanisms for transits. That means that the company does not longer charge transmission fees for transits over the Romanian transmission network.

System service ensures the continuous and safe operation of the power system while keeping all its performance parameters at rated values. The system service tariff is charged only to the loads (extracting points) and is also regulated by ANRE and published in the Official Journal, the corresponding revenues are intended to cover all the dispatching costs, including the ancillary services.

Market administration services consist of making available to all market participants the trading platforms as well as performing the settlement and clearing operations. Tariffs are regulated by ANRE, published in the Official Journal and, charged only to the loads (extracting points).

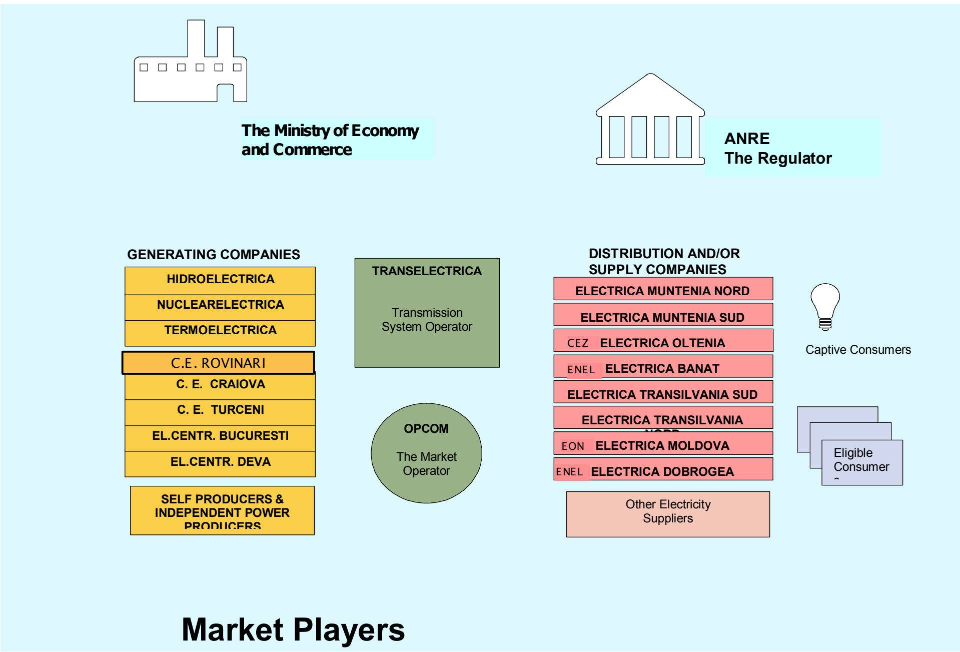


Customer's share for transmission services in 2005



Customer's share for system services

Market players : at present there are licenses for 30 producers, 7 ancillary services suppliers (Energy Complex companies Craiova, Rovinari, Turceni, Elecrocentrale Bucuresti, Deva, Hidroelectrica, Nuclearelectrica), 83 electric energy suppliers, 200 eligible consumers, 1 system operator (Transelectrica-balancing and ancillary market), 8 distribution operators.



5. Other

Institutions/companies	Links

CN TRANSELECTRICA S.A.	www.transelectrica.ro
ANRE (Romanian Electricity and Heat Regulatory Authority)	www.anre.ro
TRANSELECTRICA Balancing Market Department *	www.ope.ro
OPCOM (Romanian Electricity Market Operator)	www.opcom.ro
FORMENERG (Vocational Training Services)	www.formenerg.ro
TELETRANS (Trade Company for Telecommunication & IT Services)	ww.teletrans.ro
SMART (Transelectrica Maintenance Services)	www.smart-sa.go.ro
HIDROELECTRICA (Hydro Generation Company)	www.hidroelectrica.ro
TERMOELECTRICA (Thermal Generation Group)	www.termoelectrica.ro
NUCLEARELECTRICA (Nuclear Generation Company)	www.cne.ro
ELECTRICA (Distribution Companies)	www.electrica.ro
ROMENERGO Group	www.romenergo.ro
ROMELECTRO Group	www.romelectro.ro
GRIVCO Group	www.grivco.ro

* The site offers contact data to other actors in the energy sector

SERBIA

1. Basic capacity, generation and consumption data (year 2005)

Installed capacity by fuel, MW		
	Thermal	5524
	Hydro	2866
	Nuclear	
	Renewables	
	Total	**8390**
Yearly generation fuel by fuel, TWh		
	Thermal	26.5
	Hydro	12.8
	Nuclear	
	Renewables	
	Total	**39.3**
Annual consumption, TWh		**38.1**
Imports, TWh		**7.9**
Exports, TWh		**9.1**

2. Industry structure

2.1 Recent key developments

The first important steps towards the liberalisation of electricity market in Serbia were the approval of Serbian Energy Development Strategy and the new Energy Law (in 2004). The Energy Law fully complies with EU directives and the guiding principles for liberalisation in the energy sector in countries aiming at accessing to the European Union and it respects the commitments made by Serbia when signing the *Athens Memoranda of Understanding* for the establishment of regional electricity market in South Eastern Europe. In October 2005, Serbia signed *The Treaty on Establishment of Energy Community of Southeast* Europe and it was ratified by the Serbian Parliament in July 2006. The Treaty, which came into force on 1 July 2006, sets clear legal obligations for the implementation of the acquis communautaire on energy, environment, competition and renewables.

According to the provisions of the Energy Law, the electricity sector was unbundled and some new institutions were established in 2005:

- The Energy Agency of Republic of Serbia (AERS) as the regulatory body;
- Elektromreža Srbije (EMS) as a transmission, system and market operator;
- Elektroprivreda Srbije (EPS) as a production, distribution and supply company.

EMS and EPS are public companies which are fully unbundled i.e. ownership unbundling has been achieved on 1 July 2005.

Concerning secondary legislation envisaged by the new Energy Law, the following legislation has been approved since October 2005: Licensing rules, Decree on conditions for electricity supply, Energy permits rules, Connection pricing methodology, Transmission tariff methodology, Distribution tariff methodology and Tariff consumers price methodology. The Transmission Grid Code has been drafted and is currently in the process of approval, while the Distribution Grid Code and Market Code are in preparation.

2.2 Main actors

<u>Transmission system operator</u>

Elektromreža Srbije (EMS) is the Serbian Transmission System and Market Operator established as a public company as from 1 July 2005.
Its basic tasks are:

- The management of assets (operation and maintenance, as well as the development of Serbian transmission system consisting of 400 kV, 220 kV and part of 110 kV network);
- The system operation (including balancing and metering);
- The organisation of the electricity market (administration and development).

Main generators
There are five generation companies licensed for electricity production. Two of them comprise hydro power plants, two include thermal power plants and there is one company with CHPs. All five companies are daughter companies owned by the public company Elektroprivreda Srbije (EPS) which was established on 1 July 2005.

Foreseen/Outgoing projects for new generating units
Thermal power plant Kolubara B (total installed capacity 700MW)

Distributors
There are 5 distribution companies licensed for distribution, distribution system operation and retail supply of tariff consumers. All five companies are daughter companies owned by the public company Elektroprivreda Srbije (EPS). They operate part of the 110 kV network as well as medium and low voltage networks.

Main traders
Up to September 2006, eight trading companies (including EPS) obtained licenses for electricity trade on the Serbian market.

Other players
Wholesale public supplier
Elektroprivreda Srbije (EPS) is licensed as wholesale public supplier and is in charge of supply of tariff consumers in Serbia.

Eligible Customers
Conditions for acquiring eligible customer status are defined in the Energy Law. Eligibility is defined as voluntary with an annual consumption threshold of 25 GWh. If all the consumers within this threshold became eligible, this would corresponds to approximately 12% of the market opening.

3. Transmission network and system issues

3.2 Status of international interconnections

Existing international interconnections

From	To	Type AC/DC Single/Double	U, kV	Capacity, MVA
Djerdap HPP	Portile De Fier (Romania)	AC Single	400	1100
Niš	Sofia West (Bulgaria)	AC Single	400	1330
Kosovo B TPP	Ribarevina (Montenegro)	AC Single	400	1330
Kosovo B TPP	Skopje (FYR of Macedonia)	AC Single	400	1330
Sremska Mitrovica	Ernestinovo (Croatia)	AC Single	400	1330
Sremska Mitrovica	Ugljevik (BiH/Republic of Srpska)	AC Single	400	1330
Subotica	Sandorfalva (Hungary)	AC Single	400	1330
Kosovo A TPP	Skopje (FYR of Macedonia)	AC Single	220	347

Kosovo A TPP	Skopje (FYR of Macedonia)	AC Single	220	347
Prizren	Fierza (Albania)	AC Single	220	347
Požega	Pljevlja (Montenegro)	AC Single	220	347
Požega	Višegrad (BiH/Republic of Srpska)	AC Single	220	347
Bajina Bašta	Pljevlja (Montenegro)	AC Single	220	347

Ongoing studies in international/cross-border interconnections

From	To	Type AC/DC Single/Double	U,kV	Thermal capacity, MVA	Date for study completion	Expected date for commissioning the line under study
Serbia*	Romania	AC Single	400	1330	2006.	2010

* *There are a few possible combinations of the end nodes*

Lines under construction (internal and cross-border)

From	To	Type AC/DC Single/Double	U,kV	Thermal capacity, MVA	Expected date for commissioning the line
Niš	Skopje (FYR of Macedonia)	AC Single	400	1330	2009
Subotica	Sombor	AC Single	400	1330	2006

Future projected interconnections

From	To	Type AC/DC Single/Double	U,kV	Thermal capacity, MVA	Expected date for commissioning the line
Sombor	Pecs (Hungary)	AC Single	400	1330	after 2010

3.2. Network development plan

According to the Energy Law, EMS ensures transmission system development in line with five-year development plans and, based on the Transmission Grid Code, it prepares yearly development plans. The development plan specifies the construction schedule of new energy facilities and the modernisation of existing ones within the transmission system.
EPS is responsible for preparing development plans for generation facilities and distribution system. EMS and EPS development plans are regularly harmonised.

3.3. Main events

In December 2005, the upgrade of the transformer substation 220/110 kV "Sremska Mitrovica 2" to 400kV level was finished, including the introduction of a reconstructed 400 kV tie-line towards Ernestinovo (Croatia) and a new 400 kV tie-line towards Ugljevik (BiH/Republic of Srpska).

4. Electricity market structure

EMS is in charge of the electricity market organisation and should perform the following tasks according to the Energy Law:

- Organisation of the market on the territory of the Republic of Serbia;
- Maintaining records of all contracts either directly between market players or on the electricity market;
- Organisation and development of the market in transparent and non - discriminatory way, as well as ensuring of data confidentiality;

- Preparation of the Electricity Market code, which has to be approved by the Energy Agency of the Republic of Serbia;

The market design has been drafted and the Market Code is in preparation.

According to the draft market design, the proposed market model will be implemented in a three phase approach coping with the evolution of the regulated electricity tariffs in Serbia. In the final stage, the Serbian market shall consist of three layers:

- OTC contracts
- Day-ahead market
- Intra-day balancing market

In addition to this, different mechanisms (either market based or regulated) will be introduced for procurement of ancillary services, interconnector capacity allocation, purchase of losses and congestion management.

5. Other

Institutions/companies	**Links**
www.mem.sr.gov.yu	Serbian Ministry of Mining and Energy
www.aers.org.yu	Energy Agency of Republic of Serbia
www.ems.co.yu	Elektromreža Srbije (EMS)
www.eps.co.yu	Elektroprivreda Srbije (EPS)

SLOVAKIA

1. Basic capacity, generation and consumption data (year 2005)

Installed capacity by fuel, MW (brutto values)		
	Thermal	2966
	Hydro	2429
	Nuclear	2640
	Renewables	3
	Total	**8039**
Yearly generation fuel by fuel, TWh (netto values)		
	Thermal	8.2
	Hydro	4.6
	Nuclear	16.3
	Renewables	0
	Total	**29.1**
Annual consumption, TWh		**26.3**
Imports, TWh		**8.6**
Exports, TWh		**11.3**
Pumped storage consumption, TWh		**0.1**

2. Industry structure

2.1 Recent key developments

Two acts concerning the energy sector - the Energy Act No. 656/2004 Coll. and the amendment of the Regulation Act No. 658/2004 Coll. implementing the EU legislation into the national legislation, - were approved by Parliament in November 2005 and entered into force on 1 January 2005. These acts have had significant impact on the whole legal framework.

New legislation establishes responsibilities and rights for TSO and electricity market participants as follows:

- Regulation of the Government, establishing rules for electricity market operation,
- Decree of the Ministry of Economy of the Slovak Republic, establishing the way of loss calculation caused by the unauthorised electricity demand,
- Decree of the Ministry of Economy of the Slovak Republic, establishing details of range and procedure of providing the necessary information for state authorities,
- Decree of the Ministry of Economy of the Slovak Republic, establishing details for procedures in emergency states,
- Decree of the Ministry of Economy of the Slovak Republic, establishing details of range of the technical conditions for connection, access and operating of transmission system.

2.2 Main actors

Transmission system operator
Slovenská elektrizačná prenosová sústava, a.s.
SEPS, a.s. was founded on 21 January 2002 by splitting the former company Slovenské elektrárne into three independent joint-stock companies, namely Slovenské elektrárne, Slovenská elektrizačná prenosová sústava (SEPS, a.s.) and Tepláreň Košice.

SEPS, a.s. as a Slovak TSO, ensures the electricity transmission via its 400 kV a 220 kV lines in Slovakia region, as well as import, export, transit of electricity and its measurement. The reliable electricity transmission to customers is assured while respecting non-discriminatory and transparent principles for access to the grid in accordance with the requirements and recommendations resulting from international cooperation and with minimal environmental impact.

In the ownership of National Property Fund of the Slovak Republic are 100 % shares of SEPS, a.s., however the Ministry of Economy of the Slovak Republic performs executive rights.

During 2005 the activities of SEPS, a.s. focused primarily on the elaboration, approval and subsequent publication of two important documents which are legally binding for all market participants:

- "Technical conditions for connection, access and operating of the transmission system" (it replaced the former TSO Grid Code). The purpose of this document is to provide minimal technical, construction and operation conditions and technical rules for connection, access and usage of the transmission system for electricity market participants. The document came into force on 1 November 2005 after the approval by the Board of Directors and implemented in June 2006.
-
- "The Trading Code", including rules and standards of TSO activities in the field of services provisions, purchasing the services and electricity for covering losses and access to grid, as well as contract and financial conditions for providing services to all transmission system users in transparent way. It came into force on 30 December 2005 after approval by the Regulation Authority.

SEPS, a.s. reacts to all challenges through an appropriate development of the transmission system of Slovakia, especially in the field of implementation of advanced technology for control and operation of transmission system and also reacts to changes in generation portfolio by building up new lines and interconnections:

- New head quarter of the Slovak Power Dispatching Center (SED) in Žilina was completed in 2005,
- The realisation of further building and technology parts of the priority investment project - the reconstruction of the 400 kV electricity substation Križovany, due to decommissioning of NPP V1 Jaslovské Bohunice in 2006 - 2008,
- Investments into the electricity substation remote control systems, trade and information systems and also into innovation of main technology components.

<u>Main generators</u>
The joint-stock company Slovenské elektrárne, a.s. is the operator of two nuclear power plants, two thermal power plants, and 34 hydroelectric power plants. The company's line of business includes electricity generation, imports, exports, sales and distribution. SE, a.s., provides heat generation, sales.

List of main generators (incl. IPPs) on the Slovak territory

Jaslovské Bohunice NPP V-1, V-2	1760 MW
Mochovce NPP	880 MW
Čierny Vah HPP	735 MW
Gabčíkovo HPP	720 MW
Vojany 1 TPP	660 MW
Vojany 2 TPP	660 MW
Nováky TPP	522 MW
Bratislava PPC	218 MW
Košice TPP	121 MW

<u>Foreseen/Outgoing projects for new generating units</u>
expected projects without final decision for construction

Malženice PPC	385 MW
Trebišov	765 MW
PPC Žilina	500 MW

<u>Distributors</u>

Západoslovenská energetika, a.s. (ZSE, a.s.) - is the largest power distribution company in Slovakia (nearly 950 000 customers). It is a shareholding company and member of the E.ON Group. It supplies electric power via its own distribution networks in the territories of four Western Slovakian regions and Bratislava. It provides services of distribution, sales, purchase and generation of electricity to a million customers.

Stredoslovenská energetika, a.s. (SSE, a.s.) - is a power supply and distribution company. It conducts its business in the Regions of Žilina and Banská Bystrica and in a part of the Trenčín Region, where it delivers and distributes electricity to some 690,000 customers - businesses and households, providing its customers with complex services related to the power distribution, supply and use. EdF entered SSE as a strategic partner

Východoslovenská energetika a.s. (VSE, a.s.) - is a distribution company whose main activity is to purchase, distribute and sale electricity in the Region of Košice, Prešov and a part of Banská Bystrica Region. (nearly 600 000 customers). The company RWE Energy has entered into strategic partnership with VSE, a. s.

Main consumers (connected to the power system of Slovakia)
Four industry companies:

- Duslo, Šaľa
- OFZ, Široká
- US Steel, Košice
- Slovalco, Žiar nad Hronom

3. Transmission network and system issues

3.1 Status of international interconnections

Existing international interconnections

FROM	TO	Type AC/DC Single/Double	U [kV]	S [MVA]
Považská Bystrica (SK)	Lískovec (CZ)	single AC	220	274
Senica (SK)	Sokolnice (CZ)	single AC	220	326
Varín (SK)	Nošovice (CZ)	single AC	400	1386
Križovany (SK)	Sokolnice (CZ)	single AC	400	1323
Veľké Kapušany (SK)	Mukačevo (UA)	single AC	400	831
Gabčíkovo (SK)	Győr (H)	single AC	400	1386
Levice (SK)	Göd (H)	single AC	400	1330
Lemešany (SK)	Krosno (PL)	single AC	400	831
Lemešany (SK)	Krosno (PL)	single AC	400	831
Stupava (SK)	Sokolnice (CZ)	single AC	400	831

Ongoing studies in international/cross-border interconnections;

FROM	TO	Type AC/DC Single/Double	U [kV]	S [MVA]	Date for study completion	Expected date for commissioning the line under study
Moldava (SK) or Rimavská Sobota (SK)	Sajoivanka (H)	double AC	400	1386 *	2004	2017
Varín (SK)	Byczyna (PL)	double AC	400	1386 *	2007	2015/2020

**one circuit*

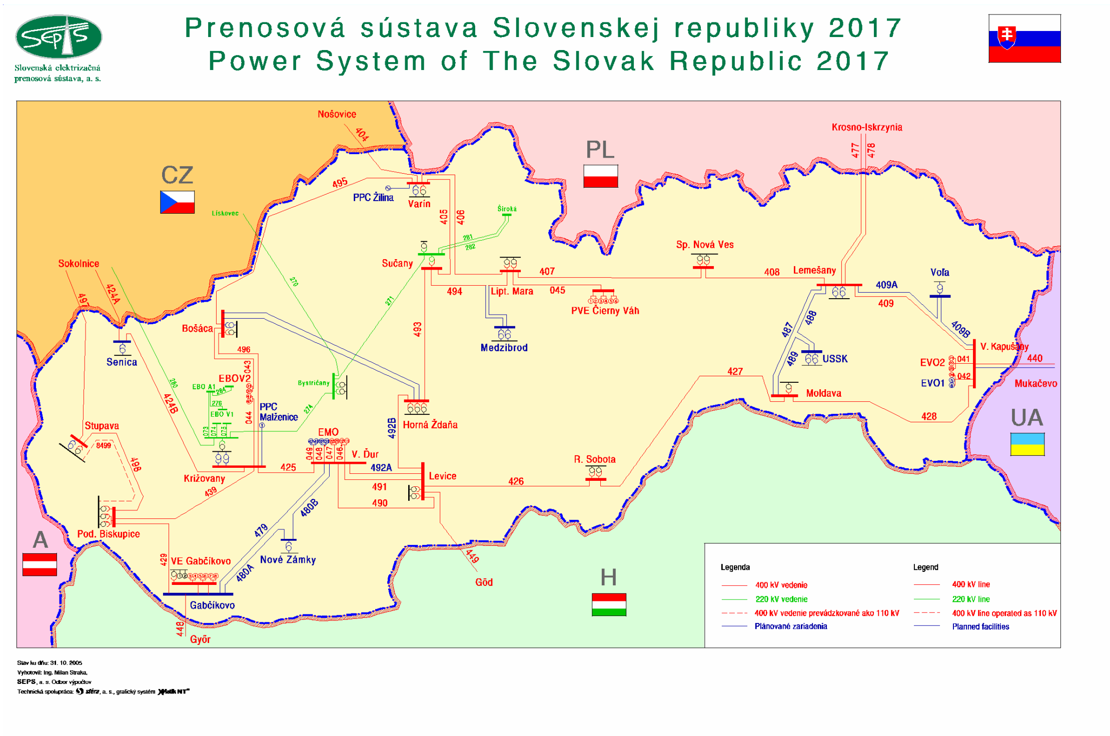
Lines under construction (internal and cross-border)

FROM	TO	Type AC/DC Single/Double	U [kV]	S [MVA]	Expected date for commissioning the line
Lemesany (SK)	Moldava (SK)	double AC	400	1386 *	2011

Future projected interconnections

FROM	TO	Type AC/DC Single/Double	U[kV]	S [MVA]	Expected date for commissioning the line
Stupava (SK) or Podunajské Biskupice	Austria	double AC	400	1386 *	2015

3.2 Network development plan

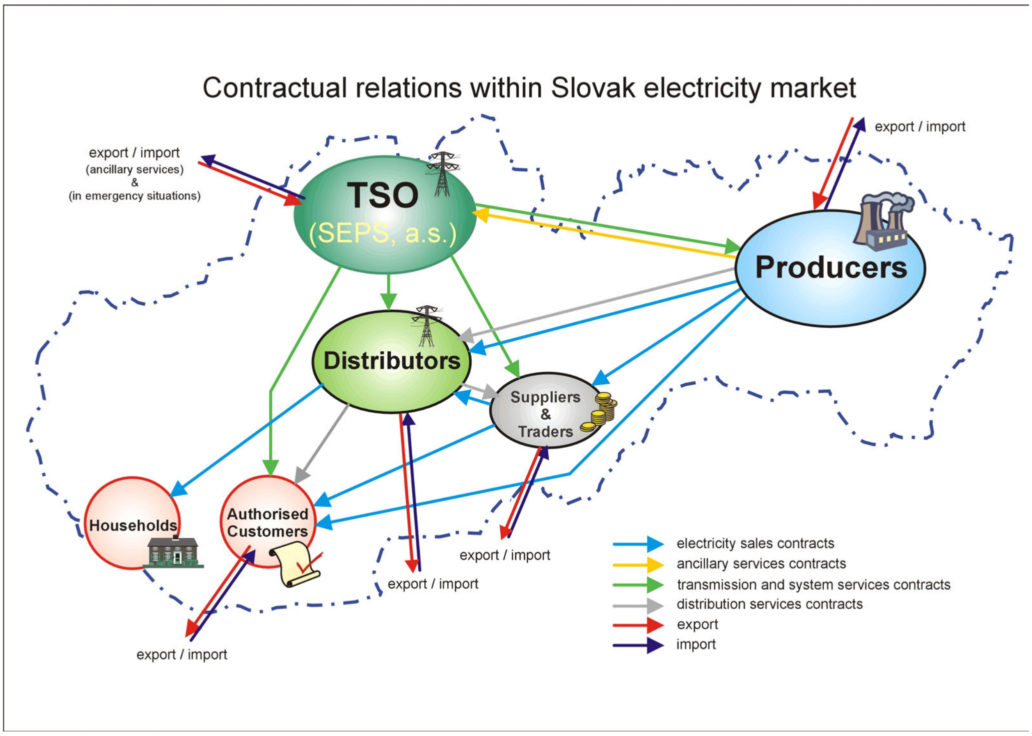


4. Electricity market structure

The definition of price regulation for electricity supplies to protected customers and for electricity distribution to eligible customers was carried out under the supervision of the Regulatory Office for Network Industries (ÚRSO) and pursuant to Act on regulation No. 658/ 2004 Coll. of 26th October 2004. This establishes at the same time the conditions and the method of regulation in network industries, the conditions for the performance of regulated activities, the rights and obligations of regulated entities, and establishing the rules for the operation of the electricity market. Prices and tariffs for services provided by Slovenská Elektrizačná Prenosová Sústava, a.s., to trading partners were governed during 2005 by ÚRSO decisions taken in late 2004 and over 2005. The fundamental framework for price regulation was laid down by Decree of the Office for Regulation of Network Industries of 31sAugust 2004 No. 2/2004, which establishes particulars of the procedure in regulation of prices for electricity generation, transmission, distribution and supplies and in establishing the scope of economically eligible costs and reasonable profit. On 30 June 2005, the Decree No. 2/2005 came into force and it now represents the price regulation framework
Pursuant to the new legislation, the business conditions of Slovenská elektrizačná prenosová sústava, a.s., were revised and approved by of the ÚRSO Decision No. 0001/2005/02/PP dated 30 December 2005 as part of Slovenská elektrizačná prenosová sústava, a.s., Operating Regulations.

The services provided by Slovenská elektrizačná prenosová sústava, a.s., in 2005 arise from its TSO obligations (SEPS, a.s., as the supplier):

- provision of power reservation on transformers and electricity transmission over the transmission system,
- coverage of losses occurring in electricity transmission over the transmission system,
- system services,
- administration of collection of the fee for system costs to Slovenské elektrárne, a.s.,
- evaluation and accounting of deviations,
- cross-border trading (electricity exports, imports, transit) within and outside of the CBT mechanism,
- allocation of transmission capacity on cross-border profiles through auctions,
- cross-border electricity exchanges.



5. Other

Link	Company
www.sepsas.sk	**Slovenská elektrizačná prenosová sústava, a.s.**
www.seas.sk	Slovenské elektrárne, a.s.
www.economy.gov.sk	Ministerstvo hospodárstva Slovenskej republiky
www.urso.gov.sk	Úrad pre reguláciu sieťových odvetví
www.zse.sk	Západoslovenská energetika, a.s.
www.sse.sk	Stredoslovenská energetika, a.s.
www.vse.sk	Východoslovenská energetika, a.s.

SLOVENIA

1. Basic capacity, generation and consumption data (year 2005)

Installed capacity by fuel, MW		
	Thermal	1255
	Hydro	845
	Nuclear	670
	Renewables	0
	Total	**2770**
Yearly generation fuel by fuel, GWh		
	Thermal	4.640
	Hydro	3.036
	Nuclear	5.613
	Renewables	0
	Total	**13.289**
Annual consumption, GWh		**12.389**
Imports, GWh		**5.833**
Exports, GWh		**6.026**

Annual production in 2005 was 13.289 GWh, 1 % lower than in 2004 (13.392 GWh). This reduction in production resulted primarily from unfavourable hydrologic conditions. The production of electricity in hydro power plants was, in comparison with 2004, lower by as much as 16 %. On the other hand, the production of nuclear energy was larger than expected, with a production growth of as much as 7.7 %. In addition, there was an increase in the production of some thermal power plants that, on average, achieved a 4.3 % growth in comparison with the previous year.

Consumption was 12,389 GWh of electricity, which was 320 GWh, or 2.6 % higher than in the previous year. The consumption of customers connected to the distribution networks increased the most, with a 4.8 % in comparison to 2004. However the customers on the transmission network consumed 0.3 % less electricity.

Export increased by 148,6 %, import by 3,74 %. In 2005 imports covered 12.3 percent of Slovenia's demand for electricity.

2. Industry structure

2.1 Recent key developments

The Legal framework of the electricity industry in Slovenia is defined in:

- Energy Act (Official Journal of the Republic of Slovenia, No. 26/2005) which adopted all requirements from the new Electricity directive,

And its sub law legislation, among them the most important legislative instruments are:

- Act for determining the methodology for network charges calculations and the methodology for network charges for energy firms and Order setting of network charges for the electricity networks usage (Official Journal of the Republic of Slovenia No. 84/2004).
- Decree on the method for the implementation of public service obligation relating to the activities of the system operator of the electricity distribution network, and the public service obligation relating to electricity delivery to tariff customers (Official Journal of the Republic of Slovenia No. 117/2004).
- Decision on prices for electricity delivery for households and prices covering supplier's expenses on electricity delivery (Official Journal of the Republic of Slovenia No. 66/2004, 38/2005).

- Decree on the rules for determining prices and purchasing of electricity from qualified electricity producers (Official Journal of the Republic of Slovenia No. 25/2002) and decision on prices and premiums for purchasing of electricity from qualified electricity producers (Official Journal of the Republic of Slovenia No. 8/2004).
- Rules on setting prices for the use of electricity networks and the criteria for the justification and clarification of costs (Official Journal of the Republic of Slovenia No. 134/2003) in part, which governs the appendixes for preferential dispatching and the appendix for supervising contracts in the organised electricity market and the means for operating the Agency.
- The Regulation fixing of prices of network charges for distribution and transmission networks (Official Journal of the Republic of Slovenia No. 70/2004).
- Order for setting the average costs of connecting new network users and for increasing the connection power of existing users (Official Journal of the Republic of Slovenia No. 11/2003) and its correction (Official Journal of the Republic of Slovenia No.16/2004).
- Price Control Act (Official Journal of the Republic of Slovenia No. 63/1999).
- Consumer Protection Act (Official Journal of the Republic of Slovenia No. 98/2004).

Slovenia was one of the first Member States to transpose into its own legislation the Directive 2003/54/EC concerning the common rules for the Internal Market in Electricity. Location of the Slovenian transmission network between the neighbouring networks of Austria, Croatia and Italy represents a big challenge for trading with electricity, mainly because of the significant price differences in the region. Physical flows of electricity towards Italy increased significantly after some Balkan countries synchronised again their networks with the European energy network. The transparency and conditions for cross-border trading in the European area allowed an increase in the amounts traded in the regions with lower prices. The amount of electricity, imported and exported through the Slovenian transmission network amounted to 75 % of the annual consumption of Slovenian customers.

Related to unbundling, the transmission system operator for the whole of Slovenia is a single legal entity that does not carry out any other activity. The companies for electricity distribution maintain separate accounts for their different energy-related activities i.e. distribution and electricity supply respectively. The system operators report annually to the Energy Agency and make their financial statements publicly available.

In 2005 the Energy Agency prepared and implemented the second regulatory framework for setting and charging for the network charges for the use of electricity networks in the regulatory period 2006–2008. With respect to economic regulation, the method of price capping included in the price basket was applied.

2.2 Main actors

Transmission system operator

Elektro - Slovenija (ELES)'s mission is to provide suppliers and consumers with non-discriminatory transmission of high-quality electricity. As a public company under a 100 % state ownership, ELES has been entrusted with three major responsibilities - to act as an electric power transmission company, as system operator, and through subsidiary company as a market operator in Slovenia. Other ELES subsidiaries are also engaged in telecommunication business and organisation of industry training programmes. At the end of 2005, ELES had 471 employees. The power transmission network encompasses 2594 km of HV network.

The key infrastructure investment projects are itemised in the state-mandated 480 million euro Transmission Network Development Programme to 2014. The construction of 400 KV Beričevo-Krško link, which will involve the closure of a 400 kV loop in Slovenia, can be regarded as a most crucial investment.

ELES will have to find more efficient concepts of network management and technical solutions to the key question of how to balance the commercially agreed and the actual flows of electricity through the network and to fix it with apposite international agreements.

As the existing high power flows through Slovenia already is starting to seriously jeopardise the operation of domestic transmission network, ELES will have to fundamentally examine the construction of some new international links, The 400 kV Cirkovce-Pince connection with Hungary and the Okroglo-Videm interconnection with Italy shall be in the foreground.

Main generators

In 2005 the production structure was as follows: 41 percent in the nuclear power plant, 34 percent in thermal power plants, and 25 percent in hydro power plants. The largest production share was held by Holding Slovenske elektrarne, d.o.o. The other companies - Gen Energija, d.o.o. the owner of Slovenian half of the Nuclear Power Plant Krško, Cogeneration Power Plant TE-TO Ljubljana, d.o.o., and Thermal Power Plant Trbovlje, d.o.o. – act independently in the electricity market.

In addition to the so-called system production in large power stations, the Slovenian electricity system also includes some dispersed production operating on the distribution network. Among them, two types of production are particularly important to Slovenia, namely the production in small hydroelectric power stations and the production in industrial facilities for the co-generation of heat and electricity.

Holding Slovenske Elektrarne HSE was established as a result of, and in response to, the processes of market deregulation. On 26 July 2001 the government of the Republic of Slovenia established HSE as an integrated entity of six companies, as follows: the hydropower producers Dravske elektrarne Maribor, Savske elektrarne Medvode and Soške elektrarne Nova Gorica, the combined gas-fired power plant TE Brestanica, the coal-fired power plant TE Šoštanj and the Premogovnik Velenje coalmining company. The Group includes also two investment companies and three international companies (HSE Italia, HSE Balkan Energy, HSE Hungary).

HSE was founded primarily with a view to ensure a unified front of the majority of power generation companies under free market conditions, implement the construction of Hydropower Stations on the Lower Sava River project, and improve the competitiveness of the companies integrated in the Group. Accordingly, HSE was set to become the leader and key factor in the transformation of the Slovenian power generation sector.

HSE production companies produce more than 50% of the all electricity generated in Slovenia. A combination of different energy sources has proven to be HSE’s key to providing safe, reliable and quality power supply to domestic as well as foreign consumers.

The unified front presented to the market by the companies integrated in the Group has resulted in improved market competitiveness, optimisation of efficient and effective utilisation of power generation capacities as a function of changing market conditions, reduction of negative financial effects arising from loss of production, a more comprehensive range of electricity products offered, reduction of risk in relation to long-term contracts, and improved opportunities on the foreign markets.

HSE business operations include energy management, environmental management and the management of related logistic processes. The broad spectrum of business activities can be grouped as follows:

- sales and trading of electricity,
- power generation and production of raw materials required for the generation of electricity,
- optimisation of production in HSE companies,
- provision of ancillary services required for the operation of the power system,
- project management and implementation of projects in the energy sector as well as environmental projects.

HSE core business interests are in the energy sector and in relation to environmental activities. In addition to achieving the core objectives that led the Government of the Republic of Slovenia to establish HSE, the strategic development of the company has followed the concept of multi-utility and the implementation of new production programmes including gas, oil, coal, electricity, water and waste. The diversification of sales programmes is necessary primarily for ensuring a balanced distribution of risks. The adopted multi-utility concept includes the expansion of HSE trade activities to commodity markets. Trading in those markets represents an additional opportunity to improve the performance of HSE and reduce risk in relation to electricity trading.

HSE is the protagonist of the largest investment into this country's power-generation sector – the projected construction of a series of five hydropower plants (HPPs) on the lower reaches of Slovenia's Sava River; namely: the new run-of -river plants at Boštanj, Blanca, Krško, Brežice and Mokrice. These new facilities, which shall be constructed by 2018, will more than double the power generated on the Sava. Their total output shall account for 21 % of the Slovenian hydropower production, and it is anticipated that they shall meet 6 % of the nation's energy needs.

Hydropower Plant	Annual production (GWh)	Installed capacity (rated output) (MW)	Start of operations
Boštanj	115	32.5	2006
Blanca	160	42.5	2009
Krško	149	39.5	2012
Brežice	161	41.5	2015
Mokrice	135	30.5	2018
Total	721	156.5	

In addition, it is expected that, in the period until 2008 the following new production units will be constructed:

- HPS Boštanj: 33 MW, which will start to operate in May 2006;
- TPS Šoštanj: two additional gas generators (2 x 42 MW) as part of Block 5, their completion is expected in 2008, after this reconstruction the total power of Block 5 will be 378 MW, the project is in the phase of project engineering;
- Pumped-Storage Power Station Avče: 190 MW in the turbine and pumping regimes, is already under construction, and is expected to start operating in 2009.

GEN Energija is legal successor of Slovenian investment in Nuclear Power Plant Krško (NEK). It was organised first as a subsidiary of ELES and now as a 100 % state owned company under the Contract between the Government of the Republic of Slovenia and the Government of the Republic of Croatia on the regulation of status and other legal relations connected to investment in NEK, its exploitation and decommissioning.

Having the only one production source is connected with high operational risks and having in mind the requirements of EU regarding competition on open electricity market the Government of the Republic of Slovenia is going to strengthen the company with Termoelektrarna Brestanica d.o.o. (TEB) and Savske elektrarne Medvode d.o.o. (SEM) they are now governed by HSE. The main goal of Gen Energija is to develop market and investment capabilities with strategic connections and existent production capacities in Slovenia.

Beside trading, the main electricity source of Gen Energija is the Nuclear Power Plant Krško (NEK). The basic capital of NEK is divided into two equal shares owned by the partners Gen Energija l.l.c. and Hrvatska Elektropriveda p.l.c., Zagreb. NEK produces and supplies electricity exclusively in favour of the two partners, who each have the right and obligation to use 50% of its total output. On other hand electricity production costs are covered by the two partners.

NEK has been in regular operation since 1984 and will continue to operate for roughly another twenty years. The main achievement in operation is the transition to an 18-month fuel cycle while, in terms of investment allocation, priority was given to secondary equipment such as the replacement of feedwater heat exchangers, low pressure turbines and of the main cooling units as well as upgrading the process information system. The two new low pressure turbines have a higher load factor in comparison with the existing turbines, which means approximately 3 % greater outgoing power or more than 20 additional MW. Its power is now on the threshold of 670 MW.

Thermal Power Plant Trbovlje is an independent power producer as well as a stranded investment. It is composed of two production units namely of PE2 unit on coal with the power threshold of 125 MW and a gas unit with two turbine aggregates with power of 31,5MW.

Thermal Power Plant TE-TO Ljubljana is an environmentally friendly manufacturer of heat, electrical energy and process steam. Its production capacities are 430 MW of heat, 103 MW of electrical energy and 100 t/h of process steam. As regards cogeneration, it simultaneously produces both electricity and heat and attains a higher efficiency level than isolated production while reducing negative effects on the environment. Joint efficiency is a at a 70% level. It provides electrical energy for 3% of the Slovenian demand and more than 90 % of demand for heat in the district heating system of the city of Ljubljana.

Distributors

Within distribution Economic Interest Grouping of Electricity Companies, the new legislation were adopted, i.e. procedures for the legal separation of business activities, as the legal separation of the activities has to be completed with reference to the systemic operator of the distribution network from other activities by 1 July 2007. Some proposals for the future organisation of distribution companies in Slovenia has already been drawn up and sent to the competent Minister.

Besides procedures for the legal separation of distribution activities, other equally important preparations are under way, notably the preparations for the transition of the status of all customers who will become eligible customers. In accordance to the legislation, this will also take place on 1 July 2007. Therefore, household customers will also be able to choose their electricity supplier. The task of distribution companies as an electricity supplier will be to provide simple and transparent procedures for customers as well as preserving and strengthening the market share.

In line with the provisions of the Energy Act, the new organisational structure of five distribution companies has already been put in place. In the framework of regulated activities in two common sectors were established; the sector for managing the distribution network and the sector for distributing electricity. Within the framework of the marketing practices, there are in common two operating sectors organised; the sectors for purchasing and selling electricity and service sectors.

In the field of purchase and sale of electricity, a drastic increase in prices in reference markets was registered in the second half of 2005. This was reflected on the daily market of electricity within Slovenia. The average purchase price was in 2005 significantly higher than in 2004. The purchase prices at the end of 2005 increased by more than 45 % in comparison to January 2005.

In Slovenia there are five distribution companies. These are.

Elektro Celje, d.d., is a Public Enterprise registered as a joint-stock company. The Government currently holds 79.5% of the shares. As of 31 December 2005, it employs 701 workers (in 2003 691). The company has sold 1.395 GWh of electricity (1,710 GWh in 2003) and distributed 1.787 GWh of electricity to its 147.633 eligible and tariff customers.

Elektro Gorenjska, d.d., is a Public Enterprise registered as a joint-stock company. The Government currently holds 79.5% of shares. As of 31 December 2005 it employs 316 workers (319 workers in 2003).The company has sold 940 GWh of electricity in 2005 (952 GWh in 2003) and distributed 967 GWh to its 80,547 eligible and tariff customers.

Elektro Ljubljana, d.d. is a Public Enterprise registered as a joint-stock company. The Government currently holds 79.5 % of shares. As of 31 December 2005, it employs 863 workers (951 workers in 2003). The company has sold 3.251 GWh of electricity in 2005 (3.269 GWh in 2003) and distributed 3.587 GWh (3310 GWh in 2003) to its eligible and tariff customers.

Elektro Maribor, d.d., is a public Enterprise registered as a joint-stock company. The Government currently holds 79.5 % of shares. As of 31 December 2005, it employs 863 workers (895 workers in 2003). The company has sold 2.096 GWh of electricity in 2005 or 5 % more than in 2004 (1947 GWh in 2003) to its 202.302 eligible and households customers (197,417 customers in 2003). The sale to eligible customers increased by 18 % while the sale to households decreased by 12 %.

Elektro Primorska, d.d., is a Public Enterprise registered as a joint-stock company. The government currently holds 79.5% of shares. As of 31 December 2003, it employs 500 workers. Company has sold 1,251 GWh of electricity in 2003 to its 116,679 eligible and tariff customers.

Main traders & other players
Main traders on Slovenian market are:

- APT Power Trading SL, d. o. o.
- C & G, d. o. o.
- Electras, d. o. o.
- Električni finančni tim, d. o. o.
- Elektro Maribor, d. d.
- Atel Energija, d. o. o.
- Ezpada energija, d. o. o.
- Holding Slovenske elektrarne, d. o. o.

3. Transmission network and system issues

3.1 Status of international interconnections

Existing interconnections

FROM	TO	Type AC/DC Single/Double	U (kV)
Divača	Redipuglia	AC single	400
Divača	Melina	AC single	400
Krško	Tumbri	AC double	400
Maribor	Kainachtal	AC double	400
Divača	Padriciano	AC single	220
Divača	Pehlin	AC single	220
Cirkovce	Mraclin	AC single	220
Podlog	Obersielach	AC single	220

Ongoing studies and activities in internal and cross-border HV lines;
Internal 2x400 kV Beričevo-Krško power line: Following a public exhibition and examination of the proposed route of the new Beričevo-Krško power line, critiques and comments were collected and collated. An audited statement on environmental impacts was also made. On these basis, the national spatial plan was then amended accordingly and adopted by Government (Official Journal of the Republic of Slovenia No. 5/06).

International 2x400 kV Cirkovce-Pince power line: A 400 KV link with Slovenia's eastern neighbour Hungary is under preparation, by way of which the country will have acquired high voltage transmission connections with all its neighbours. An assessment of the 400 kV Cirkovce substation was finished and examination has been made of the collective ecological and environmental impacts of a proposed corridors of the projected Cirkovce-Pince overhead line with Hungary. A comparative study of the various versions thereof was also undertaken, upon which the positions and statements of the spatial planning stakeholders were acquired.

International 2x400 kV Okroglo-Udine power line: The provision of an additional 400 kV link with Italy, namely between Okroglo and Udine, is also under examination.

3.2 Network development plan

According to Energy Act, "The National Energy Programme" shall determine the long-term development goals and guidelines of the energy systems and energy supply, investment in public infrastructure, the use of commercially available technologies to acquire energy resources, and the generation of energy and the expected extent of investment by private sector investors in energy-related activities. In the preparation of the National Energy Programme, the methodology of total treatment of all phases, from production to use of energy, shall be applied. A National Energy Programme shall be adopted every five years by National Assembly of Republic of Slovenia at the proposal of the Government.

Transmission and distribution system operators and production companies are obliged every two years to prepare and publish an estimate of generation and transmission capacities which will be connected to the network, the need for interconnections with other networks and the demand for electricity for the subsequent five years.

Transmission and distribution system operators shall produce a development plan every two years for the electricity transmission and distribution network of the Republic of Slovenia and a development for generation capacity. The Development plan must be compiled for a minimum of 10 years and must be harmonised with the National Energy Programme. The Government shall issue the consent for the plan.

A development plan for minimum of 10 years shall also be produced by providers of energy and fuel generation or processing activities, and the providers of petroleum derivatives.

3.3 Main events

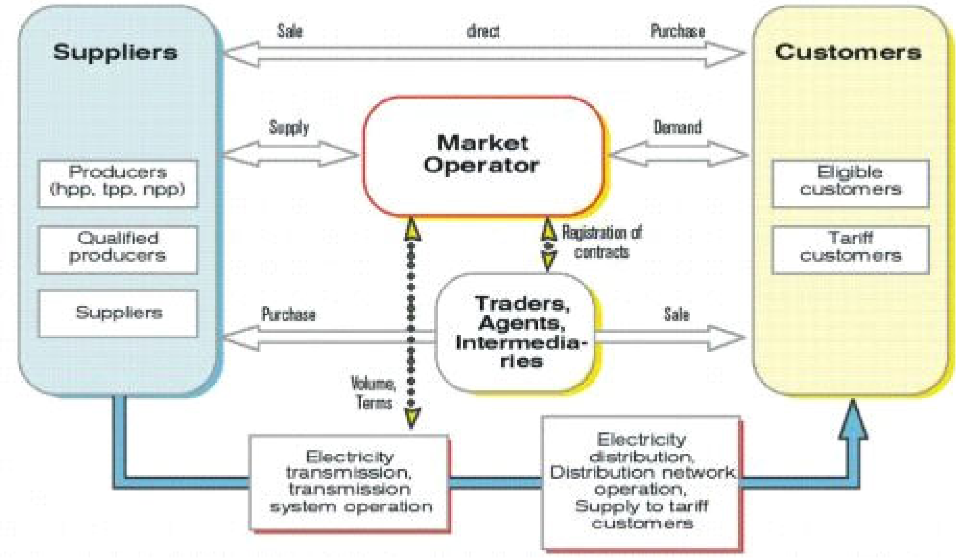
Slovene consumers were provided with a reliable supply of high quality of electrical power throughout the year via ELES' transmission network.

However, after the connection of the UCTE synchronous zone II in October 2004, surpluses of inexpensive power emerged in South Eastern Europe, which traders now sell to other areas – mainly to Italy – where the prices of electrical energy are higher. Due to the geographical location of Slovenia, power flows towards Italy through Slovenia have significantly increased, reaching on occassions1800 MW , four times higher than the agreed loads, This represents a real threat to the reliability of operation of the Slovene transmission network.

In early April, however, the company had to introduce restrictions on the flow of power across its network in order to avoid the possibility of overload and thus ensure undisturbed consumer supply. ELES was forced to restrict the import from Croatia and export to Austria. Despite this measure, ELES experienced some difficulties in ensuring the N-1 security criterion because - due to the topology of the network and its technical capacities - such instruments can exert only a limited influence on physical flows originating from foreign transmission systems that pass the Slovene transmission network. The flow of power towards Italy increased by 29.3 percent in 2005, whereas the flow of electricity entering the network from Croatia increased by 47.5 percent. At the same time flows from Austria decreased by 32.9 percent, all of which clearly points the conditional dependability of Slovenia's EES in relation to changes occurring across the transmission networks in neighbouring countries. Considering the infrastructure available, such global changes caused by market disparity have led to significant unsustainable increases in trans-national power flows.

4. Electricity market structure

With the opening of the electricity market, electrical energy became a marketable commodity. Since 15 April 2001, Slovenian energy-related legislation allows customers with a connected capacity of more than 41 kW at a single point of supply, to freely choose their suppliers of electricity. In accordance with the amended Energy Act of May 2004, as from 1 July 2004, all customers, except households, are considered to be eligible customers. The legislation classifies households as tariff customers until 1 July 2007. After this date, households will also freely choose their suppliers of electricity. Tariff customers are provided with electricity, in accordance with the tariff system, by distribution companies in the framework of the public service of the supply of electricity to tariff customers.
The figure below shows a diagram of the Slovenian electricity market.



The organised electricity market represents the trading in the daily market for electricity. The market operator (Borzen, d.o.o.) provides organised exchange of demand and supply of electricity, as well as trading by products within defined time periods. The new Ordinance relating to the Operating Mode of the Public Service of Operating the Market for Electricity (Official Journal of the Republic of Slovenia, No. 52/06), in force since 5 June 2006, gives the market operator some new responsibilities:

The market operator is now responsible to make balance contracts, rather than the transmission system operator

- The procedure of changing supplier has been made simpler and shorter, as it is no longer necessary to obtain the written consent from the current supplier.
- The period in which the supplier is to be changed has also been shortened.

One of the issues associated with the electricity market is the appropriate regulation of access to the cross-border paths, including the mode of establishing and announcing free cross-border capacities, as well as the modes of their allocation to the respective participants. The regulation EC 1223/2003 of the European Parliament and of the Council allows Slovenia to use, until 1 July 2007, the Rules on the Mode and Conditions for Allocating and the Criteria for the Access to Cross-Border Transmission Capacities (Official Journal of the Republic of Slovenia, Nos. 103/02, 103/03) when allocating the access to cross-border transmission capacities, and the mechanisms for congestion management that are in the domain of the Slovenian transmission system operator. The prices for the access to the cross-border connections are regulated by the Decision on Setting the Network Charge for the Use of Electricity Networks (Official Journal of the Republic of Slovenia, No. 84/04), and they are part of the price for the use of networks. The tenders and auctions for free capacities are published at the system operator's address (ELES-TSO).

5. Other

Link	Company

http://www.mg.gov.si/	Ministry of the Economy
www.agen-rs.si	Energy agency of the Republic of Slovenia
www.eles.si	Elektro-Slovenija
www.borzen.com	Borzen – Slovenian Market Operator
www.hse.si	Holding Slovenske Elektrarne
www.dem.si	Dravske Elektrarne Maribor
www.seng.si	Soške Elektrarne Nova gorica
www.savske-el.si	Savske Elektrarne
http://www.te-sostanj.si/	TPP Šoštanj
http://www.te-tol.si/	Cogeneration TPP Ljubljana
http://www.teb.si/	GPP Brestanica
http://www.gen-energija.si/	Holding Gen-Energija
www.nek.si	Nuklearna Elektrarna Krsko
www.elektro-celje.si	Elektro Celje
www.elektro-gorenjska.si	Elektro Gorenjska
www.elektro-ljubljana.si	Elektro Ljubljana
www.elektro-maribor.si	Elektro Maribor
www.elektro-primorska.si	Elektro Primorska

SPAIN

1. Basic capacity, generation and consumption data (year 2005) *

Installed capacity by fuel, MW (1)		
	O.R. Thermal Conventional	30925
	Coal	11424
	Heavy Fuel and Gas	6647
	Gas-Combined Cycle	12224
	O.R. Hydro (no minihydro)	16657
	O.R. Thermal Nuclear	7876
	S.R. Renewables (without great hydro)	12497
	S.R. Non Renewables	6645
	Total	**73970**
Yearly generation fuel by fuel, TWh (1)		
	O.R. Thermal Conventional	136.24
	Coal	77.39
	Heavy Fuel and Gas	10.01
	Gas-Combined Cycle	48.84
	O.R. Hydro (no minihydro)	19.17
	O.R. Thermal Nuclear	57.54
	S.R. Renewables (without great hydro)	28.03
	S.R. Non Renewables	22.23
	Total	**263.32**
Annual consumption, TWh		**246.19**
Imports, TWh		**8.07**
Exports, TWh		**9.41**

[,:thousand; .: decimal point]
*[1] Values denote **gross power** at generator mains.*
*[2] Values denote **net energy** at substation –i.e., internal consumption at power stations are previously netted-.*
[O.R. stands for "Ordinary Regime": obligations and price associated to market procedures]
Total OR=54,829 MW installed generation capacity
[S.R.: stands for "special regime": plants complying with efficiency and renewable energy usage; they have less operation obligations, production guaranteed except for system security reasons and reattributed with a bonus]
Total SR=19,142 MW installed generation capacity

2. Industry structure

2.1 Recent key developments (liberalisation, privatisation, TSO, unbundling etc.)

Regulation
General: After publication , on November 1997, of the 54/97 Electricity Act, which started the liberalisation of the power system –applied upon generation and supply-, the main reference concerning regulation of the transmission grid is the Royal Decree 1955/2000, published in December 2000 (dealing with issues such as the development of the transmission network, access to the grid and public interest of facilities and authorisation procedures, quality related to transmission grid.) The philosophy based in the lack of network capacity reserve for planning and access is one of the main features of this regulation.
Recent key developments
Concerning most significant regulatory developments since 2005:

* *Data are derived from closure of year 2005 and correspond to the mainland peninsular system (thus, it does not include the Insular systems of Balearic and Canary Islands; these have a combined dimension of 4,116 MW –installed generation- and 14,52 TWh -annual energy consumption)*

- Royal Decree-Law 5/2005 (March'05) adapting the market regulation to the Iberian Power Market (see next chapter)
- Law 24/2005 (November'05) introducing a number of reforms oriented to give impetus to productivity (including the elimination of tariffs over 1 kV by 2010)
- Royal Decree 1556/2005 (December'05) concerning 2006 electricity tariffs, which introduces a 4,8 % increase as well as a revision mechanism every 6 months.
- Royal Decree-Law 4/2006 (February'06) increasing the functions of the Energy National Commission, particularly in terms of approving company purchases and sales.
- New regulation for international interchanges according to European directions; specific development for the Spain-France interconnection based on a joint explicit auctions system for the allocation of capacity interconnection has started in June 2006. From the beginning, RTE and REE will jointly organise monthly, daily and two intra-day explicit auctions. Later in 2006, the number of intra-day auctions will increase up to six, as well as the annual auction for 2007 will launched.

Additionally, *The White Book on the regulation of generation in the Spanish Power System* was published in June 2005, dealing with different "imperfections" in the power generation market and proposing correcting regulatory mechanisms. Main issues were the limitation of market power of the generation and the elimination of tariffs.

Organisation.
Iberian Power Market: At the end of 2001, a governmental agreement between Portugal and Spain was signed in order to develop the Iberian Power Market (MIBEL, *Mercado IBérico de ELectricidad*). For this purpose both national TSOs, REN and REE were appointed responsible for elaborating all necessary procedures related to system operation, a process which involves the coordination of legal, market, operation, development, equipment and planning issues. In parallel, Regulatory Bodies (CNE and ERSE) have been made responsible for coordinating the general legal and regulatory issues. The initial objective of 2003 was postponed and the first integrated actions have started in 2006.

In the MIBEL, two main modalities for energy contracting are considered: the free bilateral contracting between the agents and the organised contracting in a Power Exchange. Moreover, in the organised Power Exchange there will be two possibilities: Day ahead contracting and medium or long term contracting. The agents will have full freedom to establish bilateral contracts or to fulfil their contracts in the Power Exchange -Day ahead or Futures- in full equality of conditions.

The Power Exchange will be managed by the Iberian Market Operator (*Operador del Mercado Ibérico*, OMI) that will have two "poles":

- The Spot Market, located in Spain -Madrid- (OMI-E), will organise a day-ahead market and an intra-daily market that will held several contracting sessions.
- OMI-E will match the bids and offers submitted by the agents and will set the price for each negotiated product at which all buying and selling contracts will be cleared.
- The Futures Market located in Portugal -Lisbon- (OMI-P) will offer for negotiation medium or long term financial products (year contracts, quarter contracts, month contracts, week contracts, …).

System Operation is to be performed in two control areas, Portugal and Spain, each one managed by the respective System Operator (REN in Portugal and REE in Spain), who will be respectively responsible for the security and system technical management, as well as the management of System Services and their associated markets, including the respective commercial settlement. In each control area the responsible System Operator acts as a Single Buyer of System Services.

Both System Operators will coordinate progressively their activities, and some regulation is being elaborated; at this point, the main issue is the procedure for assigning international capacity. There are however some regulatory differences (e.g. the grid capacity reserve for generators existing in the Portuguese system is not guaranteed in the Spanish system).

2.2 Main actors

Spanish Power System: Up to 1997, the electric power sector was structured around traditional companies sharing generation and distribution, and Red Eléctrica was already acting as transmission system operator although based on centralised optimisation of generation resources.

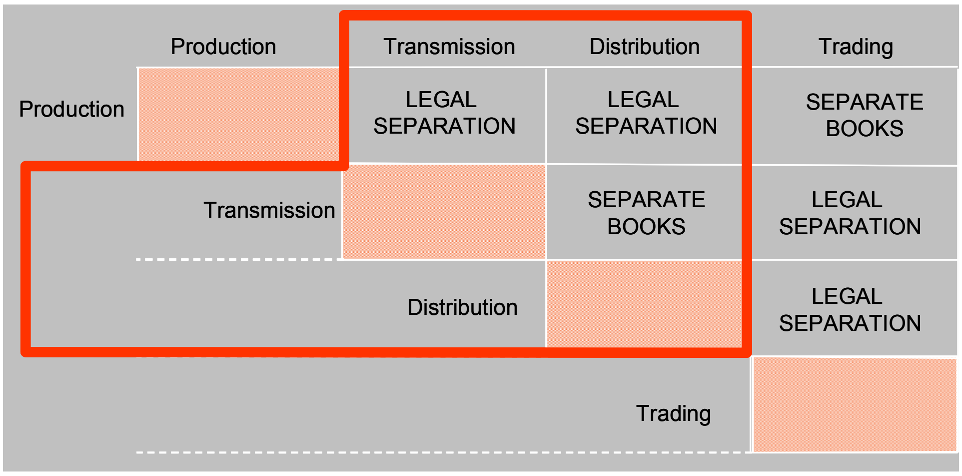
After the Electricity Act 54 of 1997, from the 1 January 1998 the generation and trading are liberalised and a wholesale market has been created, involving the following actors:

- Generators, liberalised,
- Transmission Companies, regulated
- Distribution Companies, regulated
- Trading companies, liberalised

Coordinated by:

- System Operator, regulated
- Market Operator, regulated

The obligations concerning activities and separation or unbundling requirements are shown next graph:



The following table details within each activity, the different functions as well as the requirements concerning Administrative Authorisation and Record:

Activity	**Classification**	**Agent/Institution**	**Administrative Authorisation**	**Administrative Record**
Production				
Ordinary regime	Liberalised	Generators	Yes	Yes
Special regime	Regulated (*) Liberalised	Special regime generators	Yes	Yes
Complementary services	Regulated (*) Liberalised	Generators/ Special Regime/Consumers	Yes	(*)
Electric network				
Transmission				
Development planning	Regulated	System Operator	(*)	(*)
Construction	Liberalised	Red Eléctrica de España, S.A./ Transmission Companies/ Other	Yes	
Maintenance planning	Regulated	System Operator/ Transmission Operator	(*)	(*)
Maintenance	Liberalised	Transmission Companies		
Transmission Operation	Regulated	Red Eléctrica de España, S.A.	(*)	(*)
Distribution				
Development planning	Liberalised	Distribution Companies	Yes	Yes
Construction	Liberalised	Distribution Companies	Yes	Yes
Maintenance planning	Regulated	Distribution Companies	Yes	Yes
Maintenance	Regulated	Distribution Companies	Yes	Yes
Distribution Operation	Regulated	Distribution Companies	Yes	Yes
Transactions				
Production market				
Organised contracting	Liberalised	Market Agents/ OMEL	Yes	Yes
Free contracting	Liberalised	Market Agents	Yes	Yes
International exchanges	Liberalised	Market Agents	Yes	Yes
Retail market				
Retails to eligible clients	Liberalised	Trading Companies	Yes	Yes
Retails to regulated tariff clients	Regulated	Distribution Companies	Yes	Yes
Supplementary activities				
Liquidations	Regulated	OMEL/ CNE	(*)	(*)
Billing	Regulated (*) Liberalised	Distribution Companies/ Trading Companies/ OMEL	Yes	Yes
Measurement	Regulated	System Operator/ Distribution Companies	(*)	(*)
Coordination				
Technical operation of the system	Regulated	Red Eléctrica de España, S.A.	(*)	(*)
Economic operation of the market	Regulated	OMEL (Spanish Electricity Market Operator)	(*)	(*)
Electricity enquiry				
Regulated tariff customers	Regulated	Consumers	Yes	No
Eligible customers	Liberalised	Consumers	Yes	No

(*) Activities that the Regulation entrusts to a particular Institution.

<u>Transmission System Operator</u>

Red Eléctrica de España (REE) is the company responsible for the system operation of the whole mainland Spanish System and the extra peninsular systems *(in 2003, REE was appointed System Operator of the Electric Systems of Canary Islands, Balearic Islands, Ceuta and Melilla, being this function effective from 2004)* as well as the main transmission company (transmission system is made up by 220 and 400 kV levels, in addition to international interconnection of any voltage level).

Before the end of 2002, REE owned 96% of 400 kV lines and around 30% of 220 kV lines; up until this moment, REE has acquired transmission grids from ENDESA and UNION FENOSA, and entered into the ownership of the former IBERDROLA transmission assets (complete ownership from 2005). Currently, REE owns the vast majority of the transmission system (16,846 km at 400 kV and 16.458 km at 220 kV).

Main generators (incl. IPPs)
The main generating companies in Spain are Endesa, Iberdrola, Unión Fenosa, Hidrocantábrico, Gas Natural and Viesgo (ENEL Group). Several international companies are also planning to enter the Spanish system.

The main generating units of the Spanish power system are the nuclear plants of the last generation. The following graphs identifies those with rated power around 1,000 MVA:

PLANT	RATED POWER [MW at substation]
TRILLO	1066
VANDELLOS II	1040
COFRENTES	1025
ASCO (G.1)	992
ASCO (G.2)	992
ALMARAZ (G.1)	983
ALMARAZ (G.2)	974

Foreseen/Outgoing projects for new generating units;
Due to the lack of regulation in the generation expansion process, future data are at the level of forecasts. Two main “families” concentrate most of the expectations:

- A great number of power plants with combined cycle gas turbines (CCGT) have been announced (applications for access to the grid addressed to the system operator add more than 70,000 MW), both from national and foreign generating companies.
- In the last 6 years, 12.224 MW have already been installed and expected installed power for 2010 may reach to 20,000 ÷ 30,000 MW.
- Apart from CCGT, for the end of the current planning horizon (2011) some 1.000 MW are expected in pumping hydro plants (repowering of existing ones) and some 1.000 MW of coal plants (supercritical).
- In addition to the 9,800 MW of wind power generators installed at end of 2005, there are a huge number of applications for access to the grid from agents (more the 80,000 MW have been received at REE) and regional plans (more than 40,000 MW are announced by Regional Administrations -competent for wind plants authorisation-). At national level, 20,000 MW has been established as objective in the Spanish System for 2010.

Number of distributors
5 main distributing companies (Endesa, Iberdrola, Unión Fenosa, Hidrocantábrico and Viesgo) have direct connection with the transmission grid and operate the grids of 132 kV and lower voltages. In addition, there are many local distributors with no connection to the transmission grid. Currently, 325 distributors are officially registered as distributors.

Main traders & other players (exchanges etc.)
The main national companies above mentioned have, within their holdings, the corresponding trading company (legal separation between grid activities –regulated- and trading activities –liberalised- are required in the Spanish system). There are also a number of licensed trading companies (authorised to negotiate within the Spanish system, with the main aim of supply eligible customers) as well as external agents (authorised for international interchanges). Both groups may be consulted in the Market Operator web-page (www.omel.es) or that of the National Commission for Energy (www.cne.es).

At the moment, there are 57 registered traders.

The original objective to open the market in 2007 for all consumers has been accelerated and since the 1 January 2003, all consumers are entitled to chose supplier or participate in the energy market –qualified consumers-. However, on 10 of them currently exercise the right of participating in the energy market, either directly as a market agent, via a trading company or through bilateral contracts with a producer. The main reason for this the current advantageous energy tariffs for the large consumers in strategic sectors, such as railways and metal plants. Finally, there are currently 24 registered external agents, authorised for establishing commercial interchanges through the international interconnections, whether for importing or exporting.

Final Remark: In relation to agents, it is relevant to mention that immediately after the publication of *The White Book on the regulation of generation in the Spanish Power System*, there was an attempt to acquire Endesa by Gas Natural followed by another offer from Eon, which have issued respective Acquisition Public Offers. The offer of acquisition of Gas Natural is currently subject to appeal in the Court and suspended; the one from Eon has been approved by the Energy National Commission in July 2006 subject to certain conditions, (mainly, to sell some 7,000 MW, restrictions in the reselling of assets as well as particular conditions for insular systems).

3. Transmission network and system issues

3.1 Status of international interconnections

Existing International Interconnections

The following Table shows the current international interconnections, where the recent variations are marked in **bold**.

- 2005: The commissioning of the new Balboa-Alqueva 400 kV line and the up rating of Cedillo-Falagueira 400 kV line, both in the Spain-Portugal Interconnection.
- 2006: The commissioning of the 2nd circuit of the Spain-Morocco submarine interconnection (3 new cables).

FROM	TO	U [kV]	Cap* [MVA]
SPAIN	**FRANCE**		
Irún	*Errondenia*	*132*	*111* [*]
Arkale	Argia	220	410
Hernani	Argia	400	1,430
Biescas II	Pragnéres	220	270
Benós	*Lac D'Oo*	*110*	*100* [*]
Vic	Baixas	400	1,510
SPAIN	**ANDORRA**		
Adrall	Escaldes	110	2 x 120 [D/C]
SPAIN	**PORTUGAL**		
Cartelle	Lindoso	400	2 x 1,040 [D/C]
Conchas	*Lindoso*	*132*	*105* [*]
Aldeadávila	Bemposta	220	320
Aldeadávila	Pocinho	220	320
Saucelle	Pocinho	220	320
Cedillo	Falagueira	400	1,150
Balboa	**Alqueva**	**400**	**1,223**
Santa Marina	*Elvas*	*66*	*2 x 80 [D/C]*
Rosal	*V. de Ficalho*	*15*	[*]
Enzinasola	*Barrancos*	*15*	[*]
SPAIN	**MOROCCO**		
Puerto de la Cruz	Melloussa	400	**2** x 730 [SMC]

All existing interconnections are AC type and single circuit overhead lines, except:
[D/C]: double circuit line ;
[SMC]: submarine cable to Morocco
*Cap**: Thermal Rate at Summer Season (**Only Spanish side limits**; necessary to complement with the corresponding TSO in the "TO" country)*
[*] In italics, interconnections with purposes of support to local demand, which are disregarded for interchange capacity computation and most purposes

Foreseen developments in international/cross-border interconnections:

FROM	TO	U [kV]	Cap* [MVA]	Nature of action	Status**	Foreseen date	Comments
SPAIN	**FRANCE**						
Bescanó	Baixas	400	2x1,825	New double circuit overhead line	Decided	2008 - 2010	High difficulty due to opposition Fundamental for supporting Iderian systems and markets ("less fundamental" for French system)
New 400 kV corridor					Under study	≥ 2010	Bilateral RTE-REE studies ongoing
SPAIN	**ANDORRA**						
Adrall	Andorra	220	2 x 620	New double circuit overhead line substituting existing 110 kV	Decided	≥ 2009	
SPAIN	**PORTUGAL**						
Aldeadávila	International Duero	400	2x1,825	New double circuit overhead line	Decided	2009 - 2010	New facilities are mostly located in Portuguese system (Aldeadávila substation is located less than 1 km from the border)
New 400 kV corridor Andalucía-Algarve					Under study		
New 400 kV corridor Galicia (Vigo area) – Northern Portugal					Under study		
SPAIN	**MOROCCO**						
SPAIN	**ALGERIA**						
New 400 kV Direct Current Cable					Under study	≥ 2010	Preliminary feasibility studies carried out. Not decided

: Thermal Rate at Summer Season (Only Spanish side limits**; necessary to complement with the corresponding TSO in the "TO" country). For new lines, capacities are estimated project values. For reinforcement of existing lines, it is the new value.*
***: Decision denotes the confirmation of the action, although some design specifications must be detailed.*

3.2 Network development plan

Within the Spanish Power System, Red Eléctrica de España (REE), as the Transmission System Operator, is responsible for the technical management of the system, including the elaboration and proposal of grid expansion plans to the regulator (the Ministry of Economy), the competent Administration responsible for approving and publishing the transmission plan.

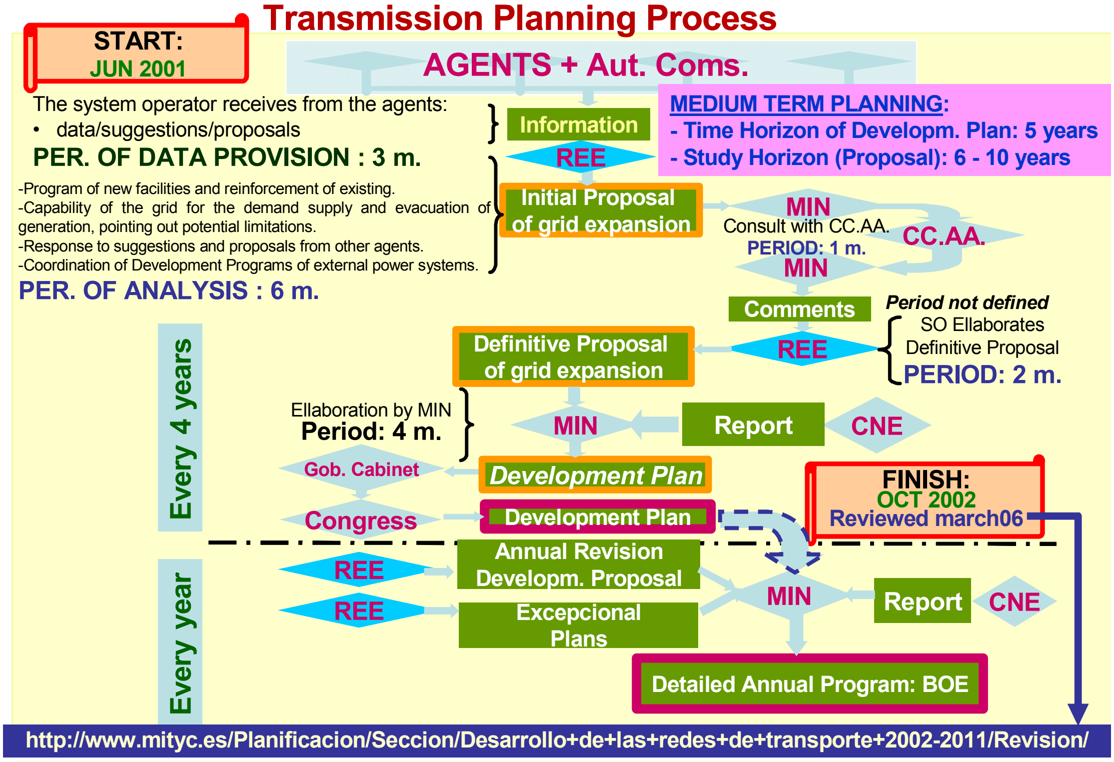
While the expansion generation forecasts have indicative character - and generating companies make their own investment decisions - the transmission grid plan has a binding nature and different time-scopes or horizons are established in the current regulation. Long term plans observe a time frame of 20 years and must be issued every 5 years. These plans have the purpose of establishing the main strategic development guidelines, which are generally associated to new transmission corridors and new interconnection substations (especially at 400 kV level).

A very important advantage of this stage is the possibility of advancing in parallel studies (environmental, legal procedures), with moderate costs albeit highly time-consuming.

Results from long term plans do not lead to operative decisions but they serve as a general framework for integrating short and medium term plans:

- Medium term plans -10 years horizon- result from the full process of data acquisition from affected agents and administrations and full associated analysis carried out every 4 years.
- Short term plans -5 years horizon- are carried out every year. Since they are the most immediate, they have the most operative purpose of updating and adjusting medium plans. Therefore, they take into account major variations experienced over the medium term hypotheses, as well as those results from the access and connection process.

A graphical representation of the preceding stages may be seen in the following figure, where participation of Agents, Regulatory Body (CNE), Regional Administrations (CCAA) and Ministry of Industry, Tourism and Commerce (MIN; which represents the actual regulator, responsible for planning) is shown, with the final approval of Government (Gob. Cabinet) and Congress.



The following Table summarises the main magnitudes of the current transmission grid, together with the current transmission plan Horizon 2011, which includes a very large number of new facilities:

Existing (December 2005) and Planned	**400 kV**	**220 kV**
Existing Lines [km of circuit] (1)	16845	16458
Up rating existing lines [km of circuit]	3347	3437
New lines [km of circuit] (2)	5496	3044
Existing Substations [nº of bays]	886	1969
New Substations and expansion of existing substations [nº of new bays]	706	1256
Existing Compensation [Mvar]	(L) 7014 (C) 200	(C) 600
New Reactive Compensation [Mvar]	(L) 2650	(C) 800
Existing Transformers [MVA] (3)	55959	
New Transformers [MVA] (4)	30650	

(1) *All overhead lines, except 16 km underground cables in 400 kV and 114 km underground cables in 220 kV*
(2) *All overhead lines, except 14 km underground cables in 400 kV and 270 km underground cables in 220 kV*
(3) *Only transmission transformers (it includes 400/132 belonging to REE).*
(4) *For the new elements, 400/132 transformers –to be owned by the distribution companies- do not belong to the transmission grid.*

3.3 Main events

Quality of supply: No major events concerning unsupplied energy to consumers –blackouts- have been registered in period 2005-2006. In this context, the following Table summarises the events in the transmission grid and supply consequences during this period in terms of supply continuity indicators.

	PERIOD	
	2005	2006 (January to June)
Number of Incidents with supply interruptions	23	13
Energy Non Supplied [MWh]	549,7	491,4
System Minutes [min]	1,18	1,53

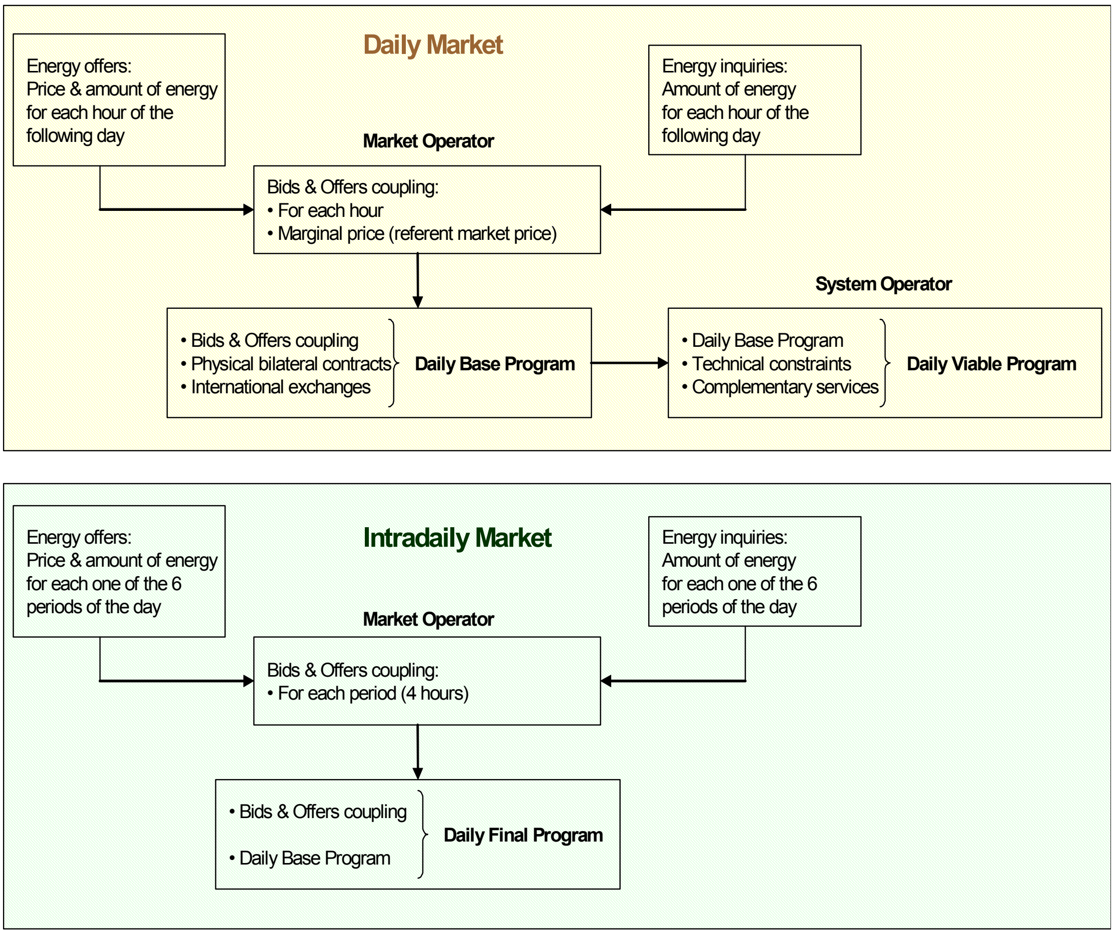
4. Electricity market structure

With the Electricity Act 54 of 1997, the generation and trading has been liberalised and a wholesale market was created as from the 1 January 1998, with the following main features:

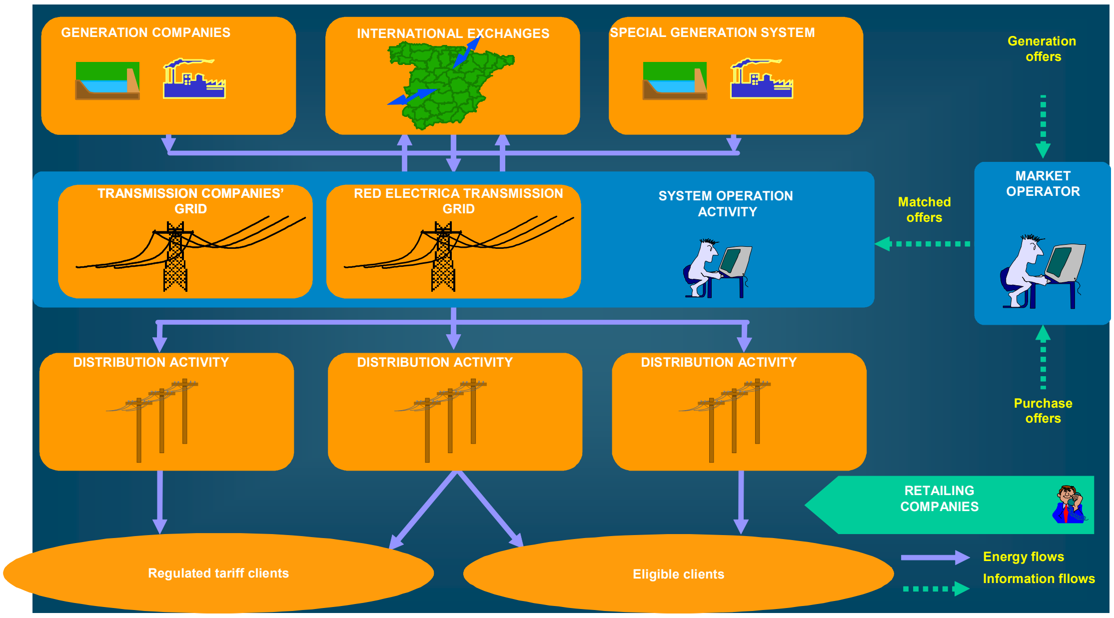
- Market Operator (OMEL) manages the energy offers and bids system
- The market is organised around registered "agents"
  - Energy Sellers: producers and external agents registered as sellers.
  - Energy Buyers: distributors, traders, eligible clients and external agents (i.e., non-national agents) registered as buyers
- Non mandatory pool with two types:
  - Organised daily energy market (daily and intradaily)
  - Physical bilateral contracts (between eligible clients or external agents and producers or external agents)
- Participation of the demand in the bidding process of the pool
- Market mechanisms are applied in the processes managed by both operators, based on firm transactions and marginal bid as reference market price:
  - Market Operator (OMEL) manages the purely commercial aspects in successive markets:
    - **Daily**: Simple bid matching algorithm for each one of the 24 hours of the following day, where complex conditions allowed (transversal coupling in energy and economics). Determination of Marginal Price as price of the last production unit to attend the demand.
    - **Intradaily**: 6 additional adjustment markets to cope with the deviations in generation and demand
  - System Operator (REE) manages the technical aspects in system services markets for technical constraints, secondary & tertiary operating reserves, singular deviations, reactive management
- Complementary Services System (regulation, voltage control and service relocation) to assure the energy supply in the appropriate conditions of quality, reliability and security. These services can be compulsory or voluntary. Regulated capacity payments for contribution of generators to long term security of supply.
- Complementary Services Market for voluntary regulation services in addition to the Daily Market.
- "Special Regime generation" (related to high energy efficiency and renewable sources) have particular conditions:
  - the economic relationship is with the distribution company. When producers do not go to the Market, the production is guaranteed (in security system conditions) and the distribution company is obliged to buy it.
  - in terms of operation, they are not obliged to communicate production programmes to the distribution company when the power is lower than 10 MW (distributor must foresee production). When power capacity is over 10 MW, they have to communicate a foreseen production with economical consequences (in case of not participating in the Power Market).
  - The producers may choose two ways of retribution:
    - A flat rate all the day long, when they do not participate in the Power Market
    - Tariff composed of the price fixed in the market plus a bonus depending on the power and technology, and an incentive to participate in the Power Market (possible retribution for power guarantee).
    - Possible retribution (or penalty) for the reactive power compensation

- Market Operator liquidates the transactions caused by the Power Market (SO collaborates in the process). OMEL determines the final price to pay for the costumers and the amount received by the energy sellers. These prices include:
  - The price obtained in the coupling of bids and offers in the daily market (Marginal Price)
  - The price of deviations for technical constraints included in the Daily Viable Program
  - The price of coupling in the intradaily market
  - Power guarantee cost
  - The price obtained in the coupling of bids and offers in the Complementary Services Market
  - Corrections caused by the deviations of the Final Hourly Program

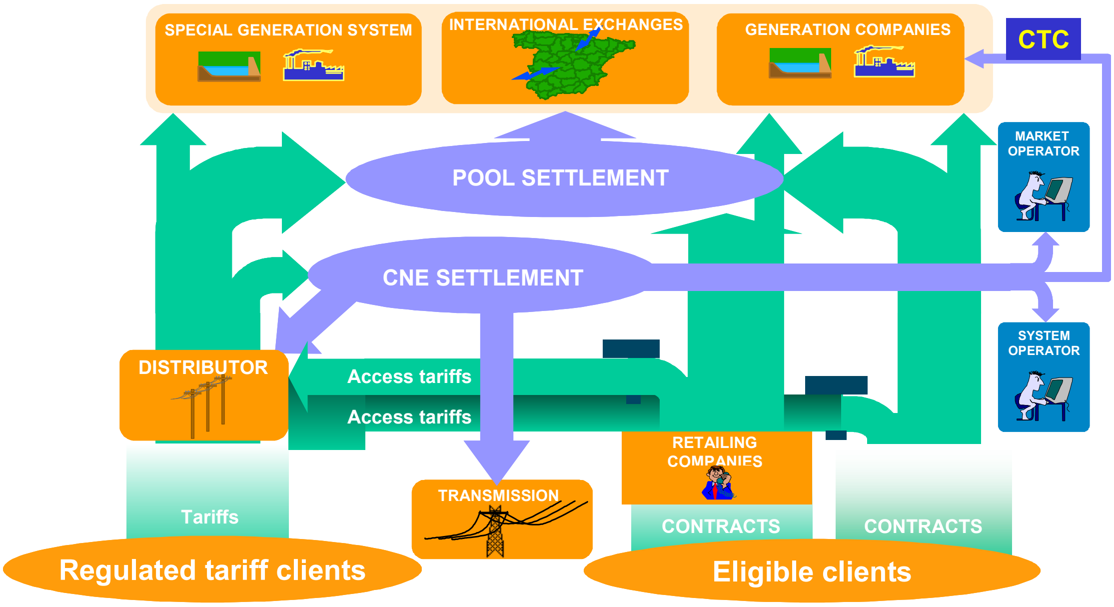
<u>Electricity Market Performance</u>



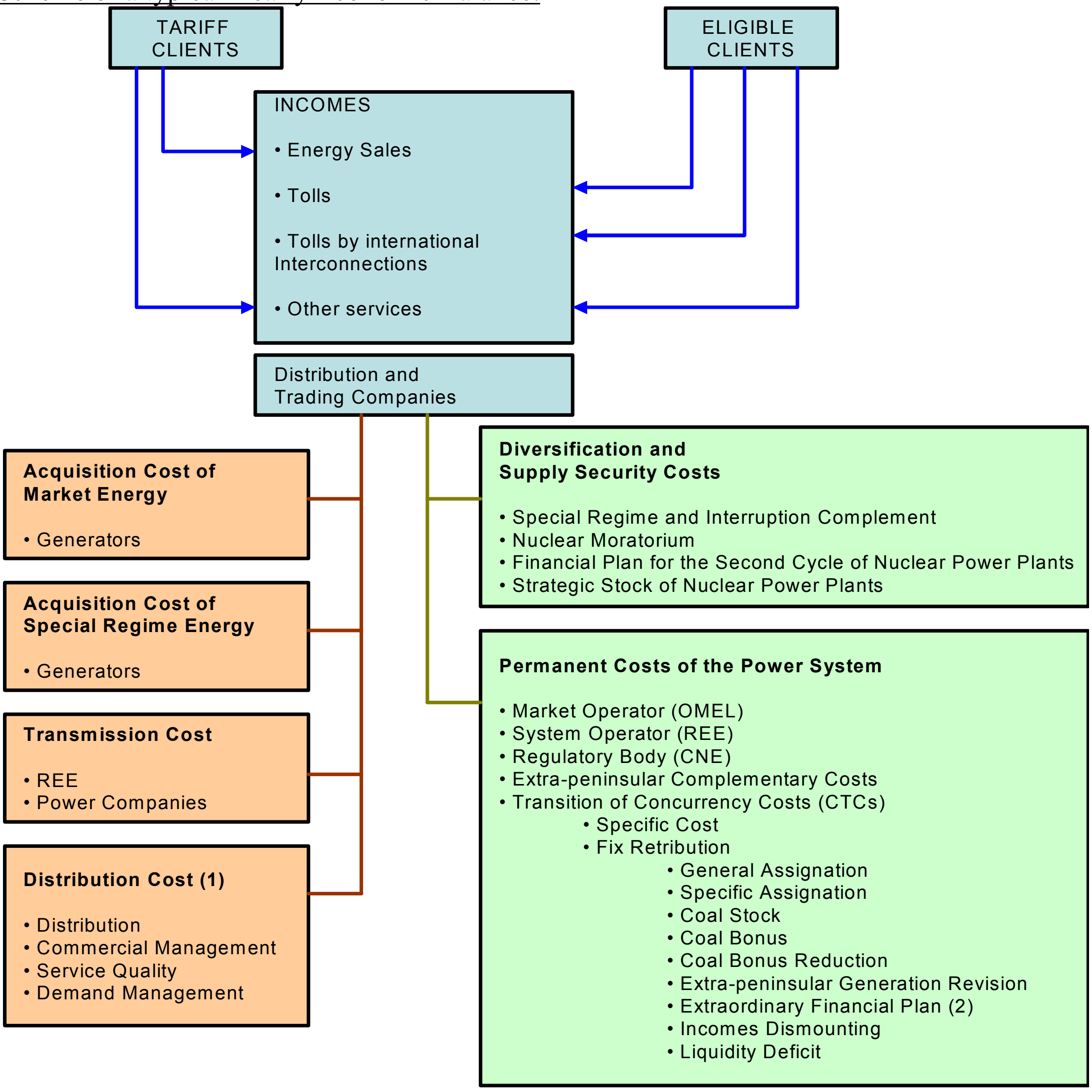
Structure of the Power Sector (Energy Flows):



Commercial Flowchart:



Scheme of a typical Yearly Economic Balance:



(1) It includes the recognised costs for commercial management corresponding for distribution companies
(2) ELCOGAS

This scheme represents the economical regulated relationships. Transmission companies receive their remuneration through a settlement process administered by the Electricity Commission.

Regulated tariff clients pay for the consumed energy and other services, such as electrical attempt. Eligible clients pay tolls for using the grid plus other services. This amount is recollected by distribution and trading companies, which report to the Electricity Commission their income from the sale of electricity and tolls, and is used for:

- The Electricity Commission deducts a fixed percentage to cover permanent costs of the system (OMEL, SO, CNE, Extra-peninsular complementary costs), the costs of maintaining the diversity and security of the electricity supplies and the energy purchase price paid by distribution companies to generation companies (ordinary and special regime).
- The remaining part is applied to cover recognised remuneration for transmission and distribution, as well as transition of concurrency costs. If a deficit situation occurs, a priority order is establish to covert the transmission and distribution cost.

5. Other

Link	Company

http://www.ree.es	Red Eléctrica de España [REE] (Spanish TSO and main Transmission Company)
http://www.mityc.es	Ministry of Industry, Tourism and Commerce [MITC] (National Administration competent for main regulation)
http://www.cne.es	Comisión Nacional de la Energía [CNE] (Advisory Regulation Commission)
http://www.omel.es	Compañia Operadorea del Mercado Eléctrico [OMEL] (Market Operator)

SWITZERLAND

1. Basic capacity, generation and consumption data (year 2005)

The DETEC (Federal Department of Energy, Transport, Environment and Communication) collects information about the Swiss electricity capacity, generation, consumption and typical daily loads, which is published each year in a statistical report. The report can be downloaded from the DETEC website [1].

Installed capacity by fuel, MW		
	Thermal	666
	Hydro	13317
	Nuclear	3220
	Renewables	185
	Total	**17388**
Yearly generation by fuel, TWh		
	Thermal	3.139
	Hydro	30.128
	Nuclear	22.020
	Renewables	
	Total	**55.287**
Pump storage consumption, TWh		**-2.540**
Physical Imports, TWh		**37.298**
Physical Exports, TWh		**29.828**
Annual consumption, TWh		**61.637**

2. Industry structure

2.1 Recent key developments

SWISSGRID has become operative as the TSO responsible for the operation of the whole Swiss transmission network as from the 15 December 2006. The operative start of SWISSGRID was delayed due to a decision of the Competition Commission with following conditions for an operative start:

- SWISSGRID is obliged to grant free access to the network installation in its possession and/or under its operation
- SWISSGRID is obliged to create a cost account for its activities
- The founder companies of SWISSGRID (ATEL, BKW, CKW, EGL, NOK, EOS and EWZ) are obliged to create cost accounts for their own network installations that are under SWISSGRID operation
- SWISSGRID is obliged to publish its network tariffs and the conditions for the use of the network
- SWISSGRID is not allowed to produce, sell, trade electricity and posses or operate distribution installations unless the latter are necessary for its own consumption, safe network operation or for the purpose of reserve capacity.
- SWISSGRID is not allowed to own shares of companies that produce, sell or trade electricity and of companies possessing or operating distribution installations.
- The members of the SWISSGRID governing board are not allowed to be board or management members of companies that produce, sell or trade electricity and of companies possessing or operating distribution installations if this companies perform activities on commercial basis.

The organisation of Swiss electricity grid companies “Swisselectric” (its members comprise ATEL, BKW, CKW, EGL, EOS and NOK) decided to appeal against the first and the last issue of this decision. “Swisselectric” recognises the necessity of granting free access to the transmission network, but it pleads for a transition period of time for the implementation. As to the SWISSGRID governing board, “Swisselectric” points out that only members that are active in the electricity industry are capable of taking qualified decisions concerning activities of a TSO. The appeal was approved by the Recurring Commission. With this decision the last obstacles for an operative start of SWISSGRID were removed.

Following rejection of the EML (Electricity Market Law) on 22 September 2002, the question arose on how the regulatory framework for the Swiss electricity industry should be formulated.

In March 2003 the DETEC appointed an expert commission with the purpose of laying down the basic form for this regulatory framework. The Federal Council released the draft of the new Federal Electricity Supply Act for consultation during the period 30 June t- 30 September 2004. A revised version after the consultation has been presented to Parliament for discussion and, most probably, it will be approved in the spring 2007.

The Electricity Supply Law will create a regulatory framework mainly for the liberalisation of the electricity market, for cross-border transmission and for the promotion of hydro power and other renewable energy sources.

Parliament approved the new Nuclear Energy Act on 21 March 2003, and the referendum deadline expired on 4 September 2003. The Act mentions in particular that new nuclear power stations are in principle an option for the supply of Switzerland with electrical energy but the possibility is given to hold a referendum against every such project.

Consultation on the draft of the new Nuclear Energy Ordinance took place from the middle of May to the middle of August 2004. The Federal Council then approved the Ordinance on 10 December 2004, and went on to declare the Act and Ordinance effective as of 1 February 2005.

2.2 Main actors

<u>Transmission system operator</u>
The seven main utilities (ATEL, BKW, CKW, EGL, NOK, EOS and EWZ) own the Swiss transmission system [2]. The seven main utilities in the transmission level founded SWISSGRID [3] as an independent TSO for the operation of the whole Swiss electricity transmission grid.

<u>Main generators</u>
The production of electricity is accomplished by about 80 power plant operators, which are mainly subsidiaries of the seven main utilities.

<u>Distributors</u>
About 900 municipal or regional distribution companies

<u>Main traders & other players</u>
The seven main utilities are at the same time the main traders within Switzerland.

3. Interconnections development

3.1 Status of interconnections

Existing interconnections (31.12.2005)

From	To	Type AC/DC Single/Double	U,kV	S, MVA
Italy	**Switzerland**			
Ponte	Airolo	AC single circuit	220	273
Mese	Gorduno	AC single circuit	220	273
Bulciago	Soazza	AC single circuit	380	1205
Musignano	Lavorgo	AC single circuit	380	1182
Gorlago	Robbia	AC single circuit	380	1240
S. Fiorano	Robbia	AC single circuit	380	1240
Avise	Riddes	AC single circuit	220	303
Valpelline	Riddes	AC single circuit	220	303
Pallanzeno	Mörel	AC single circuit	220	273
Germany	**Switzerland**			
Gurtweil	Laufenburg	AC single circuit	220	449
Gurtweil	Laufenburg	AC single circuit	220	449
Kühmoos	Laufenburg	AC single circuit	220	449
Kühmoos	Laufenburg	AC single circuit	220	449
Kühmoos	Laufenburg	AC single circuit	380	1498
Kühmoos	Laufenburg	AC single circuit	380	1498
Kühmoos	Laufenburg	AC single circuit	380	1240
Tiengen	Laufenburg	AC single circuit	380	1047
Tiengen	Beznau	AC single circuit	380	1066
Tiengen	Beznau	AC single circuit	220	308
Kühmoos	Asphard	AC single circuit	380	1240
Engstlatt	Laufenburg	AC single circuit	380	1550
France	**Switzerland**			
Sierentz	Asphard	AC single circuit	380	1214
Sierentz	Bassecourt	AC single circuit	380	1234
Sierentz	Laufenburg	AC single circuit	380	1156
Mambelin	Bassecourt	AC single circuit	380	1066
Bois-Tollot	Verbois	AC single circuit	380	1260
Bois-Tollot	Chamoson	AC single circuit	380	1447
Génissiat	Verbois	AC single circuit	220	327
Génissiat	Verbois	AC single circuit	220	327
Pressy	Vallorcine	AC single circuit	220	333
Cornier	Riddes	AC single circuit	220	286
Cornier	St.-Triphon	AC single circuit	220	286
Austria	**Switzerland**			
Y-Rehag	Meiningen	AC single circuit	220	464
Winkeln	Meiningen	AC single circuit	220	718
Pradella	Westtirol	AC single circuit	380	1240
Pradella	Westtirol	AC single circuit	380	1240

The two new interconnections between Switzerland and Italy, namely Gorlago-Robbia and S. Fiorano-Robbia, helped to improve the load situation in the southern part of Switzerland compared to the situation at the time of the black-out in Italy on 28 September 2003.

Lines under construction (internal and cross-border)
In the short term (until 2010) only Swiss internal lines are in the planning phase

From	To	Type AC/DC Single/Double	U,kV	P,MW	Expected date for commissioning the line
Bickigen	Flumenthal	AC single circuit	220 kV		2007
Mühleberg	Wattenwil	AC single circuit	220kV		2008

Both lines are implemented in an existing transmission corridor but the voltage level is increased from 132 kV to 220 kV.

3.2 Network development plan

The Federal Department of the Environment, Transport, Energy and Communication appointed a high level working group on "Transmission Lines and Security of Supply" to deal with the needs of the network development in the future. The members are representatives of cantons, Swiss Federal Railways, electricity utilities, organisations for environmental protection and governmental institutions. The main tasks of the Working Group (WG)will be the following: optimisation of the transmission network and improvement of its connections to the railway network, priority settings for construction projects, investigation of reasons for long authorisation procedures and recommendations for an improvement of the legislation concerning the construction of lines. The WG started its activities on 13 December 2005.

4. Electricity market structure

The Swiss Utilities are very active on the international markets. The prices for electricity traded on the SWEP (Swiss Electricity Power) oscillated only between 24.37 and 60.10 euros/MWh in 2004, whereas the volatility was larger again in 2005 with a peak value of 175.90 euros/MWh and a higher average price. On the other side, the end consumer price was very stable around 100 euros/MWh during the last years. The total expenses of end consumers for electricity in 2003 amounted to slightly less than 9 billion Swiss francs.

A principle decision of the Federal Court on 20 June 2003 confirmed a decision of the Anti-Trust Commission, which had granted network access to third parties in a case between a distribution company and a big customer, a decision based on the Anti-Trust Law. By that decision, a free network access is in principle granted, even without an Electricity Supply Law which regulates this aspect.

The auctioning process of the capacity allocation on the Swiss/German border started in December 2005 with unexpected high prices.

5. Other

Link	Company
www.energie-schweiz.ch	Federal Department of Energy
www.atel.ch	Aare-Tessin Electricity Company AG:
www.bkw.ch	Bernische Kraftwerke AG
www.egl.ch	Elektrizitätsgesellschaft Laufenburg AG
www.ewz.ch	Elektrizitätswerk der Stadt Zürich
www.eos-gd.ch	Energie ouest suisse
www.nok.ch	Nordostschweizerische Kraftwerke
www.ckw.ch	Zentralschweizerische Kraftwerke
www.etrans.ch	Koordination Schweizerisches Übertragungsnetz
www.swissgrid.ch	TSO Schweizerisches Übertragungsnetz; ETRANS-follow up company

Others

ALBANIA

1. Basic capacity, generation and consumption data (year 2005)

Installed capacity by fuel, MW		
	Thermal	160
	Hydro	1440
	Nuclear	0
	Renewables	0
	Total	**1600**
Yearly generation fuel by fuel, TWh		
	Thermal	0.077
	Hydro	5.332
	Nuclear	0
	Renewables	0
	Total	**5.409**
Annual consumption, TWh		**5.933**
Imports, TWh		**0.643**
Exports, TWh		**0.119**

2. Industry structure

2.1 Recent key developments

Energy sector activities are regulated by Law N° 9072, dated 22 May 2003, that regulates electrical power sector activities and defines the rights and duties of physical and legal persons and administrations involved in this sector as well as the procedures to select and develop a market model and the rules of electricity market.
The main purposes of this law are the following:

- To define the institutional authority regulating the Electric Regulatory Entity, hereinafter ERE;
- To restructure, commercialise and finally privatise KESH and to develop a competitive energy market;
- To support the regional electricity trade;
- To improve investment conditions in the electricity sector.

The best way to achieve these objectives and to attract the necessary investments at the lowest possible cost is to prepare for and introduce market focus into the power sector through targeted privatisation of the distribution and generation functions.

Albania Power System is managed by KESH sh.a, through the Production and Distribution Divisions, its staff structure, and Transmission System Operator, with the abbreviation "OST" sh.a., which is completely separated from KESH sh.a.

The government of Albania intends to sell the majority of shares in each of the generation and distribution companies to international strategic investors.

Any mass privatisation of a generation or distribution company will be timed to occur subsequent to the sale of a majority of the shares in that company to international strategic investor(s). An assessment will be made as to whether a reduction in the current 20% minimum requirement for mass privatisation to Albanian citizens would significantly increase the interest of potential strategic investors.

The Government of Albania requires that KESH should function as a commercial entity, applying modern financial rules and practices. Transmission functions will remain under public ownership to ensure system security.

The privatisation process will be fair, transparent, and realised through competitive international tenders of ownership rights to strategic investors. Privatisation is planned to begin with distribution companies moving on to generation. The transmission function will remain under public ownership and control, as described above. Generation will be privatised in order to reduce market inefficiencies and encourage competition within the sector.

2.2 Main actors

Key players of the Albanian Energy Sector are:

The Ministry of Economy, Trade and Energy, which was created in September 2005, by merging the Ministry of Economy and the Ministry of Industry and Energy. It represents the Government as the owner of the energy sector assets (state owned enterprises and their assets). The Ministry is responsible for policies in this sector, realisation of the targets for the Albanian Power Corporation and Transmission System Operator, and acts as a controller of the various technical and financial performances of KESH sh.a. and OST sh.a.. In addition, it drafts and approves for the Council of Ministers the various documents, such as the Power Sector Action Plan, the Energy Sector Action Plan, the Power Sector Policy Statement and the Market Design. It also ensures the fulfilment of the obligations arising from these Action Plans through the creation of task forces and through the Department of Energy which operates in their structure.

The National Energy Agency, was created in 1997 by transforming the previous National Committee on Energy (established in 1993 with the objective of separating energy policy from regulating and ownership matters). It acts as an advisor to the Ministry of Economy, Trade and Energy, and is responsible for carrying out analyses on energy policy, compiling energy statistics, making forecasts, liaising with foreign entities (governments/international organisations). This agency is also responsible for the design of the National Energy Strategy, which was drafted and approved in the middle of 2003 as well as implementing this strategy. The agency also takes an active part in various task forces which have been created for drafting Market Rules, Market Design and Grid Codes. It also drafts laws related, for example, to the energy efficiency.

The Entity for Electricity Regulation (Electricity Regulation Authority) was created according to the provisions of Law N° 7970 of July 1995 on electricity regulation and Law No. 9072 dated May 2003. The board of the regulator was nominated in February 2004, under the provisions of the new Power Sector Law No. 9072 of 22 May 2003.
It is an independent body with the following competencies:

- Setting the rules and requirements for granting, modifying and revoking licenses to companies for generation, transmission, distribution, supply, export and import of electric power;
- Setting, regulating and reviewing wholesale and retail tariffs and the terms and conditions of service of electric energy proposed by a licensee or reviews them according to circumstances;

- Assuring that the Investment Programs and Power Purchasing Agreements are consistent with least cost planning principles;
- Protecting the interests of consumers of electric energy concerning tariffs by assuring that:
  - such tariffs are in accordance with recognised ratemaking principles; and
  - the other conditions of service as to quality, efficiency reliability and security of electric energy supply are reasonable according to the circumstances;

- Resolving disputes between the licensees and consumers and between or among the licensees;
- Maintaining a proper balance between the interests of licensees, consumers, the state, investors and other participants in the electric energy sector;
- Promoting electric energy efficiency and improvements in the quality of service in electric power sector;
- Promoting competition in the electric energy sector;
- Monitoring and controlling the operation of services by licensees, with powers of inspection, access, acquisition of documentation, and relevant information;
- Controlling whether the licensee that provide electric power service to customers is respecting the terms of the contract or is providing services consistently with standards established by the terms of license or any regulation approved by the ERE;
- Co-operating with the corresponding authorities of other countries or international organisations and participates in the activities organised by such authorities and organisations;
- Publicising the conditions under which the electric energy services are provided in order to ensure maximum transparency and supply competitiveness;
- Approving the Grid Operation Code and Distribution Operation Code and other codes which regulate the licensees' activities and their relations with the customers;
- Approving mandatory working standards for licensees in generation, transmission and distribution of electric energy; and
- Approving Rules of Practice and Procedures which will be used in performing the ERE's function under this law.

<u>Albanian Transmission System Operator</u> **(OST)** Company Profile
OST sh.a., the State Owned Joint Stock company responsible for the transmission of electricity, was established in June 2004 and was registered in the Court of Tirana in July 2004. The objects of its activities are as follows:

- The integrated operation and management for the reliable functioning of the Transmission System, coordinating the needs for country power supply with the possibility of their covering from the different sources.
- It operates and manages the internal power system and internal market and takes part in the regional and wider market of the region..
- It operates and manages the transmission system internally and the interconnections with regional power systems.
- The operation of the electric power's supply to eligible customers connected directly to the transmission system.
- Help managing power's import and export.
- Maintenance and development of the Transmission assets and the development and extension of the transmission system in fully coordination with the generation and distribution functions or power supply clients.
- The development of the transmission system according to the long-term provisions and development plans of the power supply areas included interconnection links with the electrical power systems of the neighbouring countries.
- The maintenance and development of the auxiliary transmission assets.

OST was licensed for the activity by ERE on December 2004. The mission of OST related to its duty, as System Operator is mainly to ensure the continuity and reliability of the electricity supply and the correct coordination of the generation and transmission systems. The activities to be carried out are under the System Operation Directorate (responsible for the short and real time planning and operation), including Transmission Planning Office (responsible for the long term system planning) and Metering Office.

The mission of OST related to Transmission activity is mainly to manage and supervise the design, construction and maintenance activities of the High Voltage Transmission Grid (lines, substations and communications systems) that allow the electricity supply to be guaranteed according to the necessary security and efficiency conditions. The activities to be carried on are nowadays spread into two main Directorates:

- In the Assets and Development Directorate, performing those activities related to the design OST transmission grid facilities (lines, substations and auxiliary facilities) and responsible for planning the Engineering and Construction works, assuring the accomplishment of the established procedures.
- In the Maintenance Directorate, that manages and supports technically the maintenance activities and personnel.
-

The Albania Transmission Grid Code is approved by ERE on Decision No.58, dated 28 December 2005.

The Grid Code is constituted of: Planning Code, Connection Conditions, Operation Code and a Glossary of Terms developed as in a separate document.

<u>KESH sh.a</u>**.** (Albanian Power Corporation) was created out of the Foundation Act dated 17 October 1995 and order No.74 (2 November 1995) by the Ministry of Finance through a transformation of the economic unit Albanian Power Corporation. The Company is registered at Tirana's Court, as legal person, on Decision No.12728, dated 6 November 1995. KESH is the State Owned Joint Stock holding company responsible for the Albanian Electricity Sector operation. It is also responsible for the production, import – export, distribution as well as electricity supply to costumers directly connected to the Albanian Grid.

The objects of the activity of the Company are as follows:

- the generation, distribution, supply, purchase and sale of electricity and other energies,
- import and export of electricity and energetic materials,
- operation and maintenance of equipment, machinery and all its other assets,
- extension, modernisation and repair of power plants and corresponding network equipment,
- construction of new plants for electricity generation,
- Performance of activities for the study, design, advice and consultancy about activities defined in items a-e.

The Company should perform any commercial and financial operations related directly or indirectly to its scope of responsibility within the foreseen limits of the legislation in force.

<u>Main generators and distributors, KESH sh.a.</u>
KESH is composed by two divisions (Generation and Distribution), which are respectively made up of 6 generation units and 8 distribution zones. The electricity in Albanian Power System is more than 98 % generated by Hydro Power Plants. The most important is Drin River Cascade with three hydropower plants, which produced over 88% of total electricity supply.

The other cascades generate the other 10%. KESH has a very important Rehabilitation Program, which is under implementation. This program has foreseen the full rehabilitation work in Vau Deja HPP (5 units), Fierza HPP (4 units), Ulza HPP (4 units), Shkopeti HPP (2 units), Bistrica 1 (3 units) and Bistrica 2 (1 unit).

The Government of Albania intends to encourage load shifting and demand side management programs, construction of cogeneration plants and electricity production through renewable energy production. New cogeneration plants and renewable energy facilities that are economically efficient will reduce technical losses in transmission and distribution networks and the actual electricity supply deficit, and also constitute a valuable pilot program to test market-opening scenarios on a broader basis and introduce some competitive pressure into the internal electricity market.

The Government of Albania policy is to encourage private investments in the energy sector. ERE has provided a regulatory process to approve Power Purchase Agreements (PPAs). A number of areas need to be addressed by promoting concrete policies and transparent rules. These include (i) risk allocation and granting of selected guarantees; (ii) implementation of a mechanism to support project finance for local components of the projects in the case of joint ventures with local partners; (iii) full transparency of rules and procedures for the granting of concessions and the tender selection process; and (iv) simplified and clearly defined procedures relating to rules of foreign business operations in Albania.

<u>Traders</u>
Companies licensed for electricity trade in Albania so far are:

- GSA ltd
- Wonder Power ltd
-

These Companies are allowed to participate in the cross-border allocation procedure organised by OST sh.a.

<u>Eligible Customers</u> with annual consumption above 100 GWh:

- Darfo ltd
- Kurum ltd

3. Transmission network and system issues

The main Transmission System in Albania is composed by the 400, 220 and 110 kV. OST has 120.2 km 400 kV lines, 1102.8 km 220 kV lines, 34.4 km 150 kV line and 1202.2 km 110 kV lines. The main Transmission Network is composed by 220 kV and 400 kV lines. The 220 kV network is completely meshed and connect the main plants in the North of Albania with load centres in areas of Tirana, Elbasan and Fieri. The 110 kV network is used for the supply of the Distribution System. Part of this network is meshed and other part is radial.

3.1 Status of international interconnectors

From	**To**	**Type**	**V [kV]**	**P [MW]**
Albania	Greece	AC Single circuit	400	500
Albania	Serbia (UNMIK)	AC Single circuit	220	260
Albania	Montenegro	AC Single circuit	220	250
Albania	Greece	AC Single circuit	150	40

Albania network development plan includes new important projects not only for Albania but also for South Eastern Europe's Region.

These projects are considered as medium term developments and will be in operation by the end of 2008 or early 2009:

400 kV Connection Project (75 million Euro) 400 kV Line Tirana2 (AL) – Podgorica (MN) with length 154 km (125.5 km in Albanian side where 80 km will be double circuit and 28.5 km in Montenegrin side); 400/220/110 kV Tirana 2 Substation with 2x300 MVA 400/220 kV and 2x120 MVA 220/110 kV; 400 kV Line Tirana2 – Elbasan2 with length 48 km.

Albanian National Dispatch Center (21 million Euro)

Rehabilitation and Upgrading the existing 220/110 kV Substations (50 million Euro). This project is for replacement of the Control-Monitoring-Protection and replacement of the primary equipment in 8 substations 220/110kV.

Extension of the 220 kV network in Vlora area (20 million Euro) 220 kV Double Circuit Line from Fieri to Vlora with length 30 km; 220/110 kV Substation in Babica (Vlora area) with 2x100 MVA; Connection with existing 110 kV network.

The construction of three new 220/110 kV substations in Shkodra area, in Komani and in the area of Lac (North of Tirana) where is foreseen the connection with 110 kV existing network.

The possibility for construction of the new 400 kV ties line with UNMIK-Kosovo (Tirana2 – Kosovo B) with length about 235 km (under feasibility study).

The possibility for construction of the new 400 kV tie line with FYR of Macedonia and DC Cable with Italy (under feasibility study).

Bearing in mind the OST's above mentioned objectives, it is important to emphasise that the implementation schedule for all these projects has been delayed this due to funding problems as well as problems related to the affected communities.

3.2 Network development plan

The Planning Code (PC) specifies the criteria and procedures to be applied by OST sh.a. in order to plan and develop the Transmission System. Transmission System Users should consider the Planning Code as they plan the development of their systems/objects. The Transmission System should be planned in time in order to allow system users to plan the expansion of their systems/objects. Therefore PC defines time periods for information exchange between OST sh.a. and users. Confidentiality is maintained for the exchanged information. Standards and Procedures within the Planning Code aim to consult OST sh.a. and Users on how to have an efficient, coordinated, safe and economic Transmission System that shall fulfil future demand.

Electric Power System Planning and Development

- OST sh.a. shall prepare the Prospective Plan that represents the basis for all further detailed Planning of the Albanian Power Sector. The whole generation and distribution activities and eligible customer planning shall be based on the Prospective Plan.
- The Prospective Plan shall cover a 15-year period of forecasts on electricity demand, peak load, additional electric capacity, transmitting capacity, losses and other important parameters of the Electric Power System.

- The Prospective Plan contains the Transmission System and Users action plan related to electricity imports, exports and load shedding.
- OST sh.a. shall evaluate the demand for electricity based on data from Distribution Companies and Eligible Customers. However, OST sh.a. shall perform partial analysis to define the demand and load for the following final customer categories:
    - household
    - public services
    - agriculture (pumping stations for water irrigation)
    - industrial
- Distribution Companies shall analyse in details the load for all customer categories. Similarly, all eligible Customers shall submit their needs for expansion and load to OST sh.a.
- OST sh.a. shall elaborate all data and prepare a detailed plan.
- OST sh.a. shall assess losses, in percentage and in value, for the whole Transmission System as well as for its special elements, as follows:
    - Based on an assessment of Transmission System power losses during the peak load determined by Flow Distribution studies carried out using computer software;
    - Based on pilot studies of special elements through metering of electricity in both sides of respective elements.

3.3 Main events

At the end of June 2005, V.Dejes HPP was put out of operation due to a fire on the step-up transformer block associated with damaging of secondary circuits of power plant. As a result, about 200 MW missed for more than one month, and that quantity was replaced and produced by other upstream HPPs increasing the water consumption of Fierza's lake. Meanwhile the inflows at Drini Cascade reduced too much starting from July until the end of November, compared with normal average inflows for the season. In the meantime, following the decrease of energetic reserves at Fierza's lake, in order to face the situation by manage consumption of electricity, KESH started a program of load shedding with about 25% of the demand. At the same time, all efforts were done to increase the electricity import of about 8 GWh per day, under very difficult conditions due to limited transmission border capacities available in the region. With all these measures taken and the increase of Drin river inflows during December, it was possible to improve the energetic situation suitably.

4. Electricity market structure

In accordance with the power sector restructuring program, that will lead to the establishment of multi buyer multi seller system, on the generation side Simplified Market will be formed in the first phase with competition of the energy prices (variable charge). The execution of this Market will be managed by OST sh.a. All participants in this Market are as follows:

a. Transmission System and Market Operator ("TSMO").
The TSMO on an annual basis determines the requirements for must run reliability resources and through annual bilateral contracts purchases all electricity that the Distribution Divisions or Companies ("DDC's") need to supply Tariff Customers and related necessary ancillary services. Purchases from External Suppliers (imports) will be made under a transparent auction process pursuant to Market Rules adopted by the ERE.As the TMM ("Transitional Market Model") evolves, the TSMO role as a power purchaser will reduce to simply that of providing and purchasing ancillary services, consistent with the envisioned role of TSMOs and TSOs in the proposed REM.

b. The Public Generating Company (KESH) ("PGC").
PGC (Power Generating Company) will sell to TSMO (1) ancillary services and electricity generated by existing hydro units at regulated prices under annual bilateral contracts, and (2) additional electricity requested by TSMO to meet unanticipated load of Tariff Customers to the extent of availability. When the TMM has been operating successfully for a reasonable period of time (at least 18 months) the PGC may sell up to 5% of the capacity from existing hydro to the Export Market, assuming such capacity is not otherwise already contracted, at unregulated prices. Initially, all benefits from domestic hydro capacity will be preserved for Albanian Tariff Customers. Once the market is operating successfully, it may be beneficial to introduce another unregulated seller into the market. Conceivably, the PGC's participation as a competitor in the unregulated market might have a positive effect on prices to the benefit of Tariff Customers. Again, however, even that future participation should be limited to preserve most hydro benefits for Tariff Customers.

c. Independent Power Producers ("IPP").
The IPP's that may be developed in Albania and may sell capacity and energy to the TSMO and to Eligible Customers at commercially agreed upon terms or, if no agreement can be reached, on terms approved by the independent regulator that both facilitate development of such projects and provide Consumer Benefit.

d. External Suppliers.
External Suppliers that are based outside Albania and that export power into Albania to PGC (economy energy), the TSMO and a limited number of Eligible Customers;

e. Distribution Divisions or Companies ("DDC's").
DDC's that will together own, maintain, expand and operate the distribution system throughout Albania, each operating in defined, non-overlapping service areas. Currently these are all owned and operated by KESH. Currently, the DDC's operate as divisions of KESH.

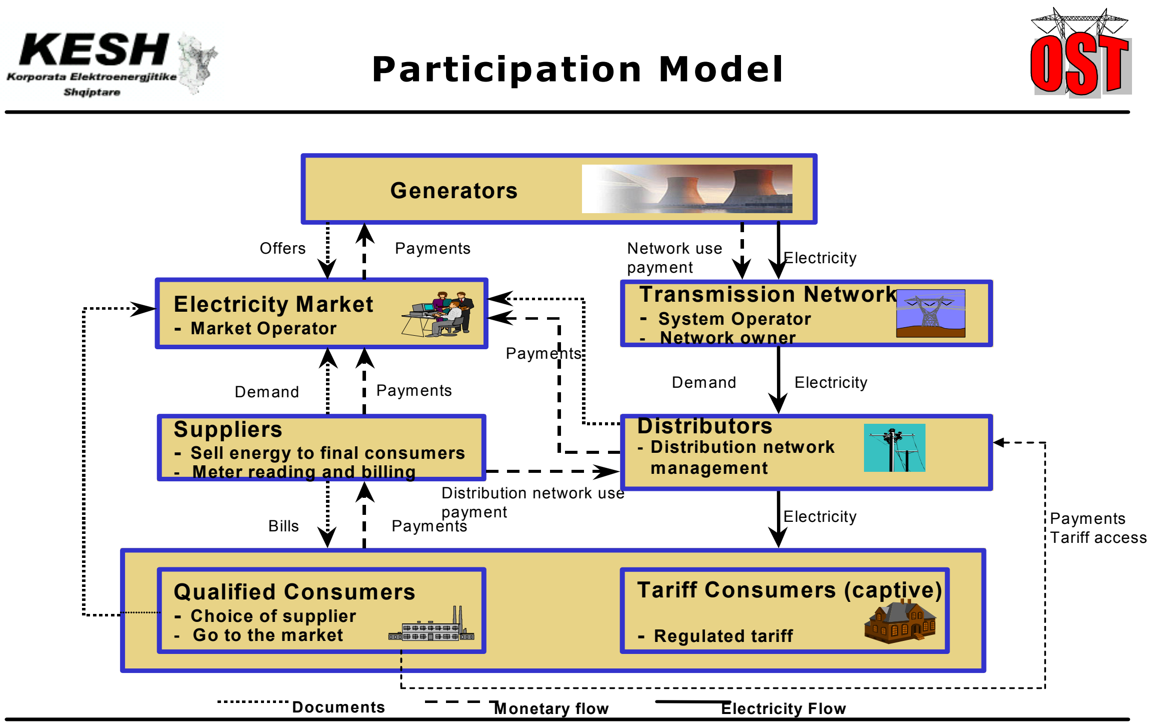
f. Tariff Customers.
Tariff Customers that will purchase electricity at regulated rates only from the DDC's serving the area in which they are located;

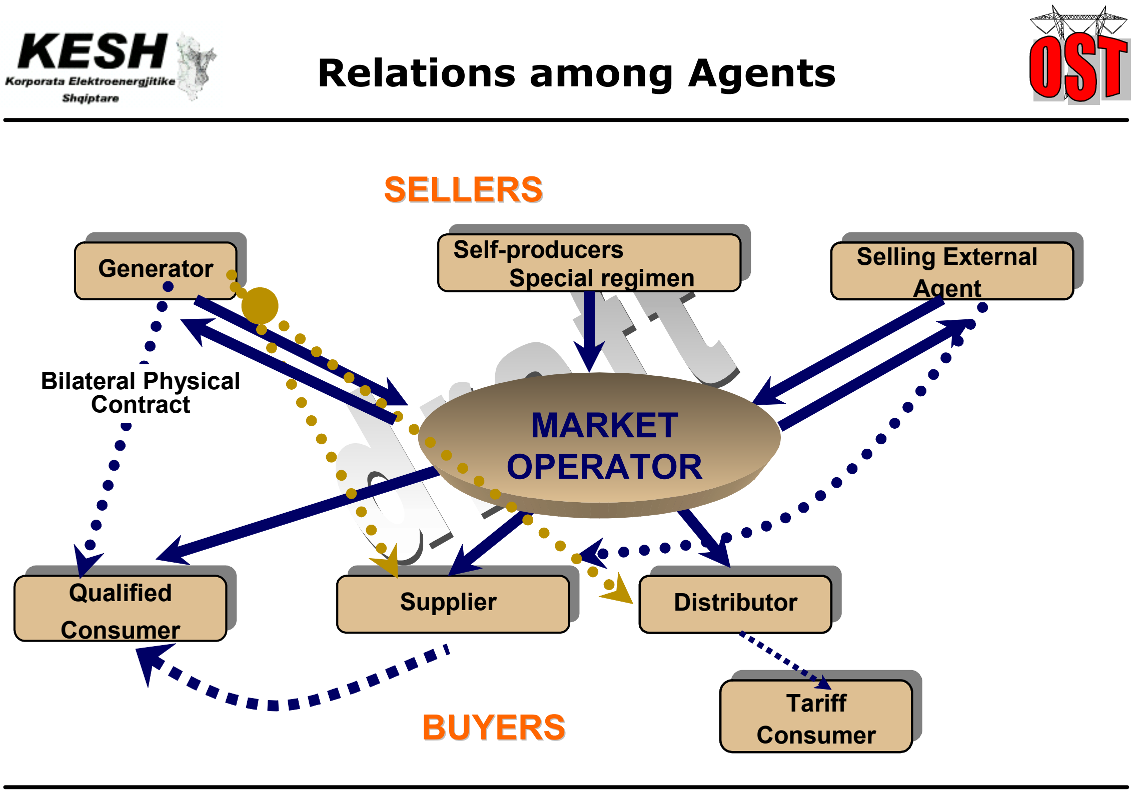
g. Eligible Customers.
Eligible Customers that will be able to purchase electricity from IPP's and External Suppliers. The number of such customers shall be limited initially and the total energy needs of these customers shall also be limited and not exceed the energy requirements of the DDC's that cannot be served from existing domestic generation and imports thereby reducing the probability of blackouts. Those limitations are necessary to preserve the commercial viability of KESH during the transition period of the TMM. In the initial stages of market development reflected by the TMM, Eligible Customers will not purchase from the PGC. Such purchases would give them priority access to PGC's low cost hydro that is reserved at regulated prices for the benefit of all Tariff Customers.

h. Independent Regulator ("ERE").
The ERE that will have responsibility for regulating performance by Market Participants of their regulated activities, under appropriate rules and regulations and in accordance with transparent procedures. Albania's new Power Reform Law (effective August of 2003) provides a legal basis for the exercise of those responsibilities by the ERE.

Relations Among Market Participants.
The relationships among, and the role of, market participants in the physical operation of the Transitional Market Model are based upon the bilateral contracts between the various participants. Many of these contracts will be subject to approval and enforcement by the Independent Regulator (ERE).

TSMO will have responsibility for operating, maintaining, and expanding the transmission system, including approving dispatch schedules proposed by PGC to meet its requirements to deliver energy during each hour, and the dispatch schedules proposed by IPPs and External Suppliers to meet their contractual obligations. PGC, Eligible Customers, and IPPs will be required to register all contracts for the purchase and sale of electricity with TSMO so that TSMO can operate the transmission system reliably and efficiently. TSMO will also have the right to dispatch directly all capacity procured under the AASSA (the Annual Ancillary Services Supply Agreement) or under unregulated ancillary services supply agreements. In the event of a system emergency, TSMO may issue emergency dispatch instructions to all generating facilities in accordance with procedures identified in a Grid Code drafted with input from market participants and adopted and enforced by the ERE.




KESH
Korporata Elektroenergjitike Shqiptare
Relations among Agents
OST
SELLERS
Generator
Self-producers Special regimen
Selling External Agent
Bilateral Physical Contract
MARKET OPERATOR
Qualified Consumer
Supplier
Distributor
Tariff Consumer
BUYERS

TURKEY

1. Basic capacity, generation and consumption data (year 2005)

Installed capacity by fuel, MW		
	Thermal **Hydro+Renewables** **Nuclear**	25879 12941
	Total	**38820**
Yearly generation fuel by fuel, TWh		
	Thermal **Hydro+ Renewables** **Nuclear**	122.2 39.8
	Total	**162.0**
Annual consumption, TWh		**160.8**
Imports, TWh		**1.8**
Exports, TWh		**0.6**

2. Industry structure

2.1 Recent key developments

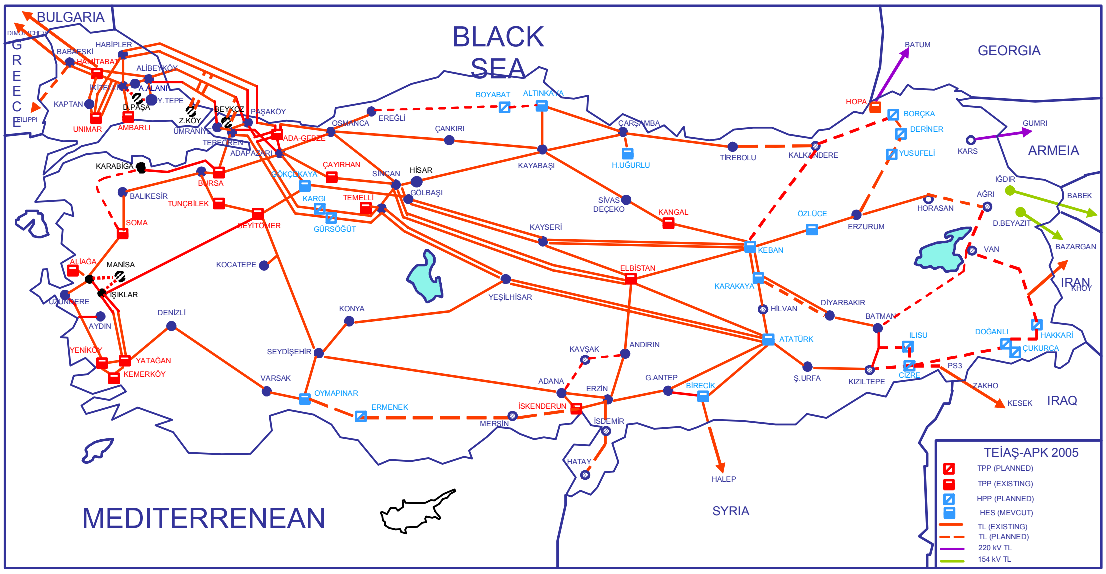
The Turkish electricity industry has been dominated by large, publicly owned and vertically integrated companies but the situation is changing. In the past, the major player was the Turkish Electricity Authority (TEK), which was established in 1970 and had a statutory monopoly until 1984. Starting from 1984, the private sector was able to participate in generation, transmission and distribution through three different modes, namely BOT, BOO and TOOR. Following the recent market liberalisation, these modes have been abolished but legal obligations arising from them had to be taken into account in market reforms.

- In 1994, TEK was split into two separate state-owned companies, namely TEAŞ and TEDAŞ.
- The arbitration issue has been resolved through the amendments to the Constitution under the Law No: 4446 of August 1999. By this law, local and international arbitration became applicable to the private power investment contracts.
- The principals and procedures to be followed by the parties when disputes arise from concession contract for public services have been put into effect in Law No: 4501 of December 1999.
- On 3 March 2001-Electricity Market Law No: 4628 came into effect and a profound structural reform was initiated in the electricity sector. The aim of the EML is to create a competitive, transparent, and commercially viable electricity market that encourages private investment without Government's guarantees and provides sufficient, reliable, and low-cost electricity to consumers. It is for the most part compatible with EU Electricity Directive of 2003. The most important provisions of the EML were the establishment of an independent regulator, a licensing framework for market participants, bilateral contracts between market participants, balancing and settlement mechanism, eligible consumer concept and regulated third party access.

- In October 2001 TEAS has been unbundled into three successor companies namely EUAS (Electricity Generation Company), TEIAS (Turkish Electricity Transmission Company), TETAS (Electricity Trading and Contracting Company).
- In November 2001-Energy Market Regulatory Authority (EMRA) which is autonomous and governed by the Board has been appointed.
- In August 2002 the Regulator issued the Licensing and Tariff Regulation and following this EMRA started to accept applications for licenses on September 3, 2002.
- 4 September 2002-Import and export regulation issued.
- 22 January 2003-Grid code issued.
- 3 March 2003-The Market has been opened to competition for eligible customers consuming over 9 GWh/year. From 25 January 2006, eligibility limit reduced to 6.0 GWh/year.
- 13 March 2003-TEIAS having Transmission Licence.
- 19 March 2003-Transmission Tariffs approved.
- 27 March 2003-Connection and Use of Transmission System Communiqué issued.
- In November2004-System Quality and Security of Supply Regulation issued.
- In November 2004-Balancing and Settlement Communiqué issued.
- Balancing and Settlement mechanism started its real operation in August 2006.
- In 2005 Import and Export Regulation revised.

2.2 *Main actors*

<u>Transmission system operator (TEİAŞ)</u>
The Turkish Electricity Transmission Corporation (TEIAS) is and will be the sole owner & operator of the national transmission network (66, 154 and 400 kV). Network of the 400 kV system is as given below.



<u>Functions of TEİAS</u>
Main functions are as follows;

- Transmission system owner and operator (TSO)
- Balancing Market Operator
- Provision of connection to and use of transmission system services to all users without discrimination, through “Connection and Use of System Agreements”
- Monitoring real-time system reliability, purchase and provide ancillary services, through “Ancillary Service Agreements”
- International interconnection activities-Development of infrastructure

Revenue

By Law and Transmission License, TEIAS; is not allowed in the trade of electricity, but collect the required revenue only from charges for provision of transmission services. The charges that are applicable under the provision of transmission services are;

- Connection Charges
- Use of System Charges
- System Operation Charges
- Market Operation Charges

Connection Charges are related to the costs of the assets for the connection of the user to the network. Only the new users pay it at once.
Use of System Charges are related to the cost of installing, operating and maintaining transmission system for bulk transfer of energy and system security and quality of supply. System Operation Charges are related to the costs of the real time generation-demand balancing service and ancillary services. System Operation charges and Use of System Charges are paid by all users based on their capacity. It is aimed to collect the %50 of each of the required revenue that is related with Use of System and System Operation Charges from Generation and %50 from the Demand.

Main generators

EÜAŞ owns 58.2 % of the total installed capacity of 38,82 GW. Power plants under BOT and BOO contracts, TOOR contracts and others, mostly cogeneration plants, account 22 %, 1.7 % and 18.1 % of the total installed capacity respectively.

Main generators in the Turkish Power System are (by considering the generators more than 500 MW capacity);

- Atatürk HPP	- 2400 MW
- Karakaya HPP	- 1800 MW
- Keban HPP	- 1328 MW
- H.Uğurlu HPP	- 520 MW
- Altınkaya HPP	- 700 MW
- Ambarlı NGCC+FO	- 1344 MW+630 MW
- Hamitabat NGCC	- 1244 MW
- Bursa NGCC	- 1434 MW
- Seyitömer TPP	- 615 MW
- Soma TPP	- 1030 MW
- Kemerköy TPP	- 650 MW
- Yatağan TPP	- 630 MW
- Elbistan TPP	- 1360 MW
- Çayırhan TPP	- 640 MW (TOR)
- Birecik HPP	- 750 MW (IPP)
- Adapazarı NG	- 770 MW (IPP)
- Gebze NG	- 1540 MW (IPP)
- Oymapınar HPP	- 540 MW
- Unimar NGCC	- 505 MW (IPP)
- Berke HPP	- 510 MW
- Birecik HPP	- 750 MW (IPP)
- Aliağa NGCC	- 1520 MW (IPP)
- İskenderun TPP (2x660 MW)	-1320 MW (IPP)
- Ankara NGCC	-770 MW (IPP)
- Elbistan 2 TPP	-1410 MW

Foreseen/Ongoing Projects for new generating units

- Borçka HPP 300 MW, by end of 2006
- Deriner HPP 672 MW, by 2007

Distributors
TEDAŞ and its seven affiliated regional distribution companies dominate the distribution and retailing sector and operate the distribution system (below 36 kV). Turkey's distribution network has been divided into 21 regions, one of which is currently operating under a TOOR contract. The government's objective is to privatise the remaining 20 distribution regions by the end of 2006.

Main traders & other players (exchanges etc.)
The main traders are TETAS (Turkish Electricity Trade and Contracting Corporation) and KARTET private wholesale company. TETAŞ has been established principally to take over the BOO, BOT and TOOR contracts in the context of market liberalisation.

3. Transmission network and system issues

3.1 Status of international interconnections

Turkey has interconnection lines with all neighbouring countries except Greece. However interconnection line between Greece and Turkey is under construction. Turkish power system is not synchronously operated with neighbouring systems. Therefore, power import and export contracts signed before the introduction of EML are carried out via "island" operation: Turkey's importing regional areas are run synchronously with the network of the neighbouring country or vice-versa.

After the EML cross-border electricity is allowed for licensed market participants namely TETAS, Private wholesale companies, retailers (and distribution companies have retailer licence) and EÜAŞ (for only export).

According to provision of Import-Export regulation, regarding the technical aspects, it is only possible to operate the Turkish electricity system together with the electricity system of other countries by any of the methods of synchronous parallel operation, directed unit mechanism and asynchronous parallel (DC) operation for import and export. Isolated region operation can be applied also for export.

Existing international Interconnections

No	FROM	TO	Type AC/DC	Length	U,kV	P,MW
			Single/Double	km		
1	Babaeski (TR)	Maritsa East (Bulgaria)	AC-Single	136	400	500
2	Hamitabat (TR)	Maritsa East (Bulgaria)	AC-Single	90+	400	2000
3	Hopa (TR)	Batum (Georgia)	AC-Single	28	220	300*
4	Kars (TR)	Gumri (Armenia)	AC-Single	78.4	220	300*
5	PS3 (TR)	Zakho (Iraq)	AC-Single	16+	400	500
6	Iğdır (TR)	Babek (Nahcievan)	AC-Single	87.3+	154	100*
7	Doğubeyazıt (TR)	Bazargan (Iran)	AC-Single	73	154	100*
8	Başkale (TR)	Khoy (Iran)	AC-Single	100	400	2000**
9	Birecik HPP(TR)	Aleppo (SR)	AC-Single		400	1000

(+) To border
(*) Capacity is limited by regional transmission system and 220/154 kV , 154/132 kV transformers capacity
(**) This line energised at 154 kV so capacity is limited by 200 MW

Ongoing studies in international/cross-border interconnections

FROM (TR)	TO	Type AC/DC Single/Double	U,kV	P,MW	Date for Study Completion	Expected date for commissioning the line under study
Babaeski	Filippi (GR)	AC-Single	400	2000	2001	2007

<u>Lines under construction (internal and cross-border)</u>
Transmission Expansion Programme
Transmission lines (400 kv)
Period 2005 to 2010

SR. NO.	Description of Transmission Line	No. of Circuits per Line	Voltage (KV)	Length of T/Line (km)	Conductor Type, Name and Size	Expected Date of Commissioning
1	Tirebolu-İyidere (Kalkandere) (Grounding Wire FO)	1	400	133	3B 1272 MCM	Second half of 2006
2	İyidere (Kalkandere)-Borçka HPP (Grounding Wire FO)	1	400	127	3B 1272 MCM	Second half of 2006
3	Borçka HPP-Deriner HPP-Yusufeli HPP (Grounding Wire FO)	1	400	75	3B 954 MCM	2008
4	Yusufeli HPP-Erzurum SS (Grounding Wire FO)	1	400	130	3B 954 MCM	2008
5	Babaeski-Greece(Border) (Grounding Wire FO)	1	400	64	3B 954 MCM	2006
6	Aliağa SS-Manisa SS (Grounding Wire FO)	1	400	39	3B 1272 MCM	2006
7	Isıklar SS-Manisa SS (Grounding Wire FO)	1	400	27	3B 1272 MCM	2006
8	Erzurum-Horasan SS-Agrı SS	1	400	82	3B 954 MCM	2006
9	İkitelli SS-Davutpasa SS Cable	1	400	13	2000 mm2	2006
10	Yıldıztepe SS-Davutpasa SS Cable	1	400	9	2000 mm2	2007
11	(Karakaya-Atatürk)Brş-Hilvan SS	2	400	1	3B 954 MCM	2006
12	Karabiga SS-Çan-Soma TPP (Grounding Wire FO)	1	400	135	3B 954 MCM	2006
14	Mersin-İskenderun TPP	1	400	130	3B 954 MCM	2007
15	Erzin-Hatay	1	400	90	3B 954 MCM	2007
16	Unimar TPP-Babaeski SS	1	400	14	3B 954 MCM	2006
18	Seydişehir--Varsak SS	1	400	76	3B 954 MCM	2007

Study Needs
Studies for Synchronisation of the Turkish Power System with the UCTE Power System:

TEAS made an application to UCTE for membership on 21 March 2000. The UCTE Steering Committee took a decision on 26 April 2000 to consider and evaluate all possibilities for the synchronous interconnection of the Turkish power system to the UCTE power system.

In this connection, a subgroup was formed under the System Development Working Group to tackle with the issue of Turkey's possible connection to UCTE.

This subgroup has already taken a number of steps concerning Turkey's application for the connection to UCTE power system, such as;

- Identified strategies, technical pre-requisites and sequence of operation
- Defined further studies and preliminary tests needed concerning the envisaged connection of Turkey to UCTE,
- Prepared the terms of reference for the activities that must be concluded prior to taking a decision for the connection of the Turkish power system to the UCTE power system.

The terms of reference in question were approved in principle by the UCTE Steering Committee (Bratislava meeting of April 2002) and the Committee proposed the execution of the Static Studies and Stability Studies that will analyse the impacts of Turkey's interconnection on the entire UCTE system by the local UCTE Transmission System Operators (TSO's) in the region.

The results of these activities will constitute a basis for the decision to be taken by UCTE with regard to the connection of Turkish power system to UCTE power system.

Financial support has been obtained by EU for the project under 2003 Financial Assistance Program. A service Contract has been signed on 28 September 2005 in Brussels by UCTE and Turkey to perform the studies up to the first quarter of 2007.

On the ground of the preparatory work done by the System Development WG, the UCTE Steering Committee took the decision to set up a Technical Committee UCTE – Turkey regarding the issues for the synchronous operation of Turkish power system with UCTE.

Later, on the basis of the UCTE Steering Committee decision regarding the new structure and new responsibilities of the Technical Committee and the Technical Committee Chairman, it was considered suitable to rename the Technical Committee as UCTE Project Group (PG) for Interconnection of Turkey and the Technical Committee Chairman – as Project Manager, respectively. The Project Manager will report to the UCTE SC at its request and the SC will make decisions on specific milestones and will give permissions for works continuation. The PG will elaborate a comprehensive document entitled "Contractual Agreement", which will include all technical, organisational and legal issues needed as preconditions for the interconnection of the Turkish Power System to the UCTE network. The Contractual Agreement will reflect the results and the recommendations of the Complementary Static and Stability Studies.

After the SC approval and decision, the PG will monitor the implementation of the measures stated in the Contractual Agreement, the mandatory Final Tests of the Turkish Power System and the trial parallel operation till the final interconnection to the UCTE Network.

The PG will work in close cooperation with the UCTE Competence Centres during the discussions of issues related to the UCTE network extension strategy and reliability of the parallel operation, as well as legal issues.

3.2 Network development plan

All legal entities to be engaged in market activities must obtain the relevant license for each facility if the subject market activity is to be performed in more than one facility, prior to the commencement of their market activities.

IPPs apply to Regulatory Authority (EMRA) to obtain generation license for the new generations. EMRA send these offers to TEİAŞ for examination of connection opportunities of the offered new generation. TEİAŞ performs required studies to define the connection opportunities of the offered new generation to the existing system, than informs the EMRA about its decision on the connection possibilities for the new generation offer.

Under the law, TEİAŞ is the owner of the HV and EHV network and also responsible for planning construction, operation and maintenance of the transmission system. Therefore every year, TEİAŞ prepares the “Transmission System Investment Plan” and additionally the “Ten Year Statement Report” for the developments of the transmission system in ten years period. This document is submitted to the Regulatory Authority (EMRA), which makes the final proposal. The document must be approved by the EMRA, MENR and the State Planning Organisation. After the approval, the document formalises the official development program for the interconnected system.

The connection assets needed to connect a new user (producer, consumer, distribution s/s)-the connection assets- are paid by the user. The cost of all other assets is paid through the Transmission tariffs. In any case, the owner of the assets is always TEİAŞ.

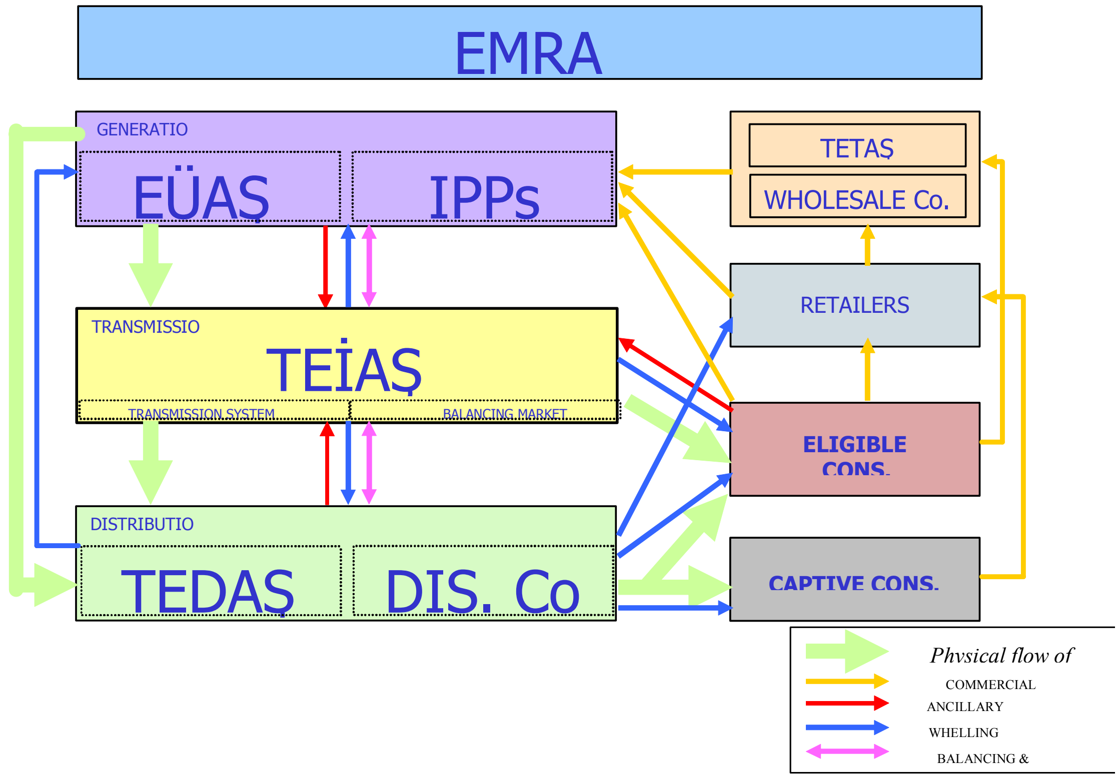
If there is more than one offer for the same connection point of the system, the offers will be decided by EMRA and the license will be given by EMRA to the suitable company. The types of the licenses will be granted by the EMRA in order to be engaged in market activities.

In addition to obtain licenses for market activities, all legal entities engaged in market activities shall be obligated comply with provisions of the applicable laws and regulations depending on the type of their operations.

3.3 Main events

In the South-Western region of Turkey on 1 July 2006, a regional blackout occurred due to the lack of generation and due to a coordination deficit between private generation companies and TSO of the Turkish power system, in particular the disobedience of private generation companies to the orders of National Dispatch Centre during the pre-disturbance emergency state conditions. In spite of the efforts made in planning, engineering, construction, operation and maintenance of the large public power systems aimed at minimising the risk of regional and national blackouts, such events unavoidably occur occasionally also in the most developed countries of Europe and North America, being inherent to the complexity of the technology of power generation, transmission and distribution. Experience has also shown that the countermeasures aimed at minimising the risk of blackouts are more easily applicable in the “vertically integrated” power systems. In the liberalised systems, where many different companies are separately the owners or responsible of generation, transmission, dispatching, distribution, telecommunications and marketing, the economical interest of individual companies can prevail; then situations of inefficient or un-timely operation coordination may occur, such as to jeopardise the successful application of part of the actions against the blackouts.[3]

4. Electricity market structure



5. Other

Link	Company
www.epdk.gov.tr	Regulatory Authority
www.teias.gov.tr	TEİAŞ General Management

3 *Blackout of the South-Western Electric Power Subsystem of Turkey of the July 1st , 2006 Report by Prof. F. ILICETO, Consultant to TEIAS*

United Kingdom and Ireland

UNITED KINGDOM

1. Basic capacity, generation and consumption data (year 2005)

Installed capacity by fuel, MW		
	Thermal	63631
	Hydro	4181
	Nuclear	11852
	Renewables	2074
	Total	**81738**
Yearly generation fuel by fuel, GWh		
	Thermal	293566
	Hydro	4961
	Nuclear	81618
	Renewables	9620
	Total	**397595**
Annual consumption, GWh		**408846**
Imports, GWh		**11160**
Exports, GWh		**-2839**

2. Industry structure

The electricity industry operates in three distinct geographical regions: England and Wales, Scotland and Northern Ireland. The systems are fully interconnected, facilitating the flow of electricity between the regions. There is open access to the grids and distribution networks. The supply market operates on the same basis as other retail markets and suppliers can operate on a nationwide basis. The same privatisation principles applied to all three regions. In England and Wales the monopoly elements of the business – transmission and distribution – have been separated from those which are subject to competition – supply and generation. By the end of 2006/07 the power system in England and Wales will be made up of 159 Large Power Stations (not including 16 auxiliary gas turbines), the 400 kV and 275 kV transmission system and 12 distribution systems. (Fig.A1.2) Since May 1999 the electricity market has been fully open to competition and any company holding an electricity licence can supply customers nationwide using distribution networks and paying the distribution companies for the use of their system. Competition in the retail market is well established and the market share of incumbent suppliers continues to generally fall; at the end of March 2005, 10.8 million (43 per cent) of domestic electricity customers had transferred away from their home supplier.

In March 2001, New Electricity Trading Arrangements (NETA) was introduced in England and Wales. Under NETA bulk electricity is traded between generators and suppliers through bilateral contracts and on power exchanges.

In April 2005 the British Electricity Transmission and Trading Arrangements (BETTA) were introduced that enabled a single GB wholesale electricity market. Under BETTA National Grid became the system operator for the combined GB system operating the assets of both Scottish transmission networks as well as its own England and Wales network. It also became responsible for producing a set of GB charging arrangements and for the recovery of these charges. National Grid Company is the sole holder of an electricity transmission licence for England and Wales and owns and operates the high-voltage electricity transmission system.

The three transmission licence holders are regulated by a five-year RPI-X price control currently set until 2007. Allowed revenues for the next price control period from 2007-2012 are currently being debated between Ofgem and the transmission licence holders.

As a System Operator, National Grid is regulated under an incentive scheme, where benefits of cost savings in system operation are shared with customers. In Scotland, the two main companies Scottish Power and Scottish and Southern Energy, cover the full range of electricity provision. They operate generation, transmission, distribution and supply businesses. The entire output of the two nuclear power stations in Scotland, which are owned by British Energy plc, was up to 2005 sold to these two suppliers under long term contracts. In addition, there are about 25 small independent hydro stations and some independent generators operating fossil-fuelled stations, which sell their output to Scottish Power and Scottish and Southern Energy.

The electricity supply in Northern Ireland is also in private hands. Northern Ireland Electricity plc (NIE) (part of Viridian Group) is responsible for power procurement, transmission, distribution and supply in the Province. Generation is in the hands of three private sector companies who own the four major power stations. There is a link (re-established in 1996) between the Northern Ireland grid and that of the Irish Republic, along which electricity is both imported and exported. In December 2001, the Moyle interconnector, the link between Northern Ireland's grid and that of Scotland was inaugurated.

2.1 Recent key developments

The Governments Energy Review was published on 11 July 2006. The findings of the review concern the following:

- Energy needs: The government will publish a white paper around the end of 2006 on energy policy for the next 30 or 40 years
- Nuclear power: "New nuclear power stations would make a significant contribution to meeting our energy policy goals," says the review - if existing capacity is replaced carbon emissions would be lower by the equivalent of 22 gas-fired power stations

Emissions trading: The government is planning an emissions trading scheme for the 5,000 large British businesses and public services not covered by the European trading scheme. Higher prices for carbon polluting generators are proposed.

Cleaner energy: More must be done to encourage smaller scale electricity generators - and combined heat and power plants - sited close to where the power is used. Low carbon alternatives such as bio mass, solar power and heat pumps will be encouraged. Renewables: Electricity companies will have to provide 20% of energy from renewables - up from the current 15%. Fossil fuels: Carbon capture and storage could cut emissions by 80-90% from fossil fuels.

The last Energy White Paper was published in February 2003. There are four goals for the energy policy:

- to cut the UK's carbon dioxide emissions by 60% by 2050, with real progress by 2020;
- to maintain the reliability of energy supplies
- to promote competitive markets in the UK and beyond
- to ensure that every home is adequately and affordably heated

In order to achieve the first goal the Government

a) confirmed the commitment to have 10% of UK electricity produced from renewable sources by 2010. The new target in the White paper is by 2020 to double the renewables share of electricity from 2010 target.
b) set another target: to achieve 10GWe of good quality Combined Heat and Power (CHP) by 2010.

The two would require very substantial changes in the way the distribution networks are designed, organised and financed. It would also have a significant effect on the transmission system, as well as on electricity prices.

The regulatory arrangements are crucial for the development of infrastructure which will permit the development of renewable generation. Discussions are currently taking place between OFGEM and the transmission owners on plans to upgrade the transmission network across Great Britain.

S.O Regulation

On Friday 24th March 2006, National Grid responded to the regulator's (Ofgem) final proposals on SO cost incentives for 2006/7. The response rejected Ofgem's two financial external cost incentives for 2006/07 as neither proposals offered an appropriate balance of risk and reward and the company would expect to make a loss under either target. National Grid has accepted a target for the internal scheme components of £107.9m.
As a result Ofgem will regulate NGET's external costs in line with its existing powers but without an external incentives scheme. The company will still be obligated under its Transmission Licence to operate the system in an economic and efficient manner.

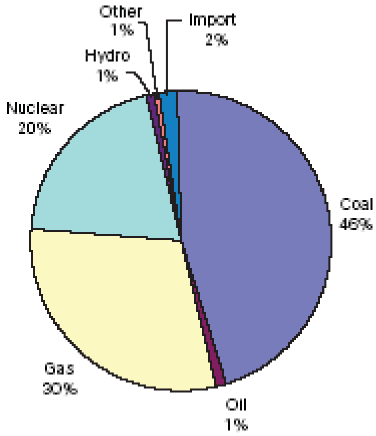
Plant Mix

Wholesale electricity prices have started to rise due to the increased cost of gas in generating electricity, higher coal prices and recovery from unsustainably low wholesale price levels, and this is starting to be reflected by recently announced price rises for domestic customers. Peak wholesale electricity prices for winter 2003/2004 have risen by about 60% since the lowest point in August 2002. In addition, between 2003 and 2005, the price of domestic electricity has risen in real terms by 10.6%.

These higher prices encouraged the return of mothballed plant to generation. As a result the projected plant margin, reflecting installed capacity as formally notified to NGET, is around 22% in 2006, compared with 16.5% in July 2003. High gas prices in the UK due to a lack of reform in mainland Europe along with dwindling North Sea continental shelf gas reserves have also made coal plant economically attractive again.

The plant mix for 2005/06 is shown in Chart 2.2.

Chart 2.2: Electricity supplied in the UK by fuel, winter 2005/06



Source: DTI Energy Trade

2.2 Main actors

Transmission system operators

There are four transmission system operators in the UK each separately owned and operated. In England and Wales the transmission system is owned and operated by National Grid Electricity Transmission (NGET), part of National Grid. It owns and operates 7,200 circuit km of OHL (275 kV and 400 kV); 660 km of underground cable; has 341 substations, and 196 supply points. The GB transmission system as a whole consists of 22,190 circuit km of OHL (132 kV, 275 kV and 400 kV); 1,140 km of underground cable; and 575 substations. Outside of England & Wales the transmission system is owned by:

- in the North of Scotland by Scottish Hydro-Electric Transmission Limited
- (SHETL)
- in the South of Scotland by SP Transmission Limited (SPTL).
- in Northern Ireland by SONI, a subsidiary of Northern Ireland Electricity plc (NIE) (part of the Viridian Group). It has 400 km of 275 kV lines and 894 km of 110kV double circuit and single circuit lines which link the province's three power stations and external interconnectors to 30 main sub stations

All these companies operate under a transmission licence granted by Ofgem – the Office of Gas and Electricity Markets which regulates the electricity industries in Great Britain.

Main generators

In the new GB market the main generating companies as of May 2005 are:

Generator	Installed Capacity (MW)	% market share
Powergen (Eon)	9,101	12
British Energy	11,568	15
Innogy (RWE)	9,435	12
Centrica	2,089	3
EdF Energy	4,820	6
Scottish Power	6,095	8
Scottish & Southern Energy	8,704	11
Drax	3,945	5
BNFL	2,312	3
International Power	1,556	2
Others	-	23

Scotland has substantial overcapacity and currently produces 70% more electricity than it needs. The surplus output is exported to England and Wales, and Northern Ireland.

Almost 90% of Northern Ireland's output is provided by Ballylumford (Premier Power, a subsidiary of British Gas) and Kilroot (AES). The smallest plant is Coolkeeragh.

For detailed information on all transmission contracted Large Power Stations and directly connected External Interconnections See Table 3.3. and Table 3.4 in National Grid Seven Year Statement on www.nationalgrid.com/uk/library/documents.
Both these tables include the assumptions relating to the commissioning dates of proposed new generation projects detailed later in Commissioning Date Assumptions.

Distributors
There are 12 licensed Distribution Network Operators (DNO) in England and Wales and two in Scotland. Each DNO owns and operates the local electricity distribution system within its own authorised area. (see below)

All DNOs have statutory duties to develop and maintain an efficient, co-ordinated and economical system of distribution and facilitate competition in generation and supply.
They have a duty to connect any customer who requires a supply. DNOs are obliged to meet minimum standards of performance related to distribution services, which are set by Ofgem.

CE Electric UK
CE Electric UK, through its subsidiaries Northern Electric Distribution (NEDL) and Yorkshire Electricity Distribution (YEDL), delivers electricity to 3.6 million customers throughout the North East of England, Yorkshire and north Lincolnshire. It is owned by MidAmerican Energy Holdings Company. www.ce-electricuk.com

Central Networks
Powergen, the UK subsidiary of E.ON, completed the £1.146 billion acquisition in 2003 of Midlands Electricity from Aquila. Powergen's distribution business now combines Midlands Electricity and East Midlands Electricity and operates under the name Central Networks. The company delivers electricity to 4,769,190 customers via 97,000 substations and 132,936 km of overhead lines and underground cables. www.central-networks.co.uk

EDF Energy
EDF Energy is one of the largest energy companies in the UK. EdF is a major generator and it supplies electricity and gas to over 5 million customers through its regional brands: London Energy, SWEB Energy and Seeboard Energy. www.edfenergy.co.uk

Scottish and Southern Energy
Scottish and Southern Energy (SSE) owns one transmission network and two distribution networks totalling 123,000 km of overhead lines and underground cables. This covers one third of the UK landmass and delivers electricity to 3.3 million customers. In addition to its networks business, SSE supplies gas and electricity to over five million customers, operates the fifth largest generation portfolio in the UK and is involved in energy trading, gas storage, contracting, retailing and telecoms. www.scottish-southern.co.uk

ScottishPower
ScottishPower's Infrastructure Division takes in the UK wires businesses, which include three asset owner companies and an asset management business. www.scottishpower.com

This structure was introduced in October 2001 to comply with the Utilities Act. The companies within the Infrastructure Division are:

SP Transmission
owns the transmission network in south and central Scotland (132 kV and above), including the interconnector between Scotland and England and the Scottish land based part of the interconnector linking Scotland and Northern Ireland.

SP Distribution
owns the distribution network (from 33 kV downwards) in south and central Scotland.

SP Manweb plc
owns the distribution system in Merseyside, Cheshire and North Wales.

PowerSystems
manages and maintains the network on behalf of the asset owners.

United Utilities
United Utilities Electricity plc manages 58,000 km distribution network which delivers 25,400 GWh of electricity annually from NG to more than 2.5 million customers in North-West England. www.unitedutilities.com

Western Power Distribution

Western Power Distribution operates and maintains the electricity distribution network in South West England and South and West Wales. It delivers electricity to 2.5 million customers over a 26,000 sq kms service area. www.westernpower.co.uk

Northern Ireland Electricity plc
Transmission and Distribution business is responsible for operation of the network to deliver electricity to 688,000 customers in the Province. www.nie.co.uk/home.htm

Suppliers, traders & other players
Across the UK there are only two survivors of the 14 autonomous Regional Electricity companies (RECs) floated when the industry was privatised in the early 1990-s, Scottish Power and Scottish and Southern Energy. Since privatisation transactions worth £67 billion have taken place and six companies now control the supply business of the original 14 regional supply companies.

Supply Business Brands	**Name**	**Owner**
Powergen	Powergen UK	Powergen (Eon)
EdF Energy	EdF Energy UK	EdF
British Gas	British Gas	British Gas (Centrica)
Scottish Power	Scottish Power Gas & Electricity	Scottish Power
Southern Electric Scottish Hydro Electric SWALEC Atlantic Electric & Gas	SSE Energy Supply	Scottish & Southern Energy
npower	Npower	Innogy (RWE)
Northern Ireland Electricity	Energia	Viridian Group

Power exchanges:
Three power exchanges started trading: the UK Power Exchange (UKPX) (www.ukpx.com); the Automated Power Exchange (UKAPX) (www.apx.com); and the International Petroleum Exchange (IPE). The last one ceased to trade electricity contracts after April 2002 because of a lack of interest in its products. UKPX is the largest power exchange by volume traded (about 863 GWh in March 2006)

3. Transmission network and system issues

3.1 Status of international interconnections

Existing international interconnections

From	**To**	**Type AC/DC Single/Double**	**U,kV**	**P,MW**
England	Scotland	AC	3x400 kV 1x275 kV 2x132 kV	2500
England Sellindge, Kent	France Les Mandarins	HVDC Bipolar 4 pairs of cables	+270 kV	2000
Scotland	Northern Ireland (Moyle Interconnector)	HVDC	Two monopoles, each 250 kV	500
England	Isle of Man	AC	90 kV	50

Ongoing studies in international/cross-border interconnections

From	To	Type AC/DC Single/Double	U,kV	P,MW	Date for study completion	Expected date for commissioning the line under study
England	Norway	HVDC	+500 kV	1200	-	Project has received environmental licences but is currently on hold
England	Netherlands	HVDC		1000-1320	-	2010 (commercial operation)
Wales	Ireland	HVDC		1x500 or 2x250	-	c. 2012

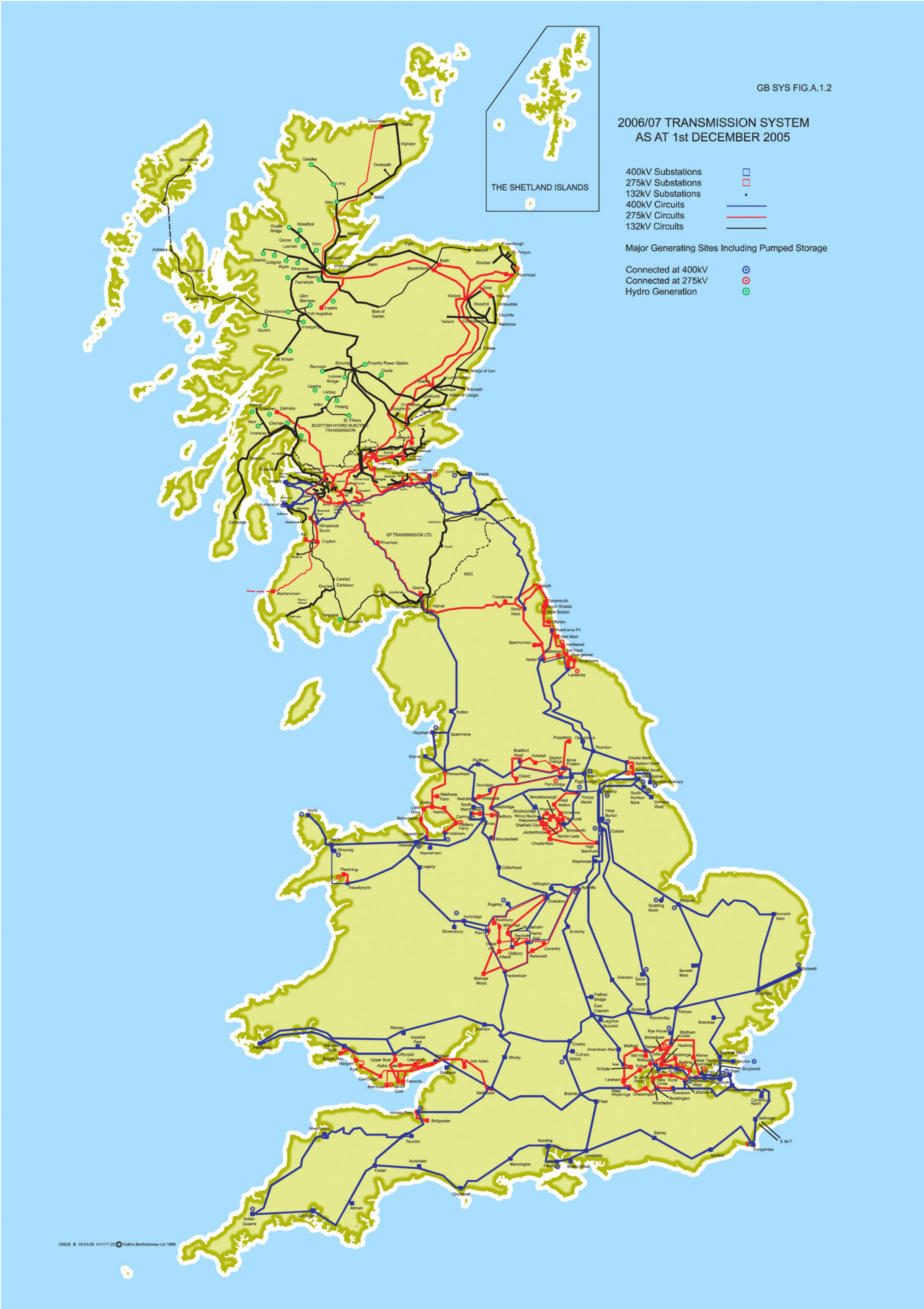
3.2 Network development plan

Since the restructuring of the Electricity Supply Industry in England and Wales in 1990, uncertainty has presented a challenge to the network planner. The broad approach to planning the future development of the transmission system is to maximise the utilisation of the existing system. This is achieved through the strategic deployment of power flow control and reactive compensation devices to make full use of the existing capability of the transmission network. This approach also has the advantage of helping keep the environmental impact of system reinforcements to a minimum. Moreover NGET seeks to use devices which are relocatable so that, as the system evolves and needs change, they can be moved to other parts of the system, thus maintaining a high utilisation of investments.

Since 1990 National Grid has invested more than £5 billion on capital expenditure on maintaining the high level of performance (e.g. in terms of reliability and availability) of the transmission system. Improvements include increasing capacity on main constraint lines by over 60%; this combined with technological advances have enabled reduction of congestion costs by 65% since 1994. Over that period since privatisation there have been significant changes in the electricity market.

National Grid has to conform with its licence obligation to make offers to any User wishing to use its system in respect of new generation and/or demand. The timescale depends, amongst other things, on the size and location of the development.

The GB 400 kV and 275 kV transmission system for 200/07 as existing on 1 December 2005 is shown geographically in Figure A1.2.



In general, the level and location of generation remains the major factor in determining the need for transmission reinforcement. However, in some areas (e.g. importing areas) demand can exert the greater influence and as such there is an increasing need for accurate demand forecasts in terms of both level and location.

Planned transmission developments may include:

Developments needed for 'transmission contracted' generation and demand cited in relevant bilateral agreements as being necessary precursors to a connection.

Infrastructure developments required to meet the general needs of the system as it evolves rather than the needs of any specific user (generation or demand).

The aggregate power station capacity is set to rise from 76.3GW in 2006/07 to 94.5GW by 2012/13. This is an increase of 23.8% or 18.2GW over the period from the 2006/07 winter peak to the 2012/13 winter peak. This net increase is made of the following:

- an increase of 9.7GW in CCGT capacity (12.7%);
- an increase of 4.9GW in on-shore wind generation capacity (6.4%);
- an increase of 3.3GW in off-shore wind generation capacity (4.3%);
- an increase of 1.3GW in new import capability (1.7%);
- an increase of 601MW in CHP capacity (0.77%);
- an increase of 554MW in Pumped Storage and Hydro capacity (0.73%);
- an increase of 135MW in Large Unit Coal capacity (0.18%);
- a decrease of 2.3GW in Nuclear Magnox capacity (3.1%)

Of the 27.3GW of additional transmission contracted capacity since 2000/01, 15.8GW or 58% is CCGT plant and 9.4GW or 34% is due to wind farms. Similarly, of the 8.8GW of new contracted capacity either existing or under construction, 7GW or 79% is CCGT plant and 1.2GW or 13.4% is due to wind farms.

There are no major new lines planned for construction in the next five years. The new developments on the network are likely to be to connect renewable generation. For additional information on the subject see: www.dti.gov.uk/energy/renewables/publications

3.3 Main events

The highest electricity demand last winter was 60.3 GW for the half-hour ending 17:30 on Monday 29 November 2005. This compares to the highest demand of 59.5 GW for a single half-hour in 2004-05.

NISM and HRDR

National Grid issued Notices of Inadequate System Margin (NISMs), when the amount of available electricity generation in excess of demand fell below a specified level in a given period, signalling a need for more electricity generating capacity to be made available. NISMs were issued on five occasions over the 2005/06 winter. Whilst this is typical of recent winters and low by historic standards, it is difficult to compare year on year as National Grid regularly revises the thresholds for issuing NISMs. On each occasion the market responded with the necessary additional capacity, which resulted in the cancellation of the NISM. One High Risk of Demand Reduction (HRDR) notice was issued on 29 December.

4. Electricity market structure

The new arrangements are based on bilateral trading between generators, suppliers, traders and customers across a series of markets operating on a rolling half-hourly basis. Under these arrangements generators self despatch their plant rather than being centrally despatched by National Grid. The trading arrangements are essentially the same under BETTA with the market extended into Scotland. There are three stages to the new wholesale market, plus a new settlement process. These are illustrated in Figure 10.1.

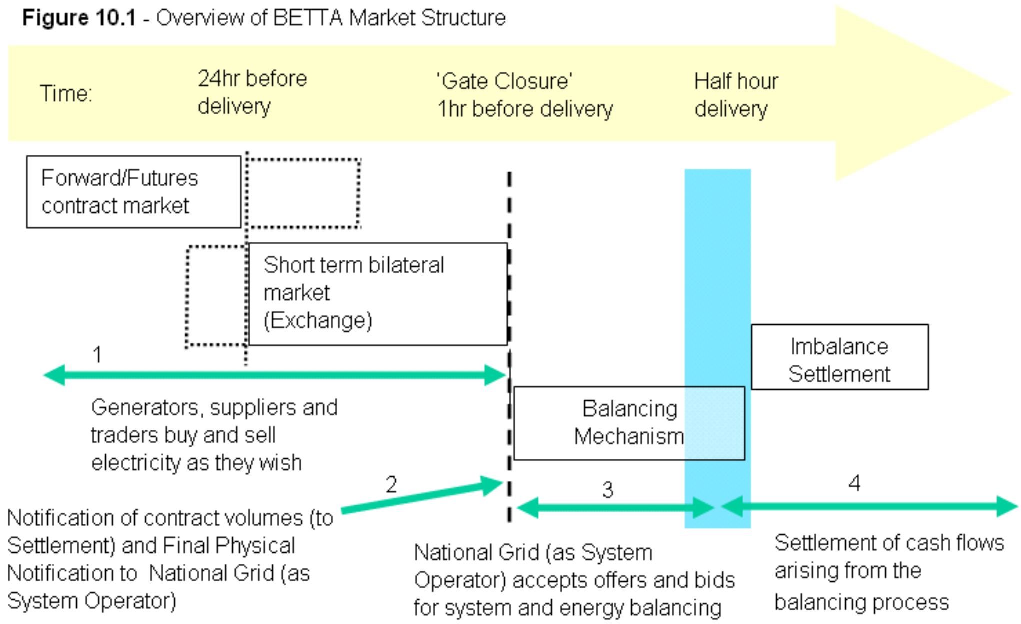


Figure: Overview of NETA Market Structure

Participation in the bilateral markets (i.e. the Forward/Futures contract market and the Short-term bilateral markets) and the Balancing Mechanism (i.e. offer/bid submission) is optional. Participation in Settlements is mandatory. The Balancing and Settlement Code (BSC) provides the framework within which participants comply with the Balancing Mechanism and Settlement Process. The BSC is administered by a non-profit making entity called Elexon.

Gate Closure is the point in time when market participants notify National Grid (as System Operator) of their intended final physical position and was set initially at 3½ hours ahead of real time. Gate Closure time was reduced to 1 hour ahead of real time in July 2002.

<u>Forwards and Futures Contract Market</u>
The bilateral contracts markets for firm delivery of electricity operate from a year or more ahead of real time (i.e. the actual point in time at which electricity is generated and consumed) typically up to 24 hours ahead of real time.

<u>Short-term Bilateral Markets (Power Exchanges)</u>
Power Exchanges operate over similar timescales, although trading tends to be concentrated in the last 24 hours.

<u>Balancing Mechanism</u>
The Balancing Mechanism operates from Gate Closure through to real time. It exists to ensure that supply and demand can be continuously matched or balanced in real time. The mechanism is operated with the System Operator, National Grid, acting as the sole counterparty to all transactions.

Participation in the Balancing Mechanism, which is optional, involves submitting ‘offers’ (proposed trades to increase generation or decrease demand) and/or ‘bids’ (proposed trades to decrease generation or increase demand). The mechanism operates on a ‘pay as bid’ basis.

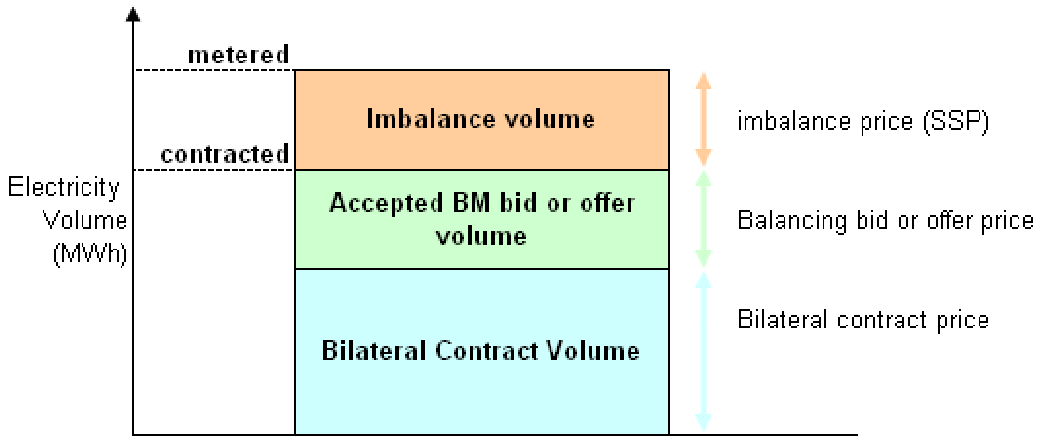
National Grid has a general duty to operate the transmission system in an efficient, economic and co-ordinated manner through the procurement and utilisation of Balancing Services including Balancing Mechanism bids and offers. This duty is underpinned by the new Balancing Services Incentive Arrangements.

All market participants are required to inform National Grid of their net physical flows in both the Forwards and Futures Contract Market and the Power Exchange. Initial Physical Notifications (IPNs) are submitted at 11.00a.m. at the day ahead stage. These are continually updated until Gate Closure when they become the Final Physical Notifications (FPNs).

Imbalances and Settlements
Power flows are metered in real time. Imbalance volumes are settled at one of the dual imbalance prices; System Buy Price (SBP) and System Sell Price (SSP).

Figure 10.2 provides a simplified example where the metered energy output of a generator exceeds the contracted position.

Figure 10.3 - Energy Imbalance



Further information on the electricity market in the UK can be found on:
www.nationalgrid.com/uk/library/documents/sys

5. Other

Institutions/companies	Links
DTI: Digest of United Kingdom Energy Statistics	www.dti.gov.uk
Ofgem: Regulator of Electricity and Gas Markets	Ofgem: Regulator of Electricity and Gas Markets
Electricity Networks Association	www.energynetworks.org
Electricity Association	www.electricity.org.uk

IRELAND

1. Basic capacity, generation and consumption data (year 2003)

Installed capacity by fuel, MW(excludes 132MW of CHP)		
	Thermal	5091
	Hydro	15
	Nuclear	0
	Renewables	223
	Total(2003)	**5329**
Yearly generation fuel by fuel, TWh		
	Thermal	Not Available
	Hydro	Not Available
	Nuclear	0
	Renewables	Not Available
	Total(2002)	**24.66**
Annual consumption(2002)(excluding CHP), TWh		21.23
Imports, TWh		Not Available
Exports, TWh		Not Available

Table : ***Generation Profile, (data for end of 2002 &2003)***

2. Industry structure

Historically the electricity generation, transmission, distribution and supply functions have been provided by a single vertically integrated, state controlled entity called the Electricity Supply Board (ESB). Currently, ESB is 95% state owned and 5% employee owned. This is the situation that existed from 1927 to the late 1990's, post the 1996 EU Electricity Directive.

2.1 Recent key developments

The legal framework regulating currently the electricity industry in the Republic of Ireland is encapsulated in the following:
The Electricity Regulation Act, 1999 (No. 23 of 1999);
Statutory Instrument No.445 of 2000. This is entitled: European Communities (Internal Market in Electricity) Regulations 2000.

These legal instruments provide for the introduction of competition in the generation and supply of electricity in compliance with the European Parliament Directive of 1996. They give the necessary powers to the Commission for Energy Regulation (CER), which is responsible to the Government, to licence and regulate the generation, transmission, distribution and supply of electricity.

The CER is also responsible for setting the price controls for each of the businesses of the statutory regulated ESB.

2.2 Main actors

Transmission system operator
The physical extent of the Transmission Network Assets can be seen in Table 2.

Voltage (Volts)	Overhead lines (kilometres)	Underground Cables (kilometres)	Substations (units)
400kV	440km	2km	3
220kV	1,700km	80km	21
110kV	5,600km	140km	105

The Statutory Instrument (SI) provides for the separation of the duties of the Transmission System Operator and the Transmission System Owner. At present a ring-fenced part of ESB is performing the role of Transmission System Operator in Ireland. ESB continues to own the transmission system and has received a Transmission System Owner licence. The SI establishes a new state-owned company, known as EirGrid to be the licensed Transmission System Operator.

The SI requires that an Infrastructure Agreement be negotiated between ESB and EirGrid. This Agreement will be the framework under which ESB and EirGrid will co-ordinate operation, maintenance and development of the transmission system. It is envisaged that the Infrastructure Agreement will be in place in the course of 2004.

Main generators
The generation playing field is made up of the incumbent, ESB, with several other independent generators. A significant number of the independent are relatively small CHP and renewables, but in terms of total capacity they are insignificant.
In the past 2 years, two significant units have been commissioned at Dublin Bay Power and Huntstown, both of which are run independently of the incumbent. In addition, recent permission has been granted by the CER for the construction of a further two independent generators (100MWs each) on separate sites in the West of Ireland at Tynagh and Aughinish. The current capacity levels and forecasts until 2009 are described in Table 3.

		Plant capacity – Exported (MW)						
Year End		2003	2004	2005	2006	2007	2008	2009
Large scale units **(includes retirement of peat)**		**5091**	**5031**	**5131**	**51331**	**5131**	**5131**	**5131**
Renewables	Wind	203	316	429	542	655	768	881
	Hydro	15	16	17	18	19	20	21
	LFG/Waste	20	25	35	45	55	65	75
Total Renewables		**238**	**357**	**481**	**605**	**729**	**853**	**977**
CHP		132	137	147	157	167	187	207
SSG – Thermal		9	9	9	9	9	9	9
Total		**5470**	**5534**	**5768**	**5902**	**6036**	**6180**	**6324**

It is apparent that the generation market as it exists at present will undergo significant changes, with several players waiting for regulatory clarifications before they enter the market. In light of this uncertainty, the Regulator is undertaking actions to ensure that increased security of supply, a requirement forecast by the TSO, can be obtained through regulatory intervention.

Given the demand forecasts for the period 2003- 2009 by the TSO, and complying with international standards of there being an annual expectation of 8 hours of supply loss to customers, the TSO has indicated that there is a requirement for increased generation capacity, given the planned closures of several units and new build programmes.

The TSO has recommended the following needs:
" to maintain the supply-demand balance in the longer term….300MW of centrally despatched , large scale plant by 2005, 250MW more by 2007 and 150MW more by 2009".

In July 2002 the CER commissioned consultants to consider the issues facing those considering investing in the Irish Electricity Market. This report was commissioned following the CER's concerns that the initial strong interest shown in investing in the Irish had not materialised. The main findings were that proposals were withdrawn due to: "…amongst other matters, failure to secure one or more of the planning permissions, gas capacity and grid connections"; another reason cited was the lack of financial institutions' appetite to finance merchant risk.

In the light of the findings and in advance of the requirement under the Minister's Policy Direction of July 1999, the CER has initiated a review of the wholesale trading arrangements to be introduced in 2005. The aim of the review is to establish trading arrangements which suit the Irish market and that will increase certainty, transparency and liquidity for entrants. This review is in its initial stages and the CER has published its first high-level model proposals.

In light of the urgency with which additional generation capacity is said to be required by the TSO's forecasts, the CER has proposed further measures to incentives entry. The proposal reflects the principles that the CER shall apply when securing additional capacity in generation in 2005. The main principles of interest include: the incumbent supplier offering a contract to the successful bidder to offer a greater degree of certainty; the contract will not be for more than 10years in duration; the contract will be flexible to ensure that it can be successfully transferred into the new trading arrangements; and the incumbent generator will not bid into the process.

In addition to the above, the CER and Ofreg are also undertaking research into the establishment of an 'all island market' where both the Northern Ireland and Republic can be considered to be a single party and the possibility of further increased interconnection with Great Britain.

<u>Distributors</u>
The Distribution system is made up by the sole incumbent ESB, who is currently the distribution asset owner and system operator. It is envisaged that the asset owner will remain a monopoly business.
In accordance with the EU Directive 2003, the system operation function will be separated from ownership by 2007.

<u>Main Suppliers</u>
The main suppliers at retail level currently are:
The Public Electricity Supplier (PES);
ESB Independent Energy (ESBIE),
Energia,
-Bord Gas,
Airtricity,

In terms of the market composition, PES (which is the ring fenced supply business within ESB) has about 68% of the annual energy sales to customers, while about 34% is divided between the remaining four retail companies above.

3. Interconnections development

3.1 Status of interconnections

Ireland is a lightly interconnected market with interconnection with Northern Ireland of a 275kV line and two 110kV lines. Through agreement, arrangements have been made between the TSO and the System Operator of Northern Ireland (SONI) to ensure system security thus leaving an allowed transfer capacity of 170MW North-South flow and 70MW South –North which is currently set at zero for daytime flows.

The island of Ireland is interconnected to the United Kingdom system in Scotland from Northern Ireland via the Moyle interconnector which has a capacity of 500MW.

From	To	Type AC/DC Single/Double	U,kV	P,MVA
Louth	Tandragee	AC-Double	275kV	600
Letterkenny	Strabane	AC-Single*	110kV	126
Corraclassy	Enniskillen	AC-Single*	110kV	126

* *Purpose is to provide standby on both sides of the international border in the event of circuit outage.*

From	To	Type AC/DC Single/Double	U,kV	P,MVA	Expected date for commissioning the line
Flagford	Srananagh	AC-Single	220kV	518	2006
Srananagh	Local Network	AC-Single	110kV	126	2006
Tarbert	Tralee No.2	AC-Single	110kV	164	2006
Banoge Loop-in		AC-Double	110kV	126	2005
Gorman Loop-in		AC-Double	110kV	126	2005

Study needs

Recent reference has been made to a possible double circuit 500kV undersea cable interconnection, approx. 75kms. long, between Ireland and Wales. This is at a very preliminary stage where the technical and financial justifications have not been concluded. The Government has expressed a desire for independent funding for this project, if it is decided to proceed.

3.2 Network development plan

Capital investment in the Transmission and sub-transmission systems has increased significantly in recent years as can be seen from Table 6.

	1997	1998	1999	2000	2001	2002
Transmission System	30.5	30.5	27.9	32.0	90.0	136.0
Sub-transmission System:						
110kV substations	10.2	22.4	33.6	33.4	61.4	58.9
38kV System	21.1	22.9	22.8	26.3	28.5	27.2
Total	**61.8**	**75.7**	**84.2**	**91.7**	**179.9**	**222.1**

Table: Capital Investment in the Transmission and Sub-transmission systems

This increase in expenditure reflects the scale of network reinforcement that has taken place during the period. Individual projects have facilitated the offloading of new power stations, including wind farms, increased capacity on the transmission network, voltage enhancement at particular locations of the network, reinforcement of the sub-transmission and distribution networks and finally refurbishment and up-rating of existing 110kV lines.

A major investment programme is underway to reinforce the Grid in order to meet international supply standards. In addition the ESB has made a further submission to the CER on accelerating its programme of MV and sub-transmission work which is now being considered by CER.

It has been recognised that the networks system is in need of considerable reinforcement and upgrading. This is not only to match the increased levels of growth in the consumption of electricity but to also match the Government's own published policy.

The main risks faced by the networks businesses include environmental and financial risks, introduced by legislation or regulatory direction.

Conditions for Appraisal, Approval, Funding and Implementation

The CER has accepted the need for major investments in expansion and reinforcements of the networks system to ensure that demand growth is met and that system security and reliability is maintained in accordance with international standards and practices. Under the price control regime ESB submits its proposals for a five-year period for capital investment and operating costs. These proposals are evaluated by CER and a determination made on the allowed investments, operating costs and rate of return (currently 6.5%). For distribution, network investment is usually made on the basis of the total allowed amount, and individual projects are not generally subject to individual approval.
However, in the case of transmission given the split between the operator and owner, the CER has taken a project by project approach.

The allowed amounts for both Transmission and Distribution investment under the 2001–2005 price controls are shown in Table 7.

Transmission allowed Capex 2001: €90m; 2002-2005: €131m per annum	
Programme	**Approved forecast By CER €m. (nominal)**
Distribution Reinforcements	665
Rural MV/LV Renewal	375
Replacement	136
Other	72
New connections	603
Total	**1851**

<u>Investment risks in Networks</u>
Network investments by regulated businesses across all markets face similar risks which include:

Changes in investment criteria and economic assessment guidelines. These have been internal to ESB and they continue to be internal to TSO and are not subject to public scrutiny. Environmental assessment guidelines are based on internal procedures and external guidelines and legislation. Public scrutiny of the environmental impact and the strength of the environmental lobby continue to increase and opposition to overhead lines may increase.

The Transmission Planning Criteria set out the standards that are applied in the planning timeframe.

Connection charging policy: The first investor must fund a shallow connection. If there is spare capacity in the shallow connection it could be taken up by a subsequent investor. First investors may be entitled to a refund if the shallow connection assets are subsequently used by a later investor or are subsequently incorporated into the transmission system.

It is Government strategic policy to enhance the infrastructure of the Border, Midland and Western (BMW) regions and other locations under the National Development Plan (NDP).

Rising funding: Regulatory Price Controls by the CER determine the framework for future investment over five years, whereas loan terms are well in excess of this period.

4. Electricity market structure

The current market in Ireland is fully liberalised in relation to generation.

The networks assets businesses (transmission and distribution), and the transmission system operation/market operation business are all presently state controlled. It is currently envisaged that this will remain the case for these businesses into the foreseeable future.

The retail market is currently partially liberalised for industrial and commercial customers and it is intended that it will be fully liberalised to include all residential customers by 2005.

The price controls for each of the businesses (Generation, Transmission, Distribution and Supply) will be reviewed by the CER towards the end of 2004.

5. Other

Link	**Company**
www.esb.ie	ESB
www.cer.ie	Commission for Energy Regulation
www.eirgrid.com	Eirgrid
www.esbie.ie	ESBIE
www.airtricity.com	Airtricity
www.energia.ie	Energia
www.bordgais.ie	Bord Gais

NORDEL

DENMARK

1. Basic capacity, generation and consumption data (year 2005)

Installed capacity by fuel, MW		
	Thermal	9433
	Hydro	11
	Nuclear	0
	Renewables	3135
	Total	**12579**
Yearly generation fuel by fuel, TWh		
	Thermal (81%)	27.72
	Hydro	0
	Nuclear	0
	Renewables (wind power – 19%)	6.62
	Total	**34.35**
Annual consumption, TWh		**35 728**
Imports, TWh		**12 998**
Exports, TWh		**11 623**

Source: Nordel Annual Report and Dansk Energiforsynings statistic 2005

2. Industry structure

2.1 Recent key developments

The further improvement of the internal energy market is supported by the transmission system operators. Denmark is a fully integrated partner in the Nordic pool system Nord Pool. The market opening in Denmark is now unlimited and open for all end consumers. All end consumers have been free to trade their consumption, apart from the priority consumption, in the market. As of January 1, 2005 end consumers are free to trade their entire consumption in the market.

The priority production is defined by law for wind production and small CHP, fuelled by biogas. As a special obligation, the TSOs have the balance responsibility for production from wind and from units < 5 MW.

The Parliament has passed an amendment to the energy act so that production from wind and from units > 5 MW from local CHP will be fully commercial and market based as of January 1, 2007.

The priority production receives the market price plus a subsidy. This subsidy is financed by end consumers from a special PSO-fee.

Denmark is split into two electrically separate areas. From 1 January 2005 there is only one TSO, Energinet.dk, in Denmark covering both areas and the new TSO was merged Gastra – The Danish gas TSO. The Danish state has taken over the ownership of the TSO, Energinet.dk.

Generation is connected to the transmission grid, the medium voltage grid and the distribution grid. The increase in local renewable and CHP production units has resulted in a situation with a major part of the production connected to the lower voltage grid.

There are no plans for new primary conventional units connected to the transmission grid. In eastern Denmark one coal fired unit is rebuild to a coal and biomass fired unit to be put into operation 2007/2008. In Western Denmark a 200 MW offshore wind farm will be commissioned in 2008. In Eastern Denmark a 200 MW offshore wind farm will be commissioned in 2009.

There are over 60 network companies, but an ongoing restructuring process will reduce this number.

There are a number of market players (traders, producers and buyers). Further information is available on the Internet (see below).

3. Interconnection Developments

3.1 Status of interconnections

Existing interconnections

Between	And	Type	Capacity Eksport/Import MW
Denmark West/Energinet.dk	Norway/Statnett	HVDC	1,000/1000
Denmark West/Energinet.dk	Sweden/Svenska Kraftnät	HVDC	630/670
Denmark West/Energinet.dk	Germany/E.ON Netz	AC	1,200/800
Denmark East/Energinet.dk	Sweden/Svenska Kraftnät	AC	1,750/1,350
Denmark East/Energinet.dk	Germany/Vattenfall Europe	HVDC	600/600

Source: Nordels Energibalance 2008 from October 2006-12-18

4. Market structure

The market structure is based on the Nordic Power Pool Nord Pool. Market rules can be found on home pages for Energinet.dk and nordpool.com.

The interconnections between Denmark and Germany are handled in a two stage procedure. First a capacity auctioning and afterwards a bilateral trade based on the obtained capacity, see home pages for Energinet.dk and E.ON Netz (www.eon-netz.de)

5. Other

Link	Company
www.energinet.dk	Energinet.dk
www.nordel.org	Nordel
www.nordpool.com	Nord Pool, the Nordic Power Exchange

FINLAND

1. Basic capacity, generation and consumption data (year 2005)

Installed capacity by fuel, MW		
	Thermal	10847
	Hydro	3017
	Nuclear	2671
	Renewables (Wind)	82
	Total	**16617**
Yearly generation fuel by fuel, TWh		
	Thermal	31.8
	Hydro	13.6
	Nuclear	22.3
	Renewables	0.2
	Total	**67.9**
Annual consumption, TWh		**85.0**
Imports, TWh		**17.9**
Exports, TWh		**0.9**

2. Industry structure

2.1 Recent key developments

The Finnish electricity market was gradually opened up for competition with the Electricity Market Act (386/1995). Since the autumn of 1998, it has been possible for all electricity consumers, including households, to arrange tender competitions for their electricity purchases. The electricity market reform aimed to improve efficiency and environmental benefits, as the Nordic hydropower capacity is taken into efficient use and the market also allows the so-called green electricity trade.

The opening up of the market has strongly influenced the electricity trade. Before the opening, distribution electricity installations and large-scale electricity consumers concluded long-term delivery contracts on wholesale electricity with electricity producers. Nowadays a major part of the wholesale trade in electricity takes place at the Nordic Power Exchange Nord Pool, whose ELSPOT market price sets the electricity market price in the Nordic countries. Besides the power exchange, electricity is traded on the so-called OTC market and directly between the buyer and the seller.

Development of the forms of electricity trade has resulted in variations in the price of electricity on the Nordic electricity market according to the hydropower production capacity, which is dependent on rains, and to the electricity consumption rate. In addition to physical electricity trade, it is possible to buy and sell electricity-related forward contracts at the Nord Pool. These forward contracts are used, for example, for controlling the risks of electricity trade, when the electricity retailers and large-scale electricity consumers can protect themselves against the price variations of market electricity.

The smaller-scale electricity consumers connected to distribution networks, such as small enterprises and households, buy their electricity from retailers. The majority of the retailers also act at the same time as local distribution network companies, but the buyers of electricity are not bound to a local vendor, but can buy their electricity from any vendor they like.

2.2 Main actors

Transmission system operator
Fingrid Oyj is the national grid operator in Finland. The Energy Market Authority controlling the Finnish electricity market has placed Fingrid under the so-called system operator responsibility. Finngrid maintains the national power balance management and ensures that the Finnish power system is maintained and used in a technically appropriate manner. Finngrid is also responsible, together with the other Nordic grid operators, for safeguarding the necessary reserves for the operation of the power system. Around a hundred regional distribution network operators are engaged in electricity transmission in the distribution networks.

The electricity network operations are subject to a monopoly and require a grid permit granted by the Electricity Market Authority. The Electricity Market Act places equality and reasonability requirements on grid operators.

The Ministry of Trade and Industry handles the redemption permit applications concerning power lines, and the Government grants the permits. The Ministry of Trade and Industry also renders advisory opinions on matters regarding land use and planning related to the permits.

Main generators
Fortum, Teollisuuden Voima, Pohjolan Voima, Helsingin Energia, Kemijoki, Vaskiluodon Voima, Alholmens Kraft, UPM-Kymmene, Stora Enso, Metsä-Botnia

Foreseen/Outgoing projects for new generating units
The fifth nuclear unit owned by Teollisuuden Voima Oy (TVO) is under construction. The 18th Dec 2003 TVO signed contract concerns the delivery of a nuclear power plant unit (Olkiluoto 3) with electric output of about 1,600 MW. It will have a pressurised water reactor with 4,300 MW thermal power to be delivered by the French-German Framatome ANP. The turbine plant will be based on the German Siemens technology. The Framatome ANP Siemens consortium will supply the nuclear power plant unit as a turnkey delivery.

On 17 Feb 2005 Government granted a construction licence to the Olkiluoto 3 nuclear power plant unit.

On 25 Jan 2006 the supplier consortium of the Olkiluoto 3 nuclear power plant unit confirmed that the reactor building civil works and the manufacture of certain primary components are delayed as compared to the original schedule. Towards the end of 2006 the delay in the project schedule has remained unchanged, and is about one year. The new plant unit will generate electricity for the very first time at the end of 2009, and commercial operation is to start in the second quarter of 2010.

There exists a governmental program to increase renewable power generation (incl. hydro) to 31 % of power demand by 2010.

Distributors
Around a hundred regional distribution network operators are engaged in electricity transmission in the distribution networks.

Main traders
Chevys Voiman Ostajat Oy , EGL Nordic AS, Energibolaget i Finland AB, Energiameklarit Oy, Fingrid Oyj , Fortum Power and Heat Oy, Fortum Markets Oy, Graninge Kainuu Oy, Gyproc Oy, Helsingin Energia, Kaakon Energia Oy, Kuopion Energia, Kymppivoima Hankinta Oy, Kaakon Energia Oy , Kainuu Energia Oy, Lahti Energia Oy, Lindex Oy, M-real

Oyj, Outokumpu Oyj, PVO-Pool Oy, RAO Nordic Oy, SOK , Station 1 Finland Oy, Satapirkan Sähkö Oy, Sempra Energy Europe Ltd, Statkraft SF, Tampereen Sähkölaitos, Turku Energia Oy, UPM Kymmene Oy Energia , Vantaan Energia, Vattenfall Sähköntuotanto Oy.

3. Transmission network and system issues

3.1 Status of international interconnections

Existing international interconnections

	To	Type AC/DC Single/Double	U,kV	P,MW
Finland	**Sweden**			
Ossauskoski	Kalix	AC Single	220	1600 Import 1200 Export
Petajaskoski	Letsi	AC Single	400	
Keminmaa	Svartby	AC Single	400	
Rauma	Forsmark	DC Single	400	550
Åland / Tingsbacka	**Sweden** / Senneby	AC Single	110	80
Finland / Ivalo	**Norway** / Varangebotn	AC Single	220	100
Finland	**Russian Federation**			
Yllikkala	Vyborg	AC Double	400	1400 Import 0 Export
Kymi	Vyborg	AC Single	400	
Imatra	Svetogorsk	AC Double	110	100 Import
Ivalo	Kaitakoski	AC Single	110	60 Import

Ongoing studies in international/cross-border interconnections

From	To	Type AC/DC Single/Double	U,kV	P,MW	Date for study completion	Expected date for commissioning the line under study
Finland / Rauma	**Sweden**/Finnbole	DC Single	500	600-800	2007	2010
Finland / Kymi ?	**Russia** /Kernovo	DC Double	?	1000	?	?

Lines under construction (internal and cross-border)

From	To	Type AC/DC Single/Double	U,kV	P,MW	Expected date for commissioning the line
Finland / Espoo	**Estonia** / Harku	DC Single	$\pm$ 150	350	Dec 2006

3.2 Network development plan

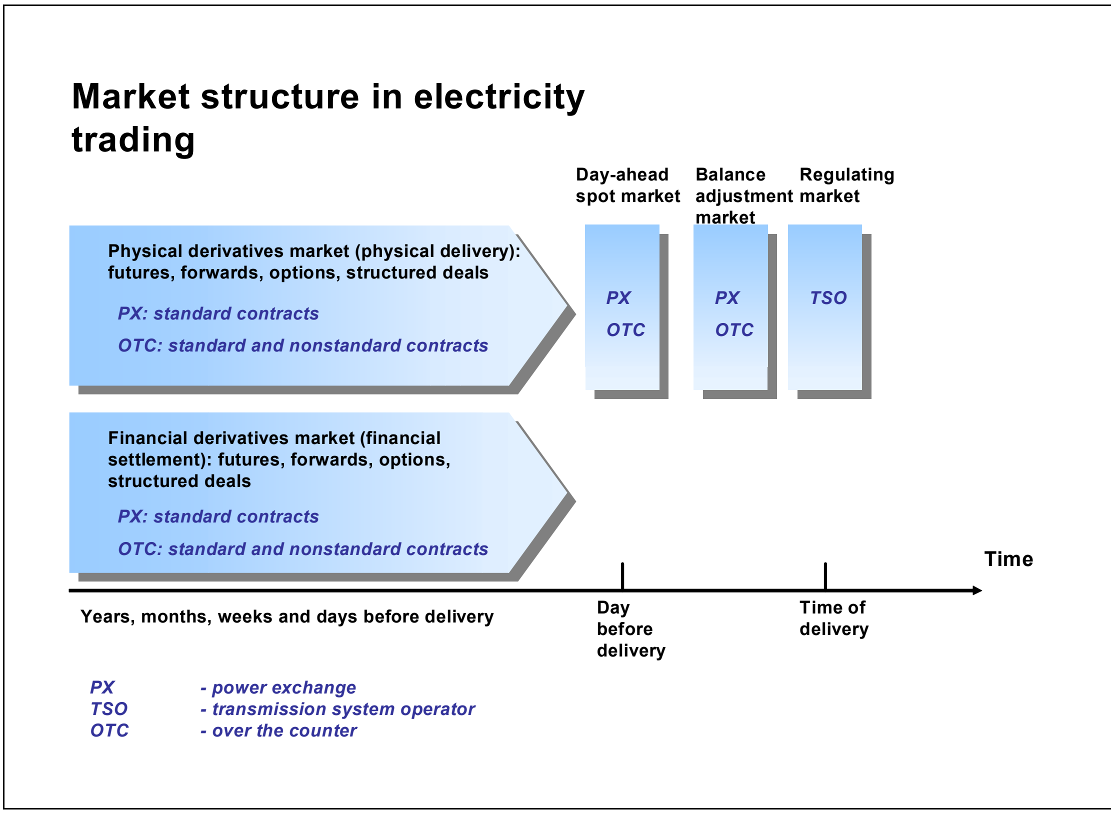
The Electricity Market Act defines rules and responsibilities for the operators of the transmission and distribution grid systems. Electricity system operation calls for a licence issued by the electricity market authority. This licence includes among many other issues following two obligations:

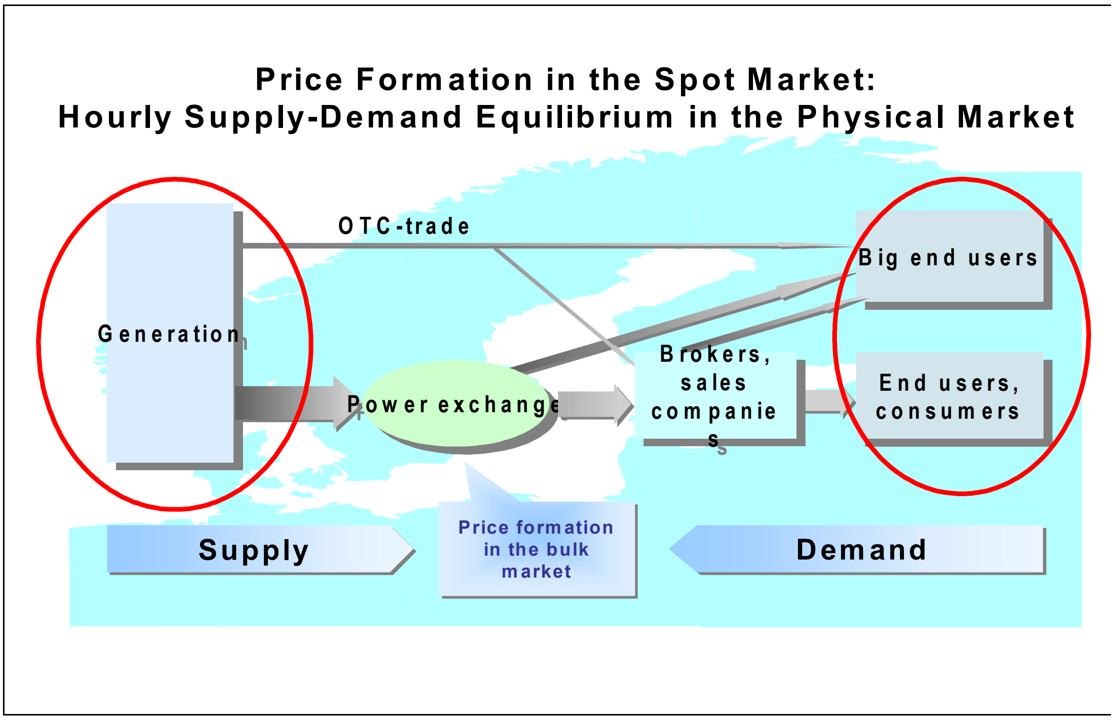
- The system operator shall maintain, operate and develop its electricity system and the connections to other systems in accordance with its customers' reasonable needs, and to secure, for its part, the supply of sufficiently high-standard electricity to its customers **(obligation to develop the electricity system).**
- On request and against reasonable compensation, the system operator shall connect to its system electricity consumption sites and power generating installations meeting required technical specifications within its area of operation **(obligation to connect**).

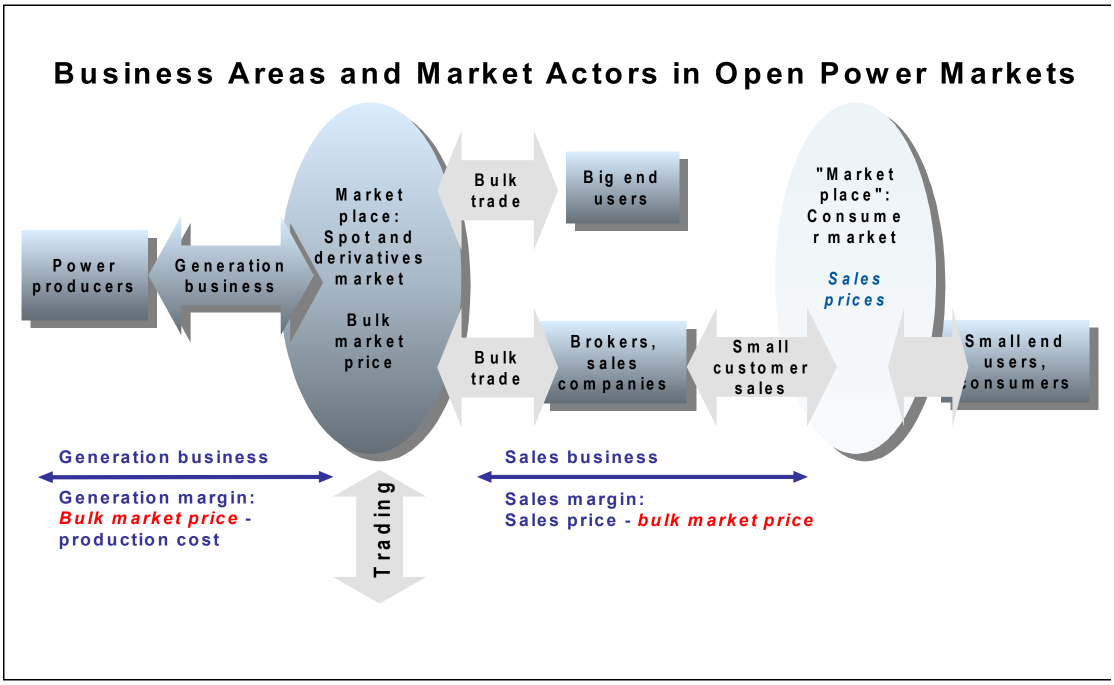
3.3 Main events

No major power outages happened in the power system of Finland in 2005/2006

4. Electricity Market Structure







5. Other

Link
www.energia.fi/eindex.html
www.energiamarkkinavirasto.fi/eng/index.html
www.fingrid.com/index_eng.html
www.nordel.org/eng/index.html

NORWAY

1. Basic capacity, generation and consumption data (year 2005)

Installed capacity by fuel, MW		
	Thermal	244
	Hydro	28268
	Nuclear	-
	Renewables (wind)	281
	Total	**28793**
Yearly generation fuel by fuel, TWh		
	Thermal	0.976
	Hydro	136.465
	Nuclear	-
	Renewables (wind)	0.507
	Total	**137.948**
Annual consumption, TWh		**125.908**
Imports, TWh		**3.652**
Exports, TWh		**15.692**

2. Industry structure

2.1 Recent key developments

The integrated Nordic electricity market is today better functioning than any other regional market for electricity in the world. Norway is part of this market and hence the Norwegian market is well functioning, too. This was also stated in the preliminary reports from EU and ESA (EFTA Surveillance Authority) on the energy sector inquiries carried out in 2005.

However, it is the aim of the electricity industry in Norway to contribute to further developing this market, especially with respect to harmonised handling of bottlenecks and common rules on how to procure reserve capacity. This aim is also shared by the electricity industry in the other Nordic countries.

Nordic Energy Ministers stated in 2005 the aim of developing a common Nordic retail market for electricity. This vision is also shared by the electricity industry in Norway.

Norway has not fully adopted EU's Emission Trading Directive, but the Norwegian legislation is as close to this directive that emission allowances freely can be traded between Norway and the EU Member States. However, a formal decision has now been taken to fully implement the EU Directive.

One of the hottest political debates in Norway the last years has been whether the ownership of Norwegian hydro power shall revert to the State or not. It has, however, turned out to be impossible to find a political agreement on a solution which creates «a level playing ground» to both private and public owners, as required by ESA. The Norwegian Government has therefore decided not to make any changes of the law from 1917. This decision will most likely lead up to a legal case at the EFTA court of Justice.

The Norwegian Regulator has started to finalise a new regulatory framework for economical control and regulation of the network monopolies, which shall come into force on 1 January 2007.

There has been a stand still throughout 2005 for the earlier notified system for «Green Certificates» for new renewable production capacity. It has been the intention that the Norwegian system should be compatible with the Swedish system, and thus create a common Norwegian/Swedish market for such certificates. However, early 2006 the Norwegian Government announced that this goal could not be achieved and now looks for other «and more effective mechanisms» for renewable support. The Norwegian electricity industry regrets this decision strongly.

2.2 Main actors

Transmission system operator
Statnett SF is responsible for construction and operation of the central grid, and operates the whole of this facility. As the transmission system operator (TSO) in Norway, Statnett is also responsible for short- and long-term coordination. This means that it coordinates the operation of the entire Norwegian power supply system to ensure the amount of electricity generated equals consumption at all times. The Statnett SF state enterprise owns 87 per cent of the central grid. Statnett is responsible on a continuous basis for identifying and developing the instruments required to maintain a moment-to. moment balance between supply and demand at times when electricity supply is very tight. In addition, Statnett plays a central role in the development and operation of transmission connections to other countries.

Main generators
The decision has now been formally taken to build the first gas fired power plant in Norway and the work has started (Kårstø, 420 MW in operation 2007).
During the year two new wind power farms have been put into operation.
More wind power has been decided and altogether 230 MW new hydro power will be developed in 2006-2007.
The five biggest power producers in Norway are.

- Statkraft AS 35.9 TW h, 8677 MW, market share 30%
- BKK Produksjon AS 6.9 TW h, 1612 MW, 5.8%
- Norsk Hydro AS 6.9 TW h, 1527 MW. 5.8%
- E-CO Vannkraft AS 6.8 TW h, 1887 MW, 5.6%
- Lyse produksjon AS 5.9 TW h, 1544 MW, 4.9%

Distributors
Grid companies may own a local, regional or parts of the central grid. A total of 176 companies are engaged in grid management and operation at one or more levels. Of these, 47 are pure grid companies. Most grid companies are wholly or partly owned by local authorities.

Main traders & other players
The 10 largest traders in Norway are ranked by supply: Statkraft AS, Norsk Hydro Produksjon AS, Fjordkraft AS, Hafslund Strøm AS, LOS AS, Lyse AS, Troms Kraft Marked AS; Nord-Trøndelag Elektrisitetsverk FKF, Norske Shell AS and Fortum Markets AS.

3. Transmission network and system issues

3.1 Status of international interconnections

Existing interconnections

From	To	U [kV]	Cap* [MVA]
Norway	**Denmark West**		
Kraistiansand	Tjele	HVDC	1040
Norway	**Finland**		
Varangerboth	Fingrid	220 AC	120* 100
Norway	**Sweden**		
Sildvik	Tornehamn	132 AC	120/50*
Ofoten	Ritsem	400 AC	700/1350*
Rösslåga	Ajaure	220 AC	415
Nea	Järpströmmen	275 AC	600
Eidskog	Charlottenberg	132 AC	100
Hasle/Halden	Borgvik /Skogssäter	400 AC	2200

*) *Exports/Imports*

Planned interconnections
Statnett has applied for a licence by Norway's Ministry of Petroleum and Energy to organise and conduct exchange of power between Norway and the Netherlands. Such licence will permit construction of the NorNed cable by the two countries' transmission system operators.

Ongoing studies in international/cross-border interconnections;
The liberalisation process opens up new opportunities for Norway with a view to increasing value creation in the Norwegian power system through increased power trade with the Continent. In addition to the NorNed project, Statnett wishes to establish a minimum of 600-1200 MW new cable capacity to other countries and 600 MW further HVDC cable capacity to Denmark is assumed as a first step.

Lines under construction (internal and cross-border)
The NorNed Project:
Feda, Norway to Eemshaven, The Netherlands, HVDC, 450 kV, 700 MW (2007)

Nea- Järpströmmen upgrade:
Nea, Norway to Järpströmmen, Sweden upgrade from 300 kV to 420 kV.

Internally: The biggest challenges in developing the main grid the coming years are associated with:

- Consumption increase in Central Norway (county of Møre og Romsdal)
- Plans for larger amounts of wind power production in Northern Norway
- Supply to Bergen area
- Security og electricity supply

Several projects are underway to cover this by increasing utilisation of the existing system and expansion of transmission facilities (voltage upgrade and new power lines)

3.2. Network development plan

Statnett has worked out a grid development plan 2005-2020 being the reference for getting the permissions from the Regulator and the Ministry step by step. A close co-operation within the Nordic system by NORDEL, is a part of this together with relevant authorities and TSOs outside the Nordic system

4. Electricity market structure

The power supply in Norway is regulated by the Energy Act. Market based power trading is one of the principles incorporated in this statute. Similar legislation is found in Sweden, Denmark and Finland. The Nordic countries form a common power market, which also links to Russia, Germany and Poland.

The power market is divided into wholesale and end user segments. Electricity is traded bilaterally between different market players and in the market organised by the Nord Poll Nordic power exchange. A number of companies' broker standard bilateral contracts, but growing proportion of contracts is traded in Nord Pool's markets. Bilateral contracts still have the largest market share.

Nord Pool's products are divided into three principal categories: the physical market, financial market and clearing.

Physical trade between the Nordic countries is based on Nord Pool's electricity market. However, financial contracts may also be concluded bilaterally between players in the various countries. Nord Pool offers trading in forward contracts and settlement to exchange members in the financial market.

In 2005 contracts worth NOK 399 billion were traded and cleared by Nord Pool.

As the first exchange in the world, Nord Pool opened on 11 February 2005 for trading in release rights (CO2).

5. Other

Link	Company
www.statnett.no	Statnett SF
www.nordel.org	NORDEL
www.nordpool.com	Nord Pool
www.odin.dep.no	Ministry of Oil and Energy

SWEDEN

1. Basic capacity, generation and consumption data*(year 2005)

Installed capacity by fuel, MW [1]		
	Thermal Conventional*	4984
	Hydro	16150
	Nuclear	8961
	Renewables	3117
	Total	**33212**
Yearly generation fuel by fuel, TWh [2]		
	Thermal*	3.9
	Hydro	72.1
	Nuclear	69.5
	Renewables**	9.2
	Total	**157.7**
Annual consumption, TWh [2]		**147.3**
Imports, TWh [2]***		**14.6**
Exports, TWh [2]		**22.0**

[1] Values denote brute power at generator mains.
[2] Values denote net energy at substation –i.e., consumption at power stations are netted.
** Including renewable biomass*
*** Excluding renewable biomass and hydro. Also all hydro generation and parts of Conventional Thermal (5.0 TWh) is renewable*
**** Import / export include also all transits through Sweden*

2. Industry structure

2.2 Main actors

<u>TSO</u>
The Swedish national electricity grid is state owned and operated by Svenska Kraftnät (280 employees), and is basically comprised of 400 kV and 220 kV power lines switchyards and transformer stations and foreign links for AC and DC. The total power-line length is approximately 15,000 km.

<u>Main generators</u>
Available capacity (MW) January 2006

Company Name	Hydro Power	Nuclear Power	Wind Power	Other Thermal	Total
Vattenfall AB	7 968	4602	26	1251	13903
E.ON Sverige AB	2746	2584	19	1720	7092
Fortum Power and Heat	3129	16666	0	1442	6238
Skellefteå Kraft AB	674	62	0	69	805
Svenska Kraftnät	0	0	0	640	640
Statkraft Sverige AB	281	0	0	0	281
Tekniska Verken Linköping	91	0	0	165	256
Jämtkraft AB	210	0	1	45	256

Number of distributors

There are 168 local grid companies in Sweden. The sizes of these companies' electricity grids vary tremendously. The smallest company has about 3 km of power lines, while the largest has more than 115,000 km.

The Largest Distributors

Company	**Number of customers**
E.On Sverige AB	1150002
Vattenfall AB	918759
Fortum Power and Heat	855084
Göteborg Energi AB	277278
Lunds Energikoncernen AB	105724
Mälarenergi AB	100593
Tekniska verken i Linköping AB	88961
Skellefteå Kraft AB	65356
Öresundskraft AB	64320
Jämtkraft AB	61275

Source: Svensk Energi (2006)

3. Transmission network and system issues

3.1 Status of international interconnections

Existing Interconnections

From	**To**	**U [kV]**	**Cap. to Sweden [MVA]**	**Cap. from Sweden [MVA]**
Sweden	**Denmark**			
Göteborg	Vester Hassing	250 HVDC	290	270
Lindome	Vester Hassing	285 HVDC	380	360
Mörarp 1 og 2	Teglstrupgård	132 AC		
Söderåsen	Gørløsegård	400 AC	1350	1750
Söderåsen	Hovegård	400 AC		
Borrby	Hasle (Bornholm)	60 AC	60	60
Sweden	**Finland**			
Kalix	Ossauskoski	220 AC		
Letsi	Petäjäskoski	400 AC	1600	1200
Svartbyn	Keminmaa	400 AC		
Forsmark	Raumo	400 HVDC	550	550
Senneby	Tingsbacka (Åland)	110 AC	80	80
Sweden	**Norway**			
Tornehamn	Sildvik	132 AC		
Ritsem	Ofoten	400 AC		
Ajaure	Rössåga	220 AC	1000	1300
Järpströmmen	Nea	275 AC		
Linnvasselv	Tunnsjö	66 AC	50	50
Höljes	Lutufallet	132 AC	40	20
Charlottenberg	Eidskog	132 AC	100	100
Borgvik	Hasle	400 AC		
Skogssäter	Halden	400 AC	2150	2150
Sweden	**Germany**			
Västra Kärrstorp	Herrenwyk	450 DC	390	460
Sweden	**Poland**			
Stärnö	Slupsk	450 DC	600	600

** To Sweden*
Annex 1 : The interconnected electric systems – Country reports, NORDE, 2004-030-0105 February 2005 239

Reinforcement plans

The three most important cross-sections with connections to Sweden have been pointed out by Nordel to be expanded:

- Between Central Sweden and Southern Sweden

- Fenno-Skan interconnection between Finland and Sweden
- Nea-Järpströmmen cross-section between Norway and Sweden

4. Electricity market structure

<u>Structure of the Electricity Market</u>

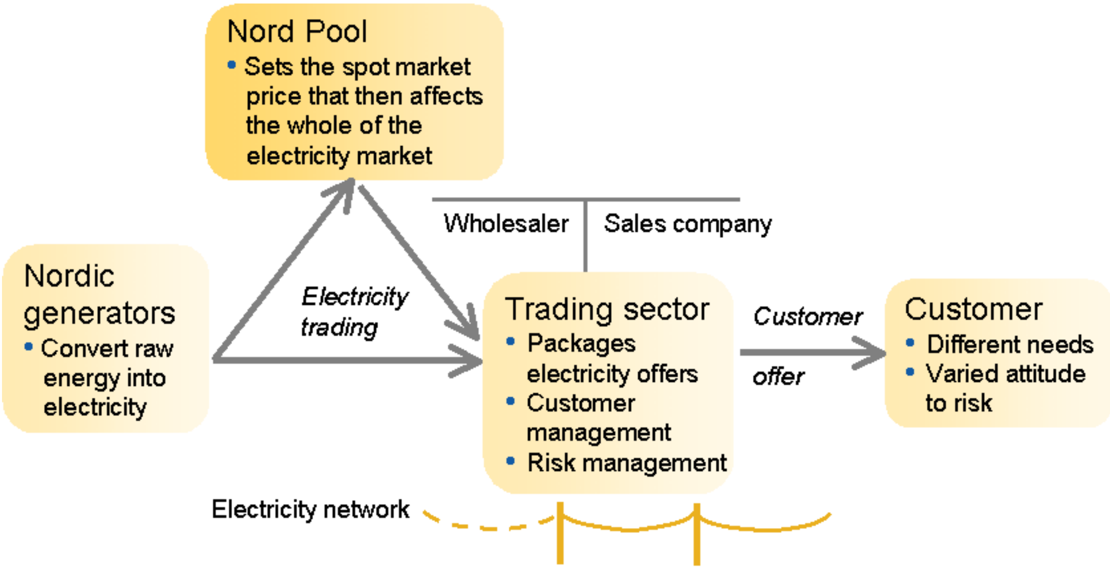


Figure: Structure of the Electricity Market

Sellers and buyers of electricity are linked together economically in a chain of contracts from the generator to the end user. Physical delivery is channelled through the grid, regional network and local network.

There are three levels of responsibility for the balance on the Swedish electricity market. On the national level, Svenska Kraftnät is responsible for the balance of the entire electricity system, under the Electricity Act. This means that the Balance Service maintains the electricity balance between production and consumption on an instantaneous – or minute-by-minute - basis. The Balance Service also collaborates with similar functions in Norway, Finland and Denmark. By monitoring and, when required, correcting imbalances between the Nordic countries, the system operators can ensure that each country is doing its fair share of the necessary joint regulation work. The second level of responsibility consists of the balance providers, which are obligated under the Balance Obligation Agreement to maintain their company balances on an hourly basis. On the third level of responsibility, we find the great majority of players - the electricity suppliers who supply electricity to consumers, or those who are consumers themselves. The players who have not signed a Balance Obligation Agreement with Svenska Kraftnät, has to enter into an agreement with a balance provider who will then manage the balance on their behalf.

Bids for balance regulation are arranged in order of price and form a "staircase" for each hour of operation. When central measures are subsequently required to adjust the electricity balance, the balance service activates the most favourable bid. This regulation using manual interventions is combined with the automatic frequency controlled regulation of the generators at certain power stations. Svenska Kraftnät purchases such regulating power, via weekly and 24-hour contracts, from electricity producers that have these possibilities.

At the end of each hour, the regulation price is determined in accordance with the most expensive taken during downward regulation (the balance measure taken during upward regulation (the balance service purchases electricity), or the cheapest measure service sells electricity), used during the hour. This final regulation price applies to all those selected to regulate the balance upwards or downwards.

5. Other

Link	Company
www.nordpool.com	Nordpool
www.svenskenergi.se	Svensk Energi (Swedenergy)
www.svk.se	Svenska Kraftnät

Baltic States

ESTONIA

1. Basic capacity, generation and consumption data (year 2005)

Installed capacity by fuel, MW		
	Thermal	2252.8
	Hydro	4.7
	Nuclear	-
	Renewables	37
	Total	**2294.5**
Yearly generation fuel by fuel, TWh		
	Thermal (including other small types)	9.862
	Hydro	0.032
	Nuclear	-
	Renewables	0.055
	Total	**9.949**
Annual consumption, TWh		**6.914**
Imports, GWh		**0.345**
Exports, GWh		**1.894**

2. Industry structure

2.1 Recent key developments

The biggest event was the launch of the construction of the Estonian-Finnish undersea cable Estlink. It is the first step in connecting Estonia with the European power system. The Estlink cable will enable Eesti Energia to trade in the Nordic electricity market. It is estimated that the cable will make possible sales of up to 2 TWh per year of electricity to Finland.

The shutdown of one of the units of the Ignalina nuclear power plant provided Estonia with the opportunity to enter the Lithuanian electricity market and to export electric energy to Lithuania. With the completion of the two new fluidised bed technology-based power blocks in Narva, the focus of the Eesti Energia investment activities was turned from generation to network development.

New common study for new possible nuclear power plant in Baltic States has begun.

TSO National Grid (OÜ Põhivõrk) commenced the extension of the 330 kV Harku substation, which is an important junction in the Balto-Scandic Estlink connection. TSO also started the construction of the 330 kV Balti-Kiisa overhead power line, which will be completed in autumn 2006.

Several important projects were completed by TSO in the financial year. TSO renovated the 110 kV distribution board of the Tartu substation, the 110 kV Allika substation, the 110 kV Valga substation and the 330 kV Rakvere substation. We also renovated the 110 kV Tõnismäe-Endla and Tõnismäe-Elektrijaama cable lines.

2.2 Main actors

Concerning the state owned sector, Eesti Energy AS is owner of owner of TSO National Grid); majority of distribution network (OÜ Jaotusvõrk), main power plants (Narva Power Plants and Iru Power Plant), oil-shale mining and treatment(AS Eesti Põlevkivi) and some other companies(Telecommunications network etc.
There are two private distribution networks owners: Fortum (in Viimsi region and west part of Estonia) and AS Narva Elektrivõrgud (east part of Estonia). Also there are some local CHP owners and as well private RES producers (major boost among the wind and CHP plants developers/owners).

<u>Transmission system operator</u>
In Estonia, transmission network is operated by TSO National Grid (OÜ Põhivõrk) and 100% owned by Eesti Energia AS. TSO has responsibility to assure the access to the transmission network of new producers, new high voltage consumers and distribution companies.
TSO develops his network to ensure connected consumers, producers and other network managers' legitimate/sufficient needs.

<u>Main generators</u>
Electricity generation is concentrated into two oil shale fuelled power stations in Narva region: Eesti and Balti power plants. These plants were designed to supply northwest region of USSR. During soviet regime approximately 50% of electricity was exported.

The Estonian oil shale power plants are 21-45 years old. Their basic equipment is very close to the operation time limit and in next 5-15 years they must be either properly reconstructed or closed. In addition, new generating capacity is needed. The structure of the generating units needs also improvement as the existing units were designed to cover the base load.

Eesti Energia AS owns presently five thermal power plants. These are: Balti power plant (PP), Eesti PP, Iru PP, Ahtme CHP and Kohtla-Järve CHP. Currently power plants owned by Eesti Energia AS, produces 97% of total Estonian electricity production. Whereby, almost 90% of electricity is produced by condensation aggregates in Eesti PP and Balti PP (Narva Elektrijaamade AS).

Eesti and Balti PP will stay as two major energy producers in Estonia. There is ongoing development of new technology for oil-shale combustion. Two energy units (brut capacity 2*215 MW, net capacity 2*190 MW) in Eesti and in Balti power plant are modified. Base load and half peak-load are suitable to cover with condensation aggregates. Condensation aggregates can work under constant load or they can react quickly for relatively leisurely load changes. There is not possible to cut grand condensation aggregates just for the peak load duration.

For ensuring Tallinn district with electricity during the next couple of years, 200 MW combined-cycle unit to Iru CHP. Usable fuel should be natural gas.

In the future, there is possibility to build two Large CHP plants in Estonia. Potential usable fuels are natural gas, black coal and nuclear fuel.

Using natural gas, the threshold question is future natural gas prices as well as its possible security of supply problems. Such power plant should be situated on near gas-pipe routes, primarily near Tallinn. Another possibility is Tartu.

Speaking about black coal, its advantage is stable price and wide availability. Possible locations for such new power plant are primarily seaport towns like Tallinn and Paldiski.

New coal or natural gas power plants capacity could be 500-1000 MW.

Building a nuclear power plant is most problematic for mankind because of diffusive preconceptions and a big issue remains the plant possible location. The most feasible location should be Paldiski district and its capacity could be 600-1500 MW.

On the assumption of necessity, the objective is to cover all regions load from local power plants (local CHPs). Besides, power production dispersing and different fuels usage is presumed (renewable energy interaction).

Distributors
There are three distribution companies in Estonia: OÜ Jaotusvõrk, which is owned by Eesti Energia and it is assigned the task of distributing electricity to the final consumer via the 35 kV low-voltage and medium-voltage network and of managing these networks; Fortum (owns and operates networks in Western Estonia and in area of Viimsi peninsula) and Narva Elektrivõrgud (East part of Estonia, now owned by Viru Keemia Grupp).

Main traders & other players
The Three main traders in the Estonian energy sector are Eesti Energia, Fortum and Narva Elektrivõrgud.

3. Transmission network and system issues

Estonia is ready to establish new interconnection with Finland (HVDC sea cable Estlink, 350 MW) by the end of 2006. Possible new interconnections with Finland (Estlink 2 etc.) are under discussion. Possible new interconnection between Estonia-Latvia with 330 kV power line from Sindi to Riga CHP-2 is also under discussion.

3.1 Status of international interconnections

Estonia and Russia are connected with 3x 330 kV lines; Estonia and Latvia are connected with 2 lines. One 330 kV line (Eesti PP – Pskov SS) is connected loose. Majority of 220 kV systems will soon be replaced with 110 kV or 330 kV grids. The most necessary 330 kV grid renovations are planned to be completed before 2010 (table 1.1). Estonian 110-330 kV grid condition is sufficient. Estonian has a very good interconnection with Russia and sufficient interconnection with Latvia.

Existing interconnections

FROM (BG)	TO	Type AC/DC Single/Double	U,kV	P,MW
Tartu	(Tsirguliina) - Valmeira	2*AC-400	330	
Eesti power plant (PP)	Tsrguliina	2*AC-400	330	
Tsirguliina	Valmeira	2*AC-400	330	
Balti PP	Leningradskaja	ACO*600x2	330	
Eesti PP	Kingisep	2*AC-300	330	

Lines under construction (internal and cross-border)

FROM	TO	Type AC/DC Single/Double	U,kV	P,MW	Expected date for commissioning the line
Kiisa	Bakti PP	ACSR-402/52	330		December 2006
Harku	Espoo	DC	150	350	November 2006

Future projected interconnections
There are no projected interconnections ahead.

Network development plan
According to economic growth, demand forecasts, different scenarios of location of interconnections and power plants, it is necessary to increase transmission capacity to major consumption regions (regions Tallinn, Tartu, Pärnu).

According to the development plan for 110-330 kV transmission grids (TSO), it is a basic recommendation to construct Tartu-Sindi-Harku 330 kV power ring according to the following steps:

- Section Tartu-Viljandi (primarily on 110 kV voltage level) by 2010
- Section Viljandi-Sindi (on 330 kV voltage level) by 2013
- Section Sindi-Harku according to the foundation of power plants in Pärnu and Tallinn and second interconnection between Estonia and Finland (roughly after 2017).

Construction of the Tartu -(Viljandi)- Sindi -(Lihula)- Harku 330 kV transmission line enables to construct 330 kV substations in Viljandi, in Lihula and Paldiski if required. This new line enables also to use full export capacity of Estlink.

From existing substations, Aruküla 220 kV substation will be transferred to 330 kV after drain of residual life-time of 220 kV transmission line (roughly 2013-2014).

By the end of period after drain of residual lifetime, most of existing 330 kV transmission lines has to be reconstructed to larger cross-section (3x 400 mm2), which ensures essentially larger transmission capacity.

According to demand growth and connection of customers, it is necessary to install in 330 kV substations additional power transformers (in Harku, Aruküla, Sindi, Balti and Püssi substations) and replace existing power transformers with powerful ones (in Tartu and Sindi substations.

Every year, TSO puts together a so-called " Development plan of the transmission network". This document includes the National Grid network planning for next 7 years and it is based on a forecast of the energy demand in the next 7 years. This document is submitted to the Estonian Energy Market Inspectorate (EMI). EMI will evaluate the report and if deficiencies are found, EMI enters a writ for National Grid.

This framework document is also the official development program followed by the National Grid observes when building new substation/power line or renovating old ones.

As the use of renewable energy is gaining ground all over the world, the Estonian energy sector will have to make huge investments in environment-friendly technology in the coming years.

3.3 Main events

The biggest event was the launch of construction of the Estonian-Finnish undersea cable Estlink. It is the first step in connecting Estonia with the European power system. The Estlink cable will enable Eesti Energia to trade in the Nordic electricity market. It is estimated that the cable will make possiblesales of up to 2 TWh per year of electricity to Finland.

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4. Electricity market structure

There is no yet appropriate energy agency established in Estonia. Responsibility for the drafting and the implementation of the energy policy in Estonia lies within the Ministry of Economic Affaires and Communication. The supervisory role is set on Energy Market Inspectorate

The energy business is definitely a global business. The European Union has established the liberation of the power market as one of its goals and Estonia, as Member State, must follow. The closest free electricity markets to Estonia are the NordPool – very attractive future market for Estonia.

AS Eesti Energy AS is responsible for planning for IPP-s, where planning depending on their own needs and implementation feasibility, it must considers the rules entrenched in existing Energy Acts:

- Electricity Market Act of Estonia;
- National Grid Code;
- Long-term development plan for the Estonian Fuel and Energy Sector up to 2015 (vision up to 2030);
- National Energy Conservation Program and Action Plan for Energy Conservation;
- National Environmental Strategy;
- Electricity sector development plan up to 2015.

Estonian energy sector legislation overview and as well all legal documents can be found at Ministry of Economic Affairs and Communication homepage: http://www.mkm.ee/index.php?id=11407

LATVIA

1. Basic Capacity, Generation and Consumption Data (year 2005)

Installed capacity by fuel, MW (net values)		
	Thermal	565.0
	Hydro	1545.8
	Nuclear	-
	Renewables	*36.5*
	Total	**2147.3**
Yearly generation fuel by fuel, TWh		
	Thermal	1.335
	Hydro	3.294
	Nuclear	-
	Renewables	0.095
	Total	**4.723**
Annual consumption[4], TWh		**6.871**
Imports[5], TWh		**5.087**
Exports, TWh		**2.940**

2. Industry structure

2.1 Recent key developments

The dominant role in Latvian electricity market is played by AS Latvenergo, which is the holding company, comprised of several subsidiaries, business units and joint stock companies, responsible and licensed for electricity (2070 MWel) and heat (1610 MWth) production, transmission, distribution and trading, as well as for telecommunication business. In addition, in the electricity sector there are about 15 other companies, which have trading licences, 8 companies, which were licensed for distribution services and about 205 small electricity producers (total 135 MWel). In the Latvian electricity market AS Latvenergo have a share of about 65%-70% in generation business and 98%-99% in power supply.

The creation of market conditions in electricity sector is one of the priorities of the Government of Latvia. For the electricity supply sector this means that the electricity energy market in Latvia must be opened gradually and work in accordance with the provisions of the Directive 2003/54/EC of 26 June 2003, which concerns common rules for the internal market in electricity (so called IEM directive).

To ensure independence of the TSO and guarantee non-discriminatory access to the transmission grid, the new directive requires at least legal independence of the TSO as provided by the status of a legal person by 1 July 2004. Latvia has fulfilled this obligation on 8 June 2005, when AS Augstsprieguma tīkls, 100% owned by AS Latvenergo was established.

The reorganisation of seven regional electricity distribution subsidisers of AS Latvenergo into legally independent joint stock company AS Sadales tīkls is on the way and is scheduled to be completed by 1 July 2007. The company will be 100% owned by AS Latvenergo.

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4 *Annual net electricity consumption, including end-user consumption and electricity losses in networks, but excluding self consumption of power plants.*

5 *Imports-exports: physical power flows in the system.*

The biggest challenges of this reorganisation process are the separation of trading and system operator functions, as well as the creation of one company from seven regional utilities.

Generation and trading are the business units of the holding company AS Latvenergo.

According to the Section 20.1 of the Energy Law of Latvia:

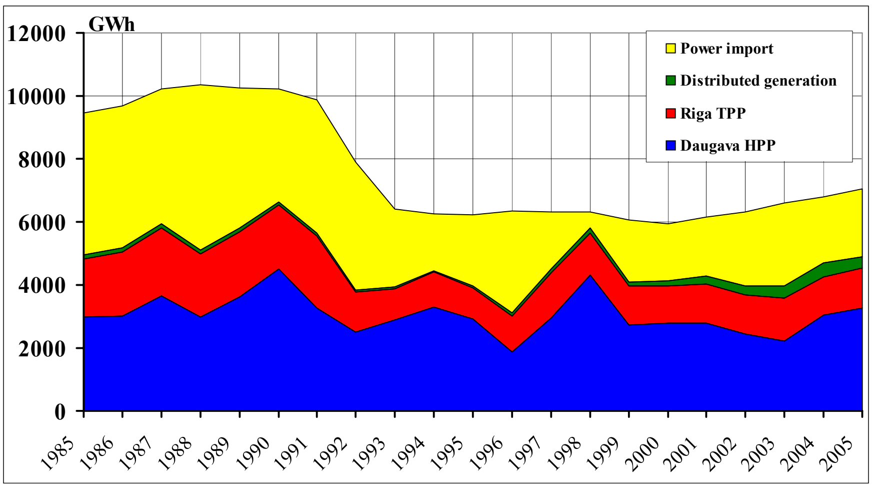
- Being a national economy object of State importance, the stock company Latvenergo shall not be privatised. All stocks of the stock company Latvenergo are the property of the State, and they are not to be privatised or alienated.
- The Pļaviņi, Ķeguma and Rīga hydroelectric power plants on the River Daugava, the Rīga 1 and 2 thermal power plants, electricity transmission networks, and existing electricity distribution and telecommunications networks, and equipment in the ownership of the stock company Latvenergo may not be utilised as a pledge for the provision of credit or the securing of other liabilities, and these objects as not to be privatised property may be transferred and be the property or in the possession of only such a capital company where all the capital shares are the property of the stock company Latvenergo and which may not be privatised or alienated.
- If the stock company Latvenergo is reorganised, the newly established holder of the right shall be a successor in rights and obligations of the stock company Latvenergo and the provisions referred to in Paragraph one and two of this Section shall apply thereto.

2.2 Main actors

Transmission system operator
AS Augstsprieguma tīkls

Main generators
The main generators remain Plavinas HPP, Kegums HPP and Riga HPP with a total installed capacity around 1500. In addition to this is Riga 1 CHP with 150 CCGT and the construction of with 270MW GT plus 150MW ST at Riga 2 CHP is just started and is planned to finish in 2008

Latvian power system is the system with power capacity deficit. This is mainly associated with unpredictable output of hydro generation.



Nowadays, the installed net generation capacity of Latvian power system is approximately 2150 MW, while peak electricity demand in 23rd January 2006 was 1420 MW.

Large power plants

Name	Start of operation	Number of units	Power Capacity[6], MW
Plavinas HPP	1965-1966	10	860
Kegums HPP-1	1939. (1947-1953)	4	71
Kegums HPP-2	1979	3	190
Riga HPP	1974-1975	6	399
Riga CHP-1	2005	3	144
Riga CHP-2	1975-1979	4	356
Total		**30**	**2020**

Distributed resources:

Type	Number of plants	Power Capacity, MW
Hydro	149	25.8
Wind	16	26.4
Sewage gas	1	2.1
Landfill gas	2	5.5
Biomass	4	2.6
Cogeneration	32	65.0
Total	**196**	**127.4**

During the winter maximum periods, the loading of Daugava hydro power plants (with installed capacity 1535 MW) is only 300-500 MW, while Riga thermal power plants are loaded at approximately 400-450 MW, distributed generation gives not more than 50 MW. It means that during winter maximum, Latvian power system is not sufficient in terms of power generation capacity. Import supplies on average provide 400-800 MW.

During the flood period (in spring) the situation is quite different. Hydro power plants are operated at nominal capacity (1300-1500 MW), thus Latvia manage to export approximately up to 700-800 MW.

Plus information about "Foreseen/Outgoing projects for new generating units"

Name of power station	maximum output MW	Category (*)	Date of commissioning or shutdown
Riga CHP-1*	144	Fossil fuel power plant (CCGT CHP, gas)	November 2005
Imanta CHP*	45	Fossil fuel power plant (CCGT CHP, gas)	October 2006
Wind parks**	140	Renewable energy sources	2007 – 2010
Biomass CHP plants**	40	Renewable energy sources	2007 – 2010
New unit in Riga CHP-2***	410	Fossil fuel power plant (CCGT CHP, gas)	June-July 2008
Old unit in Riga CHP-2	100	Fossil fuel power plant (extraction steam CHP, gas)	June-July 2008 (shutdown)
Old unit in Riga CHP-2	56	Fossil fuel power plant (extraction steam CHP, gas)	June-July 2008 (shutdown)
Kurzeme coal power plant *****	400	Fossil fuel power plant (coal power plant, CFB or PCC)	2012 – 2015
Baltic nuclear power plant (Latvian share)	400-600	Nuclear energy	2017 – 2025

* *- already commissioned*
** *- to meet RES-E targets in accordance with 2001/77/EC. Investment support schemes.*
*** *- under construction*
**** *- possible capacity of gas turbines for balancing and reserve purposes (not decided)*
***** *- coal power plant in the Western part of Latvia (Liepaja or Ventspils) for diversification. Pre-feasibility study was conducted (not decided)*

[6] *net*

Jointly with Eesti Energia and Lietuvos energija Latvenergo performs pre-feasibility study for new nuclear power plant in Ignalina that could be joint project for all three Baltic states. The possible size of the power plant will be determined during these pre-feasibility studies.

Distributors
Largest distribution company:
AS Sadales tīkls that is created by merging seven regional Latvenergo distribution companies. Planned that legally will b come independent from Latvenergo in 2007. Some really small players like “Vats” and “LDz” are around.

Main traders
Main trader is Latvenergo that at present plays role of the Public trader as well and in addition has shares in the Estlink (Nordlink). Some smaller traders like “BALTENERGOTRADE” are around but majority of the still not participate in the electricity market.

Other players
According to the Section 33 of Electricity Market Law:
One public trader shall operate in the territory of Latvia, and it shall be established by a merchant who has a distribution licence with the largest area of operation in Latvia and whose number of users connected to the networks thereof is the largest in Latvia.

The mentioned merchant is AS Latvenergo.

A public trader shall have the following duties:
- to supply electricity to all associated users throughout the territory of Latvia.
- The public trader shall supply electricity to the associated users, who are connected to a network of a distribution system operator – the establisher of the public trader – in accordance with the procedures specified by the Cabinet. The public trader shall ensure the electricity supply of the associated users connected to the networks of other distribution system operators by selling the volume necessary for the supply of such associated users to the relevant distribution system operator;
- to procure electricity produced in the co-generation process in accordance with the procedures specified in Section 28 of this Law;
- to procure electricity, which is produced by using renewable energy resources, in accordance with the procedures specified in Sections 29 and 30 of this Law;
- to procure electricity necessary for the supply of the associated users;
- to procure electricity in accordance with the procedures specified in Section 24 of this Law;
- to fulfil the duties of the final guaranteed supplier.

3. Transmission network and system issues

3.1 Status of international interconnections

Existing international interconnections

From	To	Type AC/DC Single/Double	U,kV	P,MW
Latvia	Estonia	AC, single, L301	330	550
Latvia	Estonia	AC, single, L351	330	730
Latvia	Russia	AC, single, L309	330	690
Latvia	Lithuania	AC, single, L457	330	290
Latvia	Lithuania	AC, single, L316	330	570
Latvia	Lithuania	AC, single, L324	330	540

Latvia	Lithuania	AC, single, L451	330	860

Ongoing studies in international/cross-border interconnections

From	To	Type AC/DC Single/Double	U,kV	P,MW	Date for study completion	Expected date for commissioning the line under study
Latvia	Estonia	AC or DC, single	330	600-1000	2007	2012-2020

Future projected interconnections

There was an idea of considering the HVDC submarine interconnection between Latvia and Sweden via Gotland island. So called GOTLINK project.

3.2 Network development plan

In the concept of the Latvian power systems development for 2025 the following projects for transmission system were mentioned:

- AC or DC line or cable 330 kV Latvia – Estonia;
- New 330 kV loop Grobiņa-Ventspils-Tume-Imanta with construction of substations of Venspils un Tume;
- New line 330 kV Rēzekne-Gulbene;
- 330 kV substation for reconstructed Riga 2 CHP with new generators;
- New 110kV substations in Riga's area.

3.2 Main events

No major outages in the transmission grid during the year.

4. Electricity market structure

Opening up of the market in Latvia is to be implemented in several stages, in accordance with the Regulations of the Cabinet of Ministers on eligible customers for electricity (21 September 1999). The stages are described in the table below.

Threshold for eligible consumers (share of the market)	Year of implementation
Market opening	2000
>100 GWh annually (5%)	2000–2001
>40 GWh annually (13%)	2002
>20 GWh annually (19%)	2003
>1 GWh annually (45%)	until 30th June 2004
All non-household consumers (75%)	2004–2007
All consumers	After 1st July 2007

The Electricity market law was approved on 25 May 2005. It stipulates the relationships between market participants and system operators, their rights and responsibilities, defines the main principles of trading, public service obligations, power system auxiliary services, authorisation procedure for new generation and transmission capacity, change of supplier, etc.

The secondary legislation - Regulations of the Cabinet of Ministers, which consider detailed procedures of electricity trading, balancing and auxiliary services, power purchase from supported generation, as well as tariff methodologies, which support the Electricity market law are still under development or approval.

At this stage the electricity market model of Latvia assumes the existence of eligible and non-eligible consumers. Non-eligible consumers are supplied by the Public Trader at regulated end-user tariffs, while eligible consumers could have a right to enter into the bilateral agreement with traders or directly with power producers (after obtaining of trading license) and pay system operators for their services.

At the moment approximately 75% of consumers are eligible. By 1 July 2007 all the consumers will have a right to be eligible. However, up until now, none of eligible consumers have used their right to change supplier. In this case, the Public Trader supplies them at regulated tariffs.

The public Trader is obliged to purchase the public service obligations – supported generation (cogeneration and renewable) at regulated feed-in tariffs, which are higher, than prices in the wholesale markets. All consumers must compensate Public Trader expenses, associated with these obligations.

The Regulator (Public Utility Commission) set the prices for eligible consumers and for supported generation. Latvian Grid Code is stipulating the activities of Transmission System Operator.
TSO is responsible for provision of balancing services to market participants at transmission level, while DSO – at distribution level.

At this stage, there are no provisions in the Electricity market law which foresee the operation of open day-ahead, forward, intra-day and balancing markets.

Cogeneration
Section 28 of electricity market law establishes that an entrepreneur who produces electricity in the process of co-generation may acquire the right to sell the produced electricity within the framework of the **mandatory procurement**.

The Public Trader is obliged to purchase electricity from cogeneration power plants, which could guarantee the "origin of electricity from high-efficiency cogeneration". Every producer, which might demonstrate that the electricity they sell is produced from high efficiency cogeneration, based on a useful heat demand, could apply for this support scheme. Electricity from cogeneration should be purchased at supportive feed-in tariffs. All the electricity consumers should cover costs of this public obligation.

Detailed procedures and rules about the purchase of electricity and heat from cogeneration (CHP plants) are described in the Regulation of the Cabinet of Ministers of Latvia on "electricity production in cogeneration process" (the new version of this Regulation was not approved yet) and the tariff methodology No. 311 (for cogeneration plants) approved by the Regulator on 21 December 2005. Both documents are in full conformity with the EU Directive 2004/8/EC on the promotion of cogeneration based on a useful heat demand.

The Cabinet of Ministers of Latvia shall prescribe (in the above mentioned Regulation) the criteria for the qualification of co-generation power plants for acquiring the right to sell electricity to the Public Trader. One of the criteria is a primary energy savings (PES), calculated according to the formula specified in the Directive 2004/8/EC. PES should be **at least 0%** for small and micro cogeneration (with capacity below 1 MW) and **at least 10%** - for all other cogeneration plants.

Price of electricity produced in CHP plant in **condensing mode** shall be determined based on market principles (not regulated). Electricity producers must offer this energy in a free market.

Renewable energy sources

According to EU Directive 2001/77/EC, Member States shall take appropriate steps to encourage greater consumption of electricity produced from renewable energy sources (RES-E). The global indicative target for RES-E is 12% of gross domestic electricity consumption by 2010, for the European Community the target is 22.1%.

In the Treaty of Accession to the European Union (2003), Latvia has verified its target to increase the share of electricity production from RES-E from 42.4% (1999) to 49.3% (including large hydro power plants) of gross domestic electricity consumption by 2010.

However, there are many disputes concerning the reference year for gross domestic electricity consumption. The footnote (***) for the table in the Annex of the Directive 2001/77/EC, for the new Member States was specified in the Treaty of Accession to the European Union. It includes the following statement: "For the Czech Republic, Estonia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Slovenia and Slovakia, gross national electricity consumption is based on 2000 data."

If the base year is 2010, the additional volume of electricity to be produced by RES-E in Latvia is 1.4 TWh, but if the base year is 2000 this additional power volume is 0.45 TWh. This substantial difference in almost 1 TWh, might significantly limit the free electricity market in Latvia, due to utilisation of non market-based mechanism for the support of electricity production from renewable energy sources.

The problem of allocation of RES-E obligations should be solved on EU level, because the similar issues concerns all the countries with high share of renewable energy in the electricity balance (Austria, Sweden, Finland, Spain, Denmark etc).

The Electricity market law has verified the obligation for Latvia to increase the share of electricity production from RES-E to 49.3% of gross domestic electricity consumption by 2010.

The Public Trader is obliged to purchase electricity from renewable energy sources, except large hydro power plants (with capacity superior than 5 MW) at prices determined during the tendering process. The tenders for the right to conclude power purchase agreements (PPA) with "renewable energy producers" for the duration not less than 5 years, but not superior than 10 years are organised by the Regulator and the Ministry of Economy of Latvia. The Regulator set the "starting price" for the tender. Bid prices provided by competitors should be less than the "starting price". The producer, who offered the lowest bid shall be announced as a winner. If nobody could offer the price below the "starting price", the Regulator organise the new tender with the higher starting price.

The total amount (in terms of energy) of such PPAs should be adequate to fulfil Latvian obligation on RES-E. For each type of renewable energy a separate tender is organised. All the consumers (both eligible and captive) should compensate the costs of the Public Trader, associated with the purchase of RES-E obligation or buy a renewable energy. The distribution of RES-E obligation by type of renewable technologies are summarised in the table below.

Renewable energy source by type	2007	2008	2009	2010
Hydro power plants with capacity > 5 MW	41.28%	39.21%	37.25%	35.39%
Hydro power plants with capacity < 5 MW	1.04%	1.26%	1.47%	1.64%
Wind generators	1.48%	4.22%	5.34%	6.94%
Biogas power plants	0.38%	0.42%	0.67%	0.76%
Biomass power plants	0.44%	1.26%	3.07%	4.53%
Solar energy	0.00%	0.01%	0.03%	0,04%
Total	44.62%	46.40%	47.83%	49.30%

thief on the one hand Daugava hydro power plants are free to trade on electricity market, on the other, they should be one of the major contributors to RES-E obligation. That is why the Public Trader would have to buy electricity from Daugava HPPs to fulfil the RES-E obligation.
The share of electricity produced by renewable energy sources and cogeneration might reach up to 75%-85% of gross domestic electricity consumption, which would leave a very little space for the free competition.

Security of electricity supply
Latvian electricity market law also foresees the possibility to launch the tender for the development of new generation capacity, in case the TSO (in his adequacy report) see the threat to security of electricity supply. Similar support mechanism with intermediation of the Public Trader is proposed for this public obligation. The Ministry of Economy is responsible for the decision to launch such a tender. Despite on the TSO indications on possible shortage of power capacity in the Baltic region, the Ministry haven't use this instrument to increase the capacity. This measure would further reduce the free competition in the electricity market.

5. Other

Institutions/companies	Links
Ministry of Economics of the Republic of Latvia	http://www.em.gov.lv/
Ministry of Environment of the Republic of Latvia	http://www.vidm.gov.lv/
Public Utilities Commission (Regulator)	http://www.sprk.gov.lv
Central Statistical Bureau of Latvia	http://www.csb.lv/
Bank of Latvia (exchange rates)	http://www.bank.lv/eng/main/finfo/notvalkur/
Latvian Transmission System Operator	http://www.ast.latvenergo.lv/
AS Latvenergo (energy holding company)	http://www.latvenergo.lv/
DC Baltija[7]	http://www.dcbaltija.lv/english/main_eng.php
AS Latvijas Gaze	http://www.lg.lv/
AS Rigas Siltums	http://www.rs.lv/
Competition Council	http://www.competition.lv/
National Energy Inspection	http://www.vei.gov.lv/

[7] *Joint venture of Estonia – Latvia – Lithuania "Baltic Power Systems Control Centre Ltd." Since 1st January 2007 will be substituted by BALTSO.*

LITHUANIA

1. Basic capacity, generation and consumption data (year 2005)

Installed capacity by fuel, MW		
	Thermal	2631
	Hydro (including pump storage plant)	1024
	Nuclear	1300
	Renewable	4
	Total	**4959**
Yearly generation fuel by fuel, TWh		
	Thermal	3.7
	Hydro	0.8
	Nuclear	10.3
	Renewable	0.0
	Total	**14.8**
Gross annual consumption, TWh		**10.1**
Imports, TWh		**1.1**
Exports, TWh		**-4.1**

2. Industry structure

2.1 Recent key developments

The unit No 1 of Ignalina Nuclear Power Plant was closed at the end of 2004.
The state owned power companies Lietuvos Energija, Latvenergo and Eesti Energija signed a Memorandum of Understanding and started preparation of the Feasibility Study of the new nuclear power plant in the Baltic States. The Feasibility Study should be completed by 1 November, 2006.

2.2 Main actors

Transmission system operator

The single Lithuanian Transmission System Operator Lietuvos energija AB (Joint Stock Company) is responsible for the operation and maintenance of the Lithuanian transmission grid 330 - 110 kV and Lithuanian power system.

Lietuvos Energija AB owns:

- 1607 km overhead lines 330 kV,
- 4400 km overhead lines 110 kV,
- 21 km underground 110 kV cable lines,
- 12 substations 330 kV,
- 207 substations 110 kV,
- Kaunas Hydroelectric Power Plant (100,8 MW),
- Kruonis Hydro Pump Storage Power Plant (900 MW),
- The control centre of Lithuanian power system,
- The telecommunication network and information system.

Under the Law on Electricity Lietuvos energija AB is responsible for:

- Management and development of the transmission grid,
- Secure and reliable operation of the Lithuanian power system,
- Operation of electricity market in Lithuania.

Main generators

- State-owned company Ignalinos atomine elektrine (Ignalina NPP) at present has installed one unit with capacity 1300 MW.
- Joint stock company Lietuvos elektrine AB (Lithuanian PP) has installed capacity 1800 MW.
- Vilnius CHP belongs to Vilniaus energija UAB. Its two units, 180 MW capacities each, apart from the electricity generation is also used for heat energy supply to Vilnius city.
- Kauno termofikacijos elektrine UAB (Kaunas CHP) has installed capacity 170 MW. It produces electricity and heat energy to Kaunas city,
- Mazeikiu elektrine AB (Mazeikiai CHP) has capacity 160 MW. It is used not only for electricity production, but also for heat energy supply to Mazeikiai oil refinery.
- At present time is under construction new Panevezys combine cycle CHP. Projected capacity – 35 MW, scheduled commissioning – end of 2007.

Distributors

There are two distribution companies in Lithuania:

- "Rytu Skirstomieji Tinklai" AB (Eastern distribution networks) was founded on December 31, 2001, after reorganisation of the company Lietuvos Energija AB. It performs the functions of a distribution network operator and a public supplier. The company is in charge of maintenance, reliability and development of low (0.4 kV) and medium (35-10 kV) voltage electricity networks, as well as of electricity supply to the customers within the territory covering 34.7 thousand square kilometres with the population of 1.7 million. The company provides its services to up to 700 thousand of customers.

- Public limited company VST AB was privatised on 23rd December 2003. The main shareholder of the privatised company is Lithuanian capital private limited company NDX Energija. The Company distributes and supplies electric power within the western and midland territory of Lithuania. The territory covers area of 30,378 square kilometres with approximately 1.8 million residents. The Company provides its services to over 672 thousand clients.

Main traders

In 2005 there were 8 suppliers – 3 public and 5 independent, although 24 has licenses of suppler.

3. Transmission network and system issues

The original design of the Lithuanian 330 kV grid is the part of a large high voltage network loop that goes from Lithuania via Latvia, Estonia, St. Petersburg, Moscow, and Smolensk in Russia and closed through Belarus. Due to that circumstance Lithuanian power system has to operate in parallel with power systems of neighbouring countries maintaining reliability of supply. On February 7, 2001 Baltic power companies Eesti Energia, Latvenergo and Lietuvos energija signed a multilateral agreement along with RAO EES of Russia and Belenergo of Belarus on parallel operation of Baltic, Russia and Belarus power systems.

3.1 Status of international interconnections

Existing international interconnections

From	To	Type AC/DC Single/Double	U,kV	P,MW
Lithuania – Latvia				
Klaipeda	Grobinia	AC, single	330	789
Siauliai	Jelgava	AC, single	330	789
Panevezys	Pliavine	AC, single	330	789
Ignalina NPP	Liksna	AC, single	330	943
Lithuania – Belarus				
Ignalina NPP	Polock	AC, single	330	1097
Ignalina NPP	Belarusskaja	AC, single	330	1143
Ignalina NPP	Smorgon	AC, single	330	943
Vilnius	Molodechno	AC, single	330	943
Alytus	Grodno	AC, single	330	789
Lithuania – Kaliningrad region (Russian Federation)				
Kruonis	Sovietsk	AC, single	330	1143
Jurbarkas	Sovietsk	AC, single	330	572
Klaipeda	Sovietsk	AC, single	330	572

Ongoing studies in international/cross-border interconnections

From	To	Type AC/DC Single/Double	U,kV	P,MW	Date for study completion	Expected date for commissioning the line under study
Lithuania	Sweden	Sea cable DC		700-1000	2007	Not defined yet

Future projected interconnections

In June 2005, based on decision of the European Parliament, the interconnection project of Lithuanian and Polish power grids was included in the list of priority projects in Europe. In September 2005, the transmission system operators from Lithuania and Poland – Lietuvos energija and Polskie Sieci elektroenergetyczne SA– as well as the Ministry of Economy of Lithuania and the Ministry of Economy of Poland signed a Communiqué. The power companies continued their negotiations on the interconnection of the grids of Poland and Lithuania.

3.2 Network development plan

Lietuvos energija as Transmission System Operator (TSO) is responsible for preparation of transmission system development plans. “5 year investment plan” and “10 years investment plan“ Lietuvos energija schedule each two years. These investment plans should be revised and approved by Board of the company (acceptance of all investment projects including substantiations, business plans for each commercial project, project schedules, etc.), Ministry of economy (as main owner), Regulator and State Control.

Distribution companies frame their investment plans.

4. Electricity market structure

The trade in electricity is carried out in the domestic market as well as through export and import. In Lithuania electricity is traded at:

- The wholesale electricity market, by concluding bilateral sale-purchase agreements between electricity producers and suppliers. They can sell or buy deficient or surplus quantities of electricity at the auction.
- The retail electricity market, by concluding bilateral sale-purchase agreements between eligible customers and suppliers.

From July 2004 all non-residential customers may choose supplier freely. In 2005 only 4 customers had chosen independent suppliers.

In 2005 players of Lithuanian electricity market were:

- Producers – 8;
- Suppliers – 8 (3 public and 5 independent, although 24 has licenses of suppler);
- Eligible consumers – 4, although all, except households, has the right to be eligible;
- Lietuvos Energija as Transmission System Operator, Market Operator and Exporter/Importer.

Transactions concluded with electricity suppliers are for trading in the following three types of electricity:

- Contractual electricity, that is bought or sold in accordance with bilateral contracts signed between Producers and Suppliers.
- Public Service Obligations (PSO) electricity, that are bought from the power plants included in the Public Service Obligation List, and sold to all Suppliers.
- Additional electricity, which are bought by market operator and sold to the suppliers and transmission system operator if the quantities of contractual electricity and electricity complying with public service obligations electricity are not sufficient. Additional electricity is sold at the auction arranged for producers by the market operator.

The auction is organised for Producers only as the quantities of electricity in transactions with suppliers are defined on a monthly basis. Only transactions with producers are based on hourly basis. After implementing commercial accounting system on consumption side the auction of additional energy will be open for other market participants as public suppliers and independent suppliers.

In 2005, in the Lithuanian wholesale electricity market the electricity suppliers bought 9.3 TWh. 5.5 TWh (59.8 %) were purchased from producers by concluding bilateral agreements, 1.6 TWh (16.6 %) by carrying out public service obligations and 2.2 TWh (23.6 %) of additional electricity were purchased at the auction administrated by the market operator.

5. Other

Link	Companies
www.lrs.lt	Seimas (the Parliament of Republic of Lithuania
www.ukmin.lt	Ministry of Economy The Republic of Lithuania
www.regula.lt	National Control Commission for Prices and Energy
www.lietuvosenergija.lt	Lietuvos Energija AB (TSO and MO)
www.rst.lt	Rytu Skirstomieji Tinklai AB (Eastern Distribution Networks)
www.vest.lt	VST AB (Western Distribution Company)
www.iae.lt	Ignalinos atomine elektrine (Ignalina Nuclear Power Plant)
www.lelektrine.lt	Lietuvos elektrine AB (Lithuanian Power Plant)
www.mel.lt	Mazeikiu elektrine AB (Mazeikiai CHP)
www.vilniaus-energija.lt	Vilniaus energija UAB (Vilnius CHP)
www.kte.lt	Kauno termofikacijos elektrine UAB (Kaunas CHP)

Unified Power Systems

AZERBAIJAN

1. Basic capacity, generation and consumption data

		2004	2005
Installed capacity of power plants (MW)			
	Thermal	4654	4691
	Hydro	1030	1030
	Total	**5684**	**5721**
Electricity production at power plants (TWh)			
	Thermal	19.0	19.6
	Hydro	2.8	3.0
	Total	**21.7**	**22.6**
Electricity consumption (TWh)		**23.6**	**23.6**
Import (TWh)		**0.3**	**1.4**
Export (TWh)		**2.1**	**2.4**

2. Industry structure

2.1 Recent key developments

Between 2000-2003 Yenikendskaya HPP, with total capacity of 150 MW (4 units 37.5 MW each) was put into operation. In 2000-2001, in the result of Bakinskaya TPP-1 reconstruction, two 53.5 MW gas turbine units and 2 recovery boiler units with 200 t/h rating were put into operation. In 2002, 400 MW steam-gas unit was put into operation at "Shimal" TPP.

2.2 Main actors

Transmission system operator
The Central Dispatching Control organisation (CDC), being a part of the OSC "Azerenergy", acts as a transmission system operator.

The CDC draws up electric capacity balance. Regulation of the electric capacity balance is carried out with regard to parallel operation with the Russian Federation and Iranian power systems.

The CDC provides operation conditions of the power plants and HV networks subordinated operatively to the state electric entity, shut down of the equipment for repair, and coordination of the parallel operation with the electric power systems of other states.

Main generators

№	*Power plant*	*Installed capacity (MW)*
Thermal power plants		
1	Azerbaijanskaya TPP (CHP)	2400
2	Ali-Bairamlinskaya TPP (CHP)	1050
3	TPP "Shimal"	550
4	Bakinskaya TPP (CHP) -1	106

Hydro power plants		
1	Minghechevirskaya HPP	399
2	Shamkirskaya HPP	380
3	Yenikendskaya HPP	150

Generating facilities being design and under construction
In 2007, reconstruction of the Minghechaurskaya HPP will be completed after replacement of units Nos. 1 and 3 the HPP total capacity will make 420 MW.

In the period 2005-2007 506 MW steam gas unit will be constructed and put into operation at the Sumghaitskaya TPP-1. In 2006-2008, the second steam gas unit will be constructed at TPP "Shimal".

In 2005-2007 five diesel power plants with 8.75 MW module units are planned for construction in Astara (87.5 MW), Sheki (87.5 MW), Khachmaz (87.5 MW), Nakhichevan (87.5 MW) and Baku (105 MW).

It is also planned to reconstruct Ali-Bairamlinskaya TPP with a total capacity of 900-1000 MW.

Between 2010-2014, a 900 MW TPP is planned to be constructed near Sanghachal settlement.

Distributors
The following companies carry out electricity distribution along the territory of the Republic of Azerbaijan:

- Bakinskaya HV electricity network;
- Sumgaitskaya HV electricity network;
- Gyadzhinskaya HV electricity network;
- Ali-Bairamlinskaya HV electricity network;
- electricity network management of Nakhichevan.

Main traders
Wholesale electricity trade is carried out by the JSC "Azerenergy". The private companies «Barmek and BAYVA», which took the distribution network under a long-term control, ensure electricity sale to end consumers.
There are no electricity exchanges and other trade sites in Azerbaijan at present.

3. Transmission network and system issues

3.1 Status of international interconnections

Existing international interconnections

Country	Name of substation	Voltage (kV)	Length (km)	Transmission capacity (MVA)
Iran	Imishli-Parsabad	230	64	250
Georgia	Akstafa – Gardabani	330	64	340
Russia	Yashma – Derbent	330	214	412
Turkey	Babek – Igdyr	154	94	160

3.2 Network development plan

Electricity transmission network of Azerbaijan consists of several hundreds of substations and transmission lines of different voltage.

Transmission network includes:
Substations:

Apsheron - 500 kV	Govsany - 220 kV
Agdzhabedi –330 kV	Mushvig - 220 kV
Agdam – 330 kV	Sanas Govshagy – 220 kV
Akstafa - 330 kV	Nizami - 220 kV
Gyandza - 330 kV	Promysel
Imishli - 330 kV	Sangachaly - 220 kV
Yashma – 330 kV	Khyrdalan - 220 kV
Akhsu - 220 kV	Babek -220 kV
Gabala - 220 kV	and 38 substations of 110 kV

Transmission lines:

500 кV:	Apsheronskaya Nos. 1 and 2;
330 kV:	Akstafinskaya Nos. 3 and 4, Ali-Bairamlinskayay Nos. 3 and 4, Imishlinskaya No. 3, Minghechaurskaya Nos. 3, 4, 5 and 6;
220 кV:	Ali-Bairamlinskaya Nos. 1 and 2, Apsheronskaya Nos. 3, 4, 5 and 6, Akhsuinskaya, Gabalinskaya, Govsanskaya Nos. 1 and 2, Masallinskaya No. 3, Minghechaurskaya Nos. 1 and 2, Mushvigskaya, Sangachalskaya, Yashminskaya, and 170 110 kV transmission lines.

Total installed capacity of substation transformers of the main network amounts to 9380 MVA, including 500kV substations – 1200 MVA, 330 kV – 2085 MVA, 220 kV – 3139 MVA, 110 kV – 2956 MVA.

Total length of the transmission lines amounts to 6300 km.

4. Electricity market structure

Legal regulation of the relations between the enterprises in the power sectors made on the basis of the Law “On electricity industry”.

<u>Market opening</u>
The electricity market opened for all groups of participants is planned to be established in the coming 3-4 years. . State power enterprise JSC (open stock company) “Azerenergy” buys electricity from the producers in accordance with the contracts, transports it along the HV transmission lines. JSC “Azerenergy» also makes electricity exchange with foreign countries. Power supply enterprise as legal entity purchases electricity from the state energy enterprise and electricity producers and sells it to the consumers.

<u>State regulation bodies</u>
The Bodies of executive power (Cabinet of Ministers, Ministry of Industry and Energy, Ministry of Economic Development, State Tariff Council) bear responsibility for:

- issuance of special permissions for electricity production, transmission, distribution and sale;
- conclusion of agreements giving rights to transport and distribute electricity across a certain territory;
- electricity prices (tariffs) regulation;
- issuance of special permissions for export and import of electricity;
- execution of state control over efficient, safe and reliable electricity production, transportation, distribution and consumption.

The system of electricity generation and transmission is an integrated part of JSC "Azerenergy", except small HPP, which are announced open for privatisation. Distribution networks are expelled from the "Azerenergy" structure and handed over to private companies.

Agreements on electricity distributions are concluded between an executive power body and a future supply (distribution) company for a limited time period not exceeding 30 years.

Pricing system
Electricity tariffs are considered by the State Tariff (Price) Council of Azerbaijan and approved by the Cabinet of Ministers.

There are the following electricity tariffs (prices):
- purchase price established by the electricity generator;
- wholesale price;
- retail price of the electricity sold to the consumers;
- import/export prices.

Interstate electricity transmission
Cross-border electricity export/import tariffs and electricity transit tariffs are fixed on the basis of the existing contracts agreed with the authorised bodies top authorities.
Electricity import and export are not liable to customs taxation and the only custom service duty ranging 0.15 – 0.3% of the declared electricity price is levied.

Investments in the generating facilities
Investments in the generating facilities are regulated within the framework of existing legislation and protected by the provisions of the Law "On protection of foreign investments". In accordance with the Law "On electric and thermal plants" each legal or physical person not restricting the third person rights, has a right for construction, reconstruction and operation of power plants.

BELARUS

1. Basic capacity, generation and consumption data (gross values – year 2005)

Installed capacity by fuel, MW		
	Thermal	7 903.2
	Hydro	12.0
	Nuclear	-
	Renewables	-
	Total	**7915.2**
Yearly generation fuel by fuel, TWh		
	Thermal	30.68
	Hydro	0.02
	Nuclear	-
	Renewables	-
	Total	**30.7**
Annual consumption, TWh		**34.7**
Imports, TWh		**9.0**
Exports, TWh		**5.0**

2. Industry structure

2.1 Recent key developments

The energy industry of the Republic of Belarus (including generation, transmission, distribution of electric energy and dispatch control) is under government regulation. Functions of government regulation in the area of tariff policy are fulfilled by the Ministry of Economy of the Republic of Belarus.

The Ministry of Energy of the Republic of Belarus is responsible for the effective functioning of energy industry, energy policy, developing measures for energy safety and the development of energy safety policy.

Concern BELENERGO is a vertically integrated state power company responsible for power generation, transmission and distribution of electricity in the country. It consists of 37 companies including 6 regional power companies, RUP "ODU" (National Power Control Centre), research and development institutes, maintenance and mounting organisations. Concern BELENERGO is also importer and exporter of electric energy.

2.2 Main actors

<u>Transmission System Operator</u>
There is no specially appointed TSO in Belarus. Functions of TSO are distributed between Concern BELENERGO, RUP "ODU" and regional power companies. Transmission assets are in the state ownership. They are assigned to the regional power companies through the right of economic management.

<u>Main power plants</u>
There are no independent producers and generation companies in Belarus. Power plants are subsidiaries of region power companies. Main power plants with installed capacity more than 500 MW are:

- Lukomlskaya TPP – 2412 MW
- Berezovskaya TPP – 1060 MW
- Minskaya TEC4 (CHP) – 1035 MW
- Gomelskaya TEC (CHP) – 540 MW
- Novopolotskaya TEC (CHP) – 505 MW

Foreseen/Outgoing projects for new generating units
New generation units with steam-gas turbines are planned to be installed in 2007 – 2008 at Minskaya TEC3 (230 MW) and Berezovskaya TPP (2x25 MW). A possibility for constructing a nuclear power plant in Belarus is being discussed.

Distributors
6 regional power companies operate the grids of 110 kV and below.

Main traders
Concern BELENERGO acts as a single buyer.

3. Transmission network and system issues

3.1 Status of international interconnections

Existing international interconnections

FROM (Belarus)	TO	Type AC/DC Single/Double	U, kV	P, MW
Belorusskaya s/s	Smolenskaya NPP (Russia)	AC - Single	750	1000
Vitebsk s/s	Talashkino s/s (Russia)	AC - Single	330	780
Kritchev s/s	Roslavl s/s (Russia)	AC - Single	330	940
Polotsk s/s	Novosokolniki (Russia)	AC - Single	330	570
Grodno s/s	Alitus (Lithuania)	AC - Single	330	780
Molodechno s/s	Vilnus (Lithuania)	AC - Single	330	780
Molodechno s/s	Ignalinskaya NPP (Lithuania)	AC - Single	330	810
Polotsk s/s	Ignalinskaya NPP (Lithuania)	AC - Single	330	780
Belorusskaya s/s	Ignalinskaya NPP (Lithuania)	AC - Single	330	810
Mozyr s/s	Chernobyl NPP (Ukraine)	AC - Single	330	940
Gomel s/s	Chernigov s/s (Ukraine)	AC - Single	330	780
Ross s/s	Bialystok s/s (Poland)	AC - Single	220	220

Ongoing studies in international/cross-border interconnections
None.

Lines under construction
None.

Future projected interconnections
Only internal 330 kV grid is to be developed and reconstructed within the next few years mainly in the western part of the country. A part of 220 kV lines and substations will be decommissioned and replaced by 330 kV grid.

Study needs
A study on building a nuclear power plant (including legal, human, environmental, economic and other factors) foreseen in the future

3.2. Network development plan

A general network development plan is elaborated by the concern BELENERGO over a several year period (from 5 to 10). In 2005 the State Program on modernisation of the Belarusian power system, energy saving and increasing of own fuel sources utilisation by 2010 was elaborated and adopted by the decree of the President of Republic of Belarus. The Ministry of Energy is a coordinator of the State Program and concern BELENERGO is responsible for its implementation. Both transmission and distribution plans are included in the State Program.

3.3 Main events

No substantial events influenced on system security happened in the Belarusian power system. There were two trippings of the 750 kV line Belorusskaya s/s – Smolenskaya NPP (Belarus – Russia) as well as two trippings of the shunt reactor installed at this line. Disconnections of the shunt reactor caused increase of voltage at Belorusskaya substation but they remained within permissible limits.

4. Electricity market structure

The market of electricity is regulated. The electricity market structure is shown below.

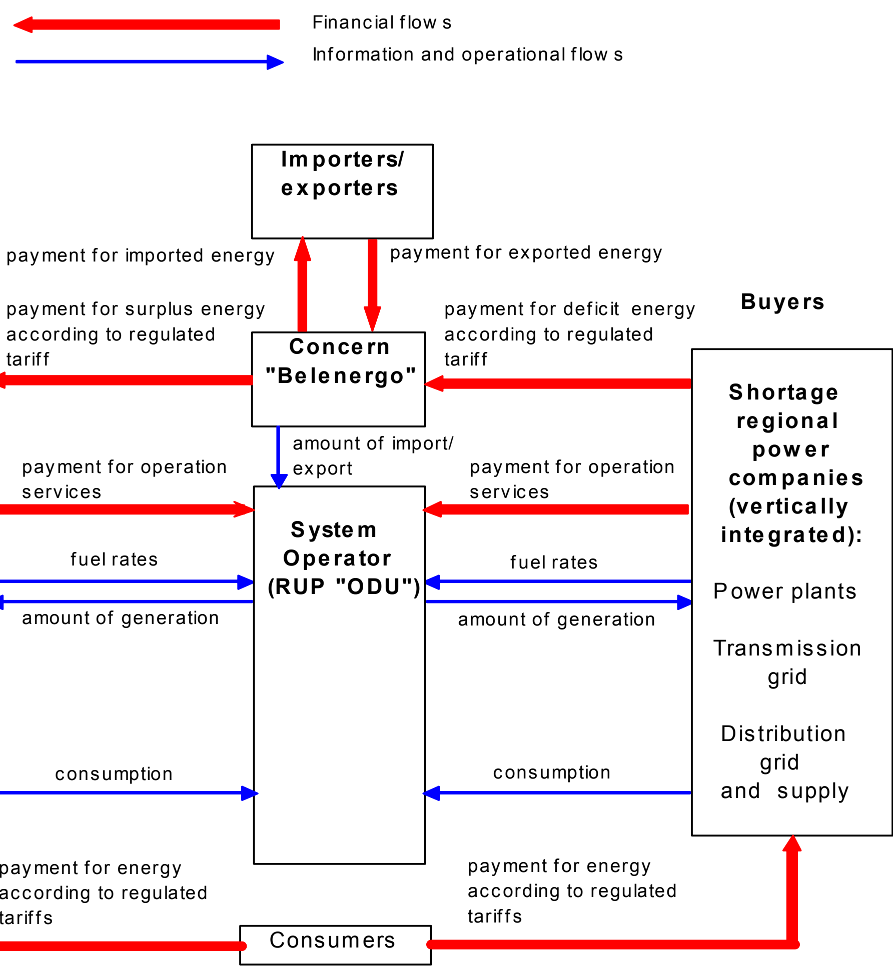


Figure: Structure of Electricity Market in Belarus

Specificities of Power System

99,8% of generation in Belarusian power system are thermal power plants, and about a half of installed capacity are CHP power plants. Some of them have cogeneration units of large capacity (180 and 250 MW). During the winter period, CHP power plants produce up to 60% of the electricity.

5. Other

Link	Company
http://www.minenergo.gov.by	Ministry of Energy
http://www.energo.by	Concern BELENERGO
e-mail: odu@odu.energo.by	RUP “ODU”

GEORGIA

1. Basic capacity, generation and consumption data

		2004	2005
Installed capacity of power plants (MW)			
	Thermal	1788	1678
	Hydro	2733	2740
	Other	158	158
	Total	**4679**	**4576**
Electricity production (TWh)			
	Thermal	0.9	1.0
	Hydro	6.0	6.3
	Total	**6.9**	**7.3**
Electricity consumption (TWh)		**8.2**	**8.6**
Import (TWh)		**1.3**	**1.5**
Export (TWh)		**0**	**0.1**

2. Industry structure

2.2 Main actors

Transmission system operator

The company JSC "Georgian State Electric System" ltd. plays the role of a transmission system operator.

Main generators

No.	**Power station**	**Installed capacity (MW)**
Thermal power plants		
1	Tbilisskaya TPP	1700
2	Tkvarchelskaya TPP	220
3	Tbilisskaya TPP (CHP)	18
Hydroelectric stations		
1	Inguri HPP	1300
2	Vardnili HPP	220
3	Zhinvali HPP	130
4	Khrami HPP-I	113
5	Ladjanuri HPP	112
6	Khrami HPP-II	110

Distributors
Distributing electric companies:
- JSC "Telali",
- JSC "United Distributing Electric Power Company of Georgia",
- LLC "Distributing Electric Power Company of Adjaria",
- JSC "Distributing Electric Power Company of Kakhetia".

There are two licensees having the right to transmit electricity in Georgia:
- LLC (limited liability company) "Georgian State Electric System" having the most part of means for electricity transmission;

- JSC "Sakrousenergo" which possesses 500 kV transmission lines "Kavkasioni", "Imereti", "Kartli-1", "Kartly-2", "Moukhrais Veli", and intersystem link "Adjara".

Dispatching is provided by LLC "Georgian State Electric System" and "Regional Energy Centre for International Cooperation".

3. Transmission network and system issues

3.1 Status of international interconnections

Existing international interconnections

Country	Substations	Voltage, kV	Length, km	Transmission capacity (MVA)
Azerbaijan	Ksani – Azerbaijanskaya TPP	500	283	1515
	Tbilisskaya TPP – Akstafa	330	64	450
Armenia	Tbilisskaya TPP – Alaverdi	220	61,5	210
Russia	Ingouri HPP – Central	500	408	1412
	Bzybi – Psou	220	41,5	254
Turkey	Batoumi – Khopa	220	30	251

3.2 Network development plan

The electric network system includes 449 substations, including 2 substations of 500 kV, 17 – 220 kV, 156 – 110 kV, 274 – 35 kV. The length of HV transmission lines totals to 9154 km, including 500 kV – 572 km, 330 kV – 21 km, 220 kV – 1565 km, 110 kV - 3907 km, 35 kV – 3134 km.

4. Electricity market structure

The Energy Wholesale Market of Georgia was formed in 1999 according to the Law "On Electricity and Gas".

The association of direct consumers and licensees of electric power industry represent legal organisational form of the Wholesale Market. In February 2002 the Energy Wholesale Market of Georgia was transferred to the international consortium IBEDROLA according to the managing contract.

The functions and tasks of the Energy Wholesale Market of Georgia are as follows: assistance in efficient functioning of this branch of economy, development of competitiveness, creation of favourable investment media, and assistance in establishing stable cooperation between licensees.

ARMENIA

1. Basic capacity, generation and consumption data

		2004	2005
Installed capacity of power plants (MW)			
	Thermal	1756	1756
	Nuclear	408	08
	Hydro	1039	1043
	Total	**3203**	**3207**
Electricity production (TWh)			
	Thermal	**1.6**	**1.8**
	Nuclear	**2.4**	**2.7**
	Hydro	**2.0**	**1.8**
	Total	**6.0**	**6.3**
Electricity consumption (TWh)			
		5.3	5.47
Import (TWh)			
		0.3	0.33
Export (TWh)			
		1.0	1.16

2. Industry structure

2.1. Recent key developments

Currently the energy sector of Armenia is one of the most fully operational and cost-effective branches of the country's economy. Armenia fully covers energy demand in the internal market and successfully performs an electricity exchange with Iran and Georgia on mutually beneficial basis.

The implemented and ongoing reforms in the energy sector and the establishment of market relations as well as the development of legislation and tariff policy regulation by law, the implementation of privatization procedure and other measures, are the factors that have secured the efficient and uninterrupted operation of the system.

As the result of power sector restructuring, the vertically integrated power system have been replaced:

- 5 generation major plants and 39 small generation companies;
- Transmission company (220 kV network);
- Distribution company(0,4-6/10-35-110 kV network);
- Dispatching Center (operator of power system);
- Settlement Center;
- Construction, installation, repairing companies, etc;
- Scientific-research and design institutes.

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The Energy Sector Development Strategy of Armenia was adopted by the Government of Armenia in June 2005. The primary objective of the mentioned strategy is to formulate strategic goals for the development of the energy system in Armenia until 2025. It aims to identify the avenues to achieve those goals, based on the principles adopted by the international community for sustainable development.

The Strategy aims at the resolution of the following primary problems:

- Providing reliable energy supply at low rates to satisfy the fundamental needs of all customers, while enhancing energy conservation, input of energy efficient technologies in all branches of economy;
- Avoiding methods of importing the primary sources that might expose the security and economy of Armenia to events political impacts beyond the control of the Republic of Armenia;
- Ensuring the safe operation of the ANPP to time as its energy can be replaced with new nuclear unit and decommissioning can proceed without unacceptable economic and energy security impacts;
- Ensuring sustainable energy supply, based on the principles of sustainable development and in compliance with the international environmental commitments of the Republic of Armenia;
- Creation of an electric energy system that is export oriented and generates high added value.

Analysis and assessment of opportunities to diversify supplies, achieve regional integration are a critical element of Armenia's Energy Sector Development Strategy. The projects on rehabilitation and modernisation of Electricity Transmission and Distribution Networks have been successfully implemented and are being continued by the financial assistance of international and financial organisations. It is planned fully completion of transmission HV network modernisation and implementation of the projects on improvement of interconnections with neighbouring countries.

2.2. Main actors

<u>Transmission system operator</u>

"The Electric Power System Operator" CJSC plays the role of a transmission system operator.

<u>Other actors:</u>

- "Armenian electric networks" CJSC – distribution company,
- generating entities including "Armenian NPP" CJSC, "Hrazdan TPP" CJSC, "Yerevan TPP" CSJC, "Vorotan Cascade of HPPs" CSJC, "Sevan-Hrazdan Cascade of HPPs" CJSC,
- "HV electric network" CJSC – transmission company.
- "The Settlement Centre" CJSC.

<u>Main generators</u>

No.	Electric power plants	Installed capacity (MW)
Thermal power plants		
1	Hrazdan TPP	1110
2	Yerevan TPP	550
3	Vanadzor TPP	96
Nuclear power plants		
1	Armenian NPP	408
Hydro power plants		
1	Spandarian HPP	76
2	Shamb HPP	171
3	Tatev HPP	158

4	Sevan HPP	34
5	Hrazdan HPP	82
6	Argel HPP	224
7	Arzni HPP	70
8	Kanaker HPP	102
9	Yerevan HPP	44
10	Dzora HPP	26.4

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Generating facilities being constructed and under construction

During 2006, thirteen (13) small HPPs with total capacity of 25,45 MW are under construction. The Meghri HPP of 140 MW is designed. At the present small HPPs with total capacity of 56 MW are exploited.

3. Transmission network and system issues

Status of international interconnections

Existing international transmission lines

Country	Name of substation	Voltage (kV)	Length (km)	Transmission capacity (MVA)
Azerbaijan	Hrazdan HPP – Akstafa	330	108	400
Azerbaijan (Nakhichevan)	Ararat-2 – Babek	220	99.6	250
	Ararat-2 – Norashen	110	98	85
	Agarak – Ordubad	110	30	85
Georgia	Alaverdi – Tbilisi TPP	220	63.5	250
	Alaverdi 2/Lalvar – Sadakhlo	110	32.1	85
	Ashotsk – Ninotsminda	110	35,8	85
	NKR Goris – Shushi	110	58	85
Iran I	Shinuhair – Agarak	220	176,5	250
Iran II	Shinuhair – Agarak	220	176.5	250
Turkey	Gumri – Kars	220	80	250

Transmission lines of Armenia

From a substation	To a substation	Voltage (kV}	Maximum current (A)	Length (km)
Agarak	Shinuhair	220	835	81.8
Alaverdi 2	to border of *Georgia*	220	690	63.4
Alaverdi	Vanadzor	220	690	47.0
Ararat	Armenian NPP	220	835	85.6
Ararat	Yeghegnadzor	220	835	65.8
Ararat	Shahumian	220	835	70.3
Armenian NPP	Ashnak	220	835	38.6
Armenian NPP	Marash	220	835	58.5
Armenian NPP	Shahumian	220	1670	32.6
Ashnak-2	Gyumri-2	220	835	54.8
Atarbekian HPP	Shahumian	220	1380	56.1
Atarbekian	Hrazdan TPP	220	945	11.6
Yeghegnadzor	Lichk	220	690	16.6
Yeghegnadzor	Shamb HPP	220	835	89.6
Yeghegnadzor	Spandarian HPP	220	690	70.9
Hrazdan TPP	Kamo	220	690	46.8
Hrazdan TPP	Marash	220	835	61.5
Hrazdan TPP	Vanadzor	220	945	49.9
Hrazdan TPP	Vanadzor	220	835	43.3
Hrazdan TPP	Zovuni	220	835	56.3
Kamo	Lichk	220	690	25.4
Gyumri-2	Vanadzor	220	835	79
Shahumian	Zovuni	220	835	19.4
Shinuhair	Shamb HPP	220	835	21.6
Shinuhair	Spandarian HPP	220	690	41.7
The total length of the 220 kV transmission lines is				**1313.8**

3.2. Network development plan

In the past, there was only one 330 kV overhead transmission line which connected the Hrazdan HPP with Akstafa substation (Azerbaijan). At present this line is not operative, though from the Armenian side it is technically ready to be operated. 220 kV overhead line and two 110 kV overhead lines are also out of operation. 220 kV transmission network covers practically the whole territory of Armenia; its total length exceeds 1300 km. Two-chain lines connect the Armenian NPP with the substation “Ashnak” and the Hrazdan TPP with Atarbekyan. There are fourteen (14) 220 kV substations in the system.

Electricity supply to internal consumers is provided by well-developed network with 110 kV overhead lines and 119 substations; the total length of lines is 3170 km.

The power system of Armenia is capable to interact with those of other countries. In particular, economic links are established with the power systems of Georgia and Iran though there is a practical opportunity of connecting it to the energy systems of Turkey and Azerbaijan as well as those of non-border countries like Turkmenistan and Russia.

4. Electricity market structure

The Energy Law regulates market relations in the Republic of Armenia. The Law regulates relations of state bodies of Armenia and economic entities of the electricity sector, including pricing, licensing and relations between suppliers and consumers.

At present, economic relations between economic entities of the power sector are based on the scheme "single buyer"; the role of the latter is carried out by the CJSC "Armenian Electricity Networks".

The Government of the Republic of Armenia, in particular, elaborates the state policy in the field of electricity industry through the Ministry of Energy and the Commission for Regulation of Public Services. The main regulation means are as follows: licensing, establishing regulated tariffs, working out model forms of agreements, approving market rules, studying investment program of development. Tariffs established by the Commission cannot be appealed in legal forms or changed.

Electricity supply is provided exclusively by the "Armenian Electricity Networks" CJSC. The retail and wholesale markets are organised and function according to market rules approved by the Commission.

The principles for forming regulated tariffs are as follows:

- provide a compensation of well-grounded expenses for operation and maintenance, depreciation of fixed assets and amortization of intangible assets;
- provide a possibility for securing reasonable profit;
- include the necessary and well-grounded expenses for insurance;
- include expenses for respecting environment protection norms;
- include expenses for the temporary closure and maintenance of power facilities.

Electricity export prices are not regulated.

Licenses for the construction and restoration of generating facilities are given by the Commission with regards to the program for further development of the energy sector and the necessity of rational use of local resources.

The Law of Armenia on foreign investments protects foreign investors.

KAZAKHSTAN

1. Basic capacity, generation and consumption data

		2004	2005
Installed capacity of power plants (MW)			
	Thermal	16238	16324
	Hydro	2247	2248
	Total	**18485**	**18572**
Electricity production (TWh)			
	Thermal	56.3	56.5
	Hydro	8.0	7.8
	Other	2.3	3.2
	Total	**66.6**	**67.5**
Electricity consumption (TWh)			
		64.7	**68.1**
Import (TWh)			
		3.4	**3.1**
Export (TWh)			
		5.3	**2.5**

2. Industry structure

2.1 Recent key developments

In 2000-2003, the following generating facilities were put into operation at the power plants:

- units Nos. 2 and 4 ("Frame" type) of 34 MW each at industrial gas-turbine power plant (GTES-144), Atyrauskiy region – in 2000;
- units Nos. 1, 2 and 3 (PG 6561 (B) type) of 34.3 MW each at GTES-KPK "Karachaganakskaya" (West-Kazakhstan region) – in 2001-2002;
- turbine No. 4 of 29 MW at Aktyubinskaya TPP (CHP) – in 2002;
- steam power unit of 37 MW (SPP-37) at the power plant of the Aktyubinsky ferroalloy factory – in 2002;
- turbines Nos. 4 and 5 of 17 MW each at the Rudnenskaya TPP – in 2002;
- turbo-generator No. 3 of 30 MW at Zhezkazganskaya TPP - 2003;
- turbo-generator No. 3 of 30 MW at the Balkhashskaya TPP - 2003.

2.2 Main actors

<u>Transmission system operator</u>
In 2004 the JSC "Kazakhstan Company for controlling electric networks" (KEGOC) was appointed to be the system operator. The system operator provides the following system services:

- electricity transmission by the National electric network,
- technical dispatching,
- power control,
- arranging the balance of electricity production – consumption.

Centralised dispatch control is provided by the National Dispatch Center of the System Operator; the Center is the head branch of the JSC "KEGOC".

Main generators

No:	Power station	Installed capacity (MW)
Thermal power plants		
1	LLC "AES Ekibastuz (Ekibastuzskaya GRES-1)	4000
2	JSC “Euro-Asian power company” (Yermakovskaya TPP)	2110
3	Zhambylskaya TPP named after Baturov	1230
4	JSC “Ekibastuzskaya TPP-2	1000
5	LLC “MAEK-Kazatomprom” TPP (CHP)-2	630
6	LLC “MAEK-Kazatomprom” TPP (CHP)-3	625
7	JSC “Kazakhmys” (Karagandinskaya TPP-2)	608
8	APK Alma-Atinsnskaya TPP (CHP)-2 (Alma-Atinskaya CHP-2)	510
9	JSC “Pavlodarenergo” (Pavlodarskaya CHP-3)	440
10	LLC “Aksessenergo”	380
11	JSC “Aluminium od Kazakhstan” (Pavlodarskaya CHP-1)	350
Hydroelectric plants		
1	LLC “AES Shulbinskaya NPP”	702
2	Bukhtarminskiy HPP	675
3	JSC “APK” (Kapchagaiskaya HPP)	364
4	LLC “AES Ust-Kamenogorskaya NPP”	331

The feasibility study of construction of units Nos. 3 and 4 of 500 MW each at the Ekibastuzskaya TPP is under development. In 2006 reconstruction of unit No. 4 of the Yermakovskaya TPP with capacity increase of up to 310 MW is envisaged. Reconstruction of all generating units of this TPP is planned for completion by 2016. The construction of the Moinakskaya HPP with the capacity of 300 MW on the river Charyn (planned time of putting into operation is 2009) and the Kerboulakskaya HPP of 50 MW on the river Ili have begun. The issue of construction of the Bulakskaya HPP of 78 MW is under consideration of the Government of Kazakhstan at present.

Distributors
There are more than twenty companies which carrying out electricity distribution over the territory of Kazakhstan.

Other players
Institutes: KazNIPIEnergoprom, Institute “Energy”, Almatyhydroproject, Kazcselenergoproject, Kazakhstan Scientific-Research Institute of Power Industry. The energy producing organizations of Kazakhstan have founded the Pool of electric capacity reserves for the purpose of providing uninterruptible electricity supply under unforeseen situations.

3. Transmission network and system issues

3.1. Status of international interconnections

Existing interconnections

Country	Name of substation	Voltage (kV)	Length (km)		Transmission capacity, MVA
			Total	Over the territory of Kazakhstan	
Russia	Kostanai – Chelyabinskaya	500 (1150)	338	208	900
	Ekibastuzskaya - Barnaulskayaя	500 (1150)	700	325	800
	Aurora – Kurgan	500	276	116	500
	Aurora – Tavricheskaya	500	282	116	500
	Sokol – Troitskaya TPP	500	164	161	900
	JSC"EEC" – Irtyshskaya	500	255	242	900
	JSC "EEC" – Rubtsovsk	500	331	171	1200
	AES Ekibastuz – Tavricheskaya	500	370	238	900
	Zhetikara – Iriklinskaya GRES	500	196	93	900
	Stepnaya – Balakovskaya NPP	500	297	55	250
	Ulke – Novotroitskaya	500	153	107	330
	Ust-Kamenogorsk – Rubtsovsk	500	150	70	800
	Aurora – Makushino	220	184	114	250
	Aktyubinsk – Orsk	220	170	158	240
	Kimpersai – Orsk	220	85	73	250
	Petropavlovskaya CHP-2 – Ishim	220	150	59	250
	Priuralskaya – Troitskaya TPP	220	45	42	250
	Stepnaya – Golovnaya	220	247	116	120
	Uralsk – Kinel	220	250	67	190
Uzbekistan	Shymkent – Tashkentskaya TPP	500	112	98	1200
	Zhilga – Tashkentskaya TPP	220	77	67	300
	Shimkentskaya – Tashkentskaya TPP	220	132	112	400
Kyrghyzstan	Almaty – Bishkek	500	299	299	700
	Zhambyl – Bishkek	500	211	210	900
	Almaty – Glavnaya	220	199	189	240
	Zhambylskay TPP – Bishkek	220	178	175	240
	Zapadnaya – Bystrovka	220	80	54	220
	Shu – Glavnaya	220	174	164	240

3.2. Network development plan

The electricity network of Kazakhstan includes:

- transmission lines of 0.4 – 1150 kV with total length 464132 km,
- 3419 substations of 35 – 1150 kV with total capacity of 63178 MVA.

Transmission lines with voltage levels of 220 kV and more are not subjected to privatisation.

The regional network companies operate networks with voltages of 110 kV and below, and provide electricity transmission to consumers on the retail market. The JSC "KEGOC" provides interstate and interregional electricity transmission from power plants to consumers of the wholesale market.

To increase electricity supply from TPPs of the Northern Kazakhstan to consumers in the southern regions of the Republic JSC "KEGOC" is carrying out the project of constructing the second North-South 500 kV line of 1115 km long. Putting this line into operation will allow increasing electricity supply to the South up to 1300 -1350 MW. Construction of one-chain intersystem link Northern Kazakhstan – Aktyubinskaya region with voltage of 500 kV, length of 500 km and transmission capacity of 700 MW has begun; for the first time it is being realised on the basis of concession agreement between private company and the Ministry of Energy and Mineral Resources of Kazakhstan. The construction is planned for completion in 2008.

4. Electricity Market Structure

In February 2004, the Concept of further improving market relations in electricity industry was adopted by the Government's Decree. Based on this Concept the Law "On electricity industry" was approved.

The further development of the competitive wholesale market of electricity is based on creating the system of interfaced markets acting in parallel including:
- market of decentralised electricity trade,
- market of centralised electricity trade (spot trade),
- balancing on-line market,
- market of auxiliary services.

The market of centralised electricity trade is organised and carried out by the Operator of the centralised trade market.

The Law "On electric power industry" envisages stage-wise realisation of measures directed at development of competitiveness on the retail electricity market, including:
- restructuring of vertically integrated regional electric companies;
- completion of regional electric companies privatisation with separation of electricity trade functions from function of electricity transmission by regional networks;
- establishment of several energy supplying companies within a single territorial entity;
- insurance of the right of choice of the electricity supplier for retail consumers.

The tariffs of electricity transmission provided by the regional electric companies are regulated by the Agency for Control of Natural Monopolies of Kazakhstan.
In June 2005 JSC "KEGOC" initiated establishment of the Coordinating Electric Power Council of the Central Asia with participation of electric power companies of Kazakhstan, Kyrghyzstan, Tajikistan and Uzbekistan

KYRGYZSTAN

1. Basic capacity, generation and consumption data

		2004	2005
Installed capacity of power plants (MW)			
	Thermal	**791**	**716**
	Hydro	**2951**	**2910**
	Total	3743	3626
Electricity production (TWh)			
	Thermal	**1.0**	**0.9**
	Hydro	**14.1**	**14.0**
	Total	1.1	14.9
Electricity consumption (TWh)			
		11.8	12.2
Import (TWh)			
		0.1	0
Export (TWh)			
		3.4	2.7

2. Industry Structure

2.1 Recent key developments

In 2001 the Tashkoumyrskaya HPP with capacity of 450 MW reached the design output. In 2002 the Shamaldysaiskaya HPP of 240 MW was put into operation. In 2003 the construction of the Kambaratinskaya HPP-2 of 360 MW began.

Within the framework of the Power and district heating rehabilitation project realised by the JSC "Kyrgyzenergo" together with the World Bank, ABD, the Northern Fund of Development, governments of Denmark, Switzerland and Russian Federation, turbo-generator No. 11 at TPP in Bishkek was put into operation.

2.2 Main actors

<u>Transmission system operator</u>
The JSC "National Electric Grid of Kyrgyzstan" with 93.72% share of the state property, which transmits electricity by internal networks of 110 – 500 kV and interstate transmission lines, plays the role of the Kyrgyz power system Operator.

<u>Main generators</u>

№	Power plant	Installed capacity, MW
Thermal power plants		
1	Bishkekskaya CHP	666
2	Oshskaya CHP	50
Hydropower plants		
1	Toktogoulskaya HPP	1200
2	Kourpsaiskaya HPP	800
3	Tash-Koumyrskaya HPP	450
4	Shamaldy-Saiskaya HPP	240
5	Uch-Kourganskaya HPP	180

Distributors

In July 2001 seven electric network companies – JSC “Electro” were formed on the basis of privatisation of the “Kyrgyzenergo”. These companies distribute electricity by 0,4 – 35 kV network over the territory of Kyrgyzstan and include:

- JSC “Power Plants”;
- JSC “National Electric Grid of Kyrgyzstan”;
    - OSC "Severelectro" (the city Bishkek, Chuyskaya and Talasskaya oblasts);
    - OSC "Vostokelectro" (Issyk-Kulskaya and Narinskaya oblasts);
    - OSC "Oshelectro" (Oshskaya and Batkenskaya oblasts);
    - OSC "Zhalal-Abad Electro" (Zhalal-Abadskaya oblast);
- JSC “Bishkekteploset”.

3. Transmission Network and System Issues

3.1 Status of international interconnections

Existing international interconnections

Country	Substations	Voltage, kV	Length, km	Transmission capacity, MW
Republic of Kazakhstan	Zhambyl – Frounzenskaya	500	210,9	870
	Frounzenskaya – Almaty	500	298,6	870
	Zhambylskaya TPP – Frounzenskaya	220	178,4	270
	Almaty – Glavnaya	220	198,7	270
	Glavnaya – Chu	220	173,8	270
	Bystrovka – Zapadnaya	220	80,0	247
Republic of Uzbekistan	Lochin – Toktogulskaya HPP	500	172,4	870
	Lochin – Ortyabrskaya -1,2	220	87,9	240
	Lochin – Uzlovaya -1,2	220	65,3	240
	Kzyl-Ravat – Kristall	220	91,1	550
	Yulduz – Kristall	220	76,9	330
	Sardor – Kristall	220	69,3	330
	Sokin –Alay -1,2	220	45,9	115

3.2 Network development plan

Electric network of the Kyrgyz power system includes:

- 0.4 – 500 kV transmission lines with total length of 86820 km, including 500 kV lines – 541 km, 220 kV – 1714 km, 110 kV – 4340 km;
- 518 electric substations with voltages of 35 – 500 kV, including 2 substations 500 kV with capacity of 1829 MVA, 14 – 220 kV/2777 MVA, 173 – 110 kV/4112,4 MVA.

4. Electricity market structure

The basic principles of organisation and regulation of economic activities in fuel and energy complex are determined by the Laws “On energy industry”, “On electricity industry”, “The rules of using National electricity network of Kyrgyz Republic”.

In 2001 “Kyrgyzenergo” was transformed into two joint stock companies: JSC “Power Plants” having 93.72% share of the state property, which consolidated power plants with capacity over 30 MW, and JSC “National Electricity Grid of Kyrgyzstan”.

The power plants with capacity up to 30 MW were transferred to the private possession.

Choice of the electricity supplier may be made by industrial consumers (12% of total consumption of the internal market), trade companies (5% of total consumption), and distributing electricity network companies (total distribution of 87% consumed electricity).

Since October 2005, the "National Agency of the Kyrgyz Republic for antimonopoly policy and development of competitiveness" has been carrying out state regulation of the industry. The National Agency is authorised for licensing in the electricity sector, establishing tariffs for electricity and heat, coordination of standards and normative documents on services provided to consumers of energy resources, carrying out international cooperation.

Tariffs for electricity supplied to commercial organisations are subject of the state regulation. The tariffs are approved by the National Agency. Export/import tariffs when crossing national borders are established on the bases of interstate protocols. There are no custom duties for export and import of electricity in the Kyrgyz Republic. . There are only fixed customs charges (0.15% of electricity price) for processing of export and import customs formalities, and levying VAT tax at the place of destination, when the electricity is imported.

To create favourable conditions for attracting foreign investments, the Law "On foreign investments in Kyrgyz Republic" has been adopted. The Law provides state guarantees for foreign investors applicable to juridical and physical persons. The Kyrgyz Republic provides non-discriminative national treatment regime to the foreign investors.

The right of electricity trade is given to the electricity suppliers being the juridical persons. As a rule, they are represented by owners of generating facilities and distributing electricity network companies. All state and non-state juridical persons have a right to sell electricity on the basis of licenses issued by the National Agency.

REPUBLIC OF MOLDOVA

1. Basic capacity, generation and consumption data

		2004	2005
Installed capacity of power plants (MW)			
	Thermal	**2846**	**2850**
	Hydro	**64**	**64**
	Other	**74**	**74**
	Total	2984	2988
Electricity production (TWh)			
	Thermal	**3.8**	**3.8**
	Hydro	**0.3**	**0.4**
	Other	**0.1**	**0.1**
	Total	4.2	4.3
Electricity consumption (TWh)			
		5.6	5.8
Import (TWh)			
		1.8	1.6
Export (TWh)			
		0.4	0

2. Industry infrastructure

2.2 Main actors

Transmission system operator
The Central Dispatching Office of the power system, being part of the state enterprise "Moldelektrika" plays role of the national transmission system operator.

Main generators

No.	Power station	Installed capacity (MW)
Thermal power plants		
1	Moldavian GRES	2520
2	Kishinevskaya CHP-2	240
3	Kishinevskaya CHP -1	66
4	Beltskaya CHP	24
5	Other CHPs (sugar refineries)	74
Hydroelectric stations		
1	Dubossarskaya HES	48
2	Kosteshtskaya HES	16

Distributors
The following companies carry out electricity distribution over the territory of Moldova:

- The Kishinev electricity networks;
- The North-Western electrical networks;
- The Northern electrical networks;
- The Central electrical networks;

- The Southern electrical networks;
- The Eastern electrical networks;
- The South-Eastern electrical networks.

Main traders
The right to sell electricity is given to all holders of licenses for electricity supply using regulated of non-regulated tariffs.

3. Transmission Network and System Issues

3.1. Status of international interconnections

Existing international interconnections

Country	Name of substation	Voltage, kV	Length, km	Transmission capacity, MVA
The Ukraine	Moldavian GRES – Usatovo	330	64.37	400
	Moldavian GRES – Novo- Odesskaya	330	45.0	400
	Moldavian GRES – Kotovskaya	330	145.8	400
	Moldavian GRES – Artsiz	330	104.4	850
	Beltsy – Dnestrovskie HPPs	330	123.0	400
	Rybnitsa no. 1 – Kotovskaya	330	36.4	850
	Rybnitsa no.2 – Kotovskaya	330	36.4	850
Romania	Vulkaneshty – Isakcha (Romania)	400	54.7	665

3.2 Network development plan

The electric network includes 15001 substations of 6 – 400 kV with total capacity 10022 MVA.

Voltage, kV	Number (unit)	Installed capacity, MVA
400	1	500
330	5	2525
110	166	3687
35	133	846
6-10	14698	3464

The length of 0.4 kV – 400 kV transmission lines is 64706.9 km. It includes:

Voltage (kV)	Length (km)
400	On territory of Republic of Moldova 214.0
330	532.4
110	5231.1
35	1378.4
6-10	24499.0
0.4	33066.0
Total	64706.9

4. Electricity Market Structure

Regulation of economic and commercial activities in the electricity sector is carried out by the National Agency for Regulation in Electricityr Industry (NARE).

Generation, transmission, distribution and supply of electricity are carried out on the basis of separate licenses. The Law "On electric power", rules out the possibility of combining any of the activities mentioned above by one juridical person.

The main principles of creating a functioning market are as follows: demonopolisation and decentralisation of the electric power sector, separate licensing of electricity ptoduction, transmission, distribution and supply and regulation of the market by an independent public body.

Joint stock companies are the principal market actors at present. Among them, there are three electricity distributing companies with 100% of foreign capital, two electricity distributing companies and four power plants with 100% of state property and one commercial electricity import operator. Two other power plants and two distributing companies are subjects to privatisation.

Liberalisation of the electricity market will be carried out in stages. The consumer having the right to conclude contracts with a supplier of electricity must obtain the status of Independent Consumer from NARE.

Tariffs for production, transportation and supply of electricity are approved by NARE. Regulated tariffs are used for internal producers. Non-regulated tariffs are used for external suppliers

TAJIKISTAN

1. Basic capacity, generation and consumption data

		2004	2005
Unstalled capacity of power plants (MW)			
	Thermal	329	318
	Hydro	4067	4037
	Total	**4396**	**4355**
Electricity production (TWh)			
	Thermal	0.2	0.2
	Hydro	16.7	16.9
	Total	**16.5**	**17.1**
Electricity consumption (TWh)		**16.9**	**17.3**
Import (TWh)		**4.8**	**4.5**
Export (TWh)		**4.4**	**4.3**

2. Industry structure

2.1 Recent key developments

Construction of small hydroelectric stations has been developed in the last decade. The following small HES were built:

- "Sponzh" on the Bartang river;
- "Savnob" on a spring of the kishlak Savnob;
- "Tekharb" on the Vanch river inflow;
- "Andorbak" on the Kamochdara river;
- "Pamir-1" on the Gunt river;
- Khazora on the Ziddi river and some others.

2.2 Main actors

<u>Transmission system operator</u>
The Central dispatching service (TSDS) being a part of the Open Joint Stock holding company "Barki-Tochik" (OAK HK "Barki-Tochik") acts as a transmission system operator.

<u>Main generators</u>

№	Power plants	Installed capacity, MW
Thermal		
1	Doushanbinskaya CHP	198
2	Yavanskaya CHP	120
Hydro		
1	Nurekskaya HPP	3000
2	Baipazinskaya HPP	600
3	Golovnaya HPP	240
4	Kairakkoumskaya HPP	126

Foreseen and ongoing projects
In the long-term perspective, a complex development of the water resources of such rivers as Pyandzh, Vakhsh, Zarafshon, Kafarnigan and others should be envisaged to provide domestic consumers with electricity and carry out electricity export to the neighbouring countries.

It is necessary to continue construction of hydropower facilities on the river Vakhsh including:

- Rogunskaya HPP with installed capacity of 3600 MW and annual electricity production of 13.1 TWh. The first stage of construction will be completed in 2009.
- Sangtudinskaya HPP-1 with installed capacity of 670 MW and annual electricity production of 2.7 TWh. The agreements with the Government of the Russian Federation concerning completing construction and putting HPP into operation have been concluded.
- Sangtudinskaya HPP-2 with installed capacity of 220 MW. According to the agreement between ministries of energy of Tajikistan and Iran HPP has to be constructed and put into operation within four years.

Distributors
Electricity distribution and supply are provided by Open Joint Stock Holding Company "Barki Tochik".

3. Transmission network and system issues

3.1 Status of international interconnections

Existing international interconnections

Country	Name of substation	Voltage, kV	Length, km	Transmission capacity, MVA
Uzbekistan	Regar – Guzar	500	257	1560
	Regar – Surkhan	500	162	580
	Regar – Gyulcha	220	48	690
	Regar – Denau	220	49	690
	Zarya – Syr-Daryinskaya TPP – Kairakumskaya HPP	220	48	690
	Khudzhand – Syr-Daryinskaya TPP	220	42	690
	Uzlovaya – Syr-Daryinskaya TPP	220	5	600
	Kizilinsky track of land – Syr-Daryinskaya TPP	220	9	600
	Donkurgan – Metallurgy	110	9	380
	Kanibadam – Yaipan	110	12	600
Kyrghyzstan	Kanibadam - Batkent	220	53	600

3.2 Network development plan

220-110 kV transmission lines form the main distributing network of the Republic. 500 kV overhead lines are used to transmit electricity from the Nurekskaya HPP and for connection of the National power system with the United power system of the Central Asia.

Total length of 110-500 kV transmission lines is 4371 km, installed capacity of substations of 110 – 500 kV is 10161 MVA.

In the coming five years it is necessary to reconstruct and restore electric networks of 0,4-110 kV, and equip networks with modern means of communication, telemetry and control.

4. Electricity market structure

The Law of the Republic of Tajikistan «On power industry» determines the basic organisational and legal principles of regulation of economic activities in the field of electricity industry.

The state regulation in the field of electricity industry is carried out by means of licensing, taxation, financing, providing investment, social and scientific-technological policy.

The Ministry of Energy of Tajikistan on the auction basis effects licensing; openness and transparency of the auctions is ensured.

Energy enterprises on the territory of the Republic of Tajikistan can be created and function on the bases of various forms of ownership (state, private, corporate, joint).

Tax or other privileges can be established for foreign investments in the electricity industry.

Electric power plants and distributing networks may be handed over by the government of the Republic of Tajikistan into concession.

At present 24 electric power facilities including 10 distributing companies have been reincorporated as joint stock companies.

UZBEKISTAN

1. Basic capacity, generation and consumption data

		2004	2005
Installed capacity of power plants (MW)			
	Thermal	10619. 0	10619.0
	Hydro	1419.6	1419.6
	Other	319	319
	Total	**12357.6**	**12357.6**
Electricity production (TWh)			
	Thermal	42.3	40.2
	Hydro	6.0	6.0
	Other	1.4	1.4
	Total	**49.7**	**47.6**
Electricity consumption (TWh)			
		49.4	**47.3**
Import (TWh)			
		0.64	**0.67**
Export (TWh)			
		0.89	**0.96**

2. Industry infrastructure

2.1 Recent key developments

In 1995 the 7th power unit with boiler (П-64-3), turbo-unit (K-300-240-3) and generator (TBB-320-2E) was put into operation.

In 2001-2002 reconstruction of power units Nos. 7 and 8 was carried out at the Syrdaryinskaya TPP at the expense of EBRD credit. As a result of this reconstruction the capacity of the power units was brought to the design capacity of 300 MW; it allowed improving operational reliability of equipment and technical-and- economic indices of power plant.

In 2005 the power unit №1 of 800 MW was put into operation at the Talimarjanskaya TPP.

2.2 Main actors

Transmission system operator

The Central dispatching service being a part of the State joint-stock company "Uzbekenergo" plays the role of a transmission system operator.

Main generators

№	Power plant	Installed capacity, MW
Thermal power plants		
1	Syr-Daryinskaya TPP	3000
2	Novo-Angrenskaya TPP	2100
3	Tashkentskaya TPP	1860
4	Navoiyskaya TPP	1250
5	Takhiatashskaya TPP	730
6	Angrenskaya TPP	484

7	Ferganskaya CHP	305
Hydropower plants		
1	Charvakskaya HPP	620
2	Khojikentskaya HPP	165
3	Touyamuyunskaya HPP	150
4	Andizhanskaya HPP	140
5	Farkhadskaya HPP	126
6	Gazalkentskaya HPP	120

3. Transmission network and system issues

3.1. Status of international interconnections

<u>Existing international interconnections</u>

Country	Name of substations	Voltage, kV	Length, km	Transmission capacity, MVA
Kazakhstan	Tashkentskaya TPP – Chimkent	500	105,0	900
	Tashkentskaya TPP – Chimkent	220	117,4	310
	Tashkentskaya TPP – Djilga	220	110,5	240
Kyrghyzstan	Lochin – Toktogulskaya HPP	500	178,0	850
	Lochin – Oktyabrskaya	220	2x87,7	450
	Lochin – Osh	220	2x65,3	250
	Kyzyl-Ravat – Kristall	220	28,1	260
	Sardor – Kristall	220	69,3	320
	Sokin - Alay	220	2x46,0	200
	Fazylman – Oktyabrskaya	220	2x35,9	130
	Yulduz – Kristall	220	62,0	320
Tajikistan	Regar – Guzar	500	250,3	1000 to s/s Regar 1350 to s/s Guzar
	Regar – Surkhan	500	162,3	460
	Regar – Denau	220	49,8	260
	Regar – Gulcha	220	48,0	260
	Cyr-Daryinskaya TPP – KNS	220	2x6,6	250
	Cyr-Daryinskaya TPP – Zarya	220	75,9	300
	Cyr-Daryinskaya TPP – Khojent	220	47,0	260
	Cyr-Daryinskaya TPP – Uzlovaya	220	2x4,9	500
	Sary-Bazar– Rudaki	220	86,0	250
	Sogdiana – Rudaki	220	48,2	250
	Obikhayot – Asht	220	48,0	260
Turkmenistan	Maryiskaya TPP – Karakul	500	369,0	850
	Karakul – Ghrjou	220	67,6	200
	NS-3 KMK – Voskhod	220	44,0	130

3.2 Network development plan

The electric network comprises over 235900 km of transmission lines of various voltage levels and substations with total transformer capacity over 47800 MVA.

Electricity transportation from generating facilities to distributing-and-selling enterprises is carried out by the unitary enterprise “Uzelektroset” by the main networks of 220-500 kV; the length of these lines exceeds 7500 km. Electricity supply to consumers is provided by regional distributing-and-selling enterprises by transmission lines of 0.4 – 110 kV with the length of over 228130 km, including cable lines 10600 km long.

4. Electricity Market Structure

The de-monopolisation process of energy production, distribution and supply is currently in progress.

Unitary Enterprise "Talimarjanskaya TPS" is intended to be transformed into a joint-stock company in 2007, whereas Unitary Enterprise "Tashkentskaya TPS" in 2008.

All enterprises of the distribution and supply network are transformed into joint stock companies.

The issues of unbundling of the operation and supply functions of these enterprises are under development at present.

The gradual restructuring and further reforming of the electricity sector will allow to create competitive environment and to meet demand in electricity and heat of the industrial consumers and population.

THE RUSSIAN FEDERATION

1. Basic capacity, generation and consumption key data

		2004	2005
Installed capacity of power plants (MW)			
	Thermal	**148.3**	**149.2**
	Nuclear	**22.7**	**23.7**
	Hydro	**45.5**	**46.1**
	Total	216.6	219.0
Electricity production (TWh)			
	Thermal	**609.4**	**633.0**
	Nuclear	**144.7**	**149.3**
	Hydro	**177.8**	**169.7**
	Total	931.9	952.0
Electricity consumption (TWh)			
		924.8	939.6
Import (TWh)			
		12.2	9.9
Export (TWh)			
		19.2	22.3

2. Industry infrastructure

2.1 Recent key developments

In the period 1995-2005 turbine capacities of 14.81 GW were put into operation at the power plants of Russia including 12.28 GW at the power plants of RAO UES.

The following generating facilities were put into operation at the expenses of investment means of RAO UES:

Project name	Design capacity, MW	Capacity, put into operation in 2000-2005, MW
Boureia HPP	2000	1005
Irganai HPP	800	107
Cascade of N. Cherekskaya HPP	120	60
Zelenchuk HPP	160	160
North-Western CHP	900	450[1)]
Kaliningrad CHP-2	900	450
Sochi CHP	79	79

[1)] *The 2-d CC unit 450 MW was connected to the grid in November 2006.*

2.2 Main actors

<u>Transmission system operator</u>
The JSC “System Operator – Central Dispatching Office of UES” (SO–CDO UES) plays the role of the System operator of the Unified national (all-Russia) electric grid. The JSC “SO-CDO UES” comprises seven United dispatch offices (UDC) and 57 regional Dispatch offices.

Main generators

№	Power plant	Installed capacity, MW
	Thermal power plants	
1	Surgut TPP-2	4800
2	Refta TPP	3800
3	Kostroma TPP	3600
4	Surgut TPP-1	3280
5	Ryazan TPP	2650
6	Stavropol TPP	2400
7	Zainsk TPP	2400
8	Konakovo TPP	2400
9	Irikla TPP	2400
10	Perm TPP	2400
11	Novocherkassk TPP	2112
12	Kirishskaya TPP	2100
13	Troitsk TPP	2059
	Hydropower plants	
1	Sayano-Shushenskaya HPP	6400
2	Krasnoyarsk HPP	6000
3	Bratsk HPP	4500
4	Boguchansk HPP (under construction)	3000
5	Ust-Ilim HPP	3840
6	Volzhskaya HPP (town Volzhsky)	2541
7	Zhigouly HPP, Zhigoulyevsk	2300
8	Boureia HPP (under construction)	2000
9	Cheboksary HPP	1370
10	Saratov HPP	1360
11	Zeia HPP	1330
12	Nizhnekamsk HPP	1205
13	Zagorsk pumped storage hydro power plant (PSHPP)	1200
14	Votkinsk HPP	1020
15	Chirkei HPP	1000
	Nuclear power plants	
1	Balakovo NPP	4000
2	Leningrad NPP	4000
3	Koursk NPP	4000
4	Smolensk NPP	3000
5	Kalinin NPP	3000
6	Novovoronezh NPP	1834
7	Kola NPP	1760
8	Volgodonsk NPP	1000
9	Beloyarsk NPP	600

Main traders

Non-Commercial Partnership "Administrator of Trade System of Wholesale Electricity Market of UES of Russia" (ATS, non-profit organisation) plays the role of the main trader. The main goal of the Administrator is the organisation and financial arrangements on the wholesale market, protection of interests of suppliers and purchasers.

Functions of the ATS:

- Registry of all whole-sale market participants (including "FOREM" Ltd.);
- Admission to the whole-sale market (except "FOREM" Ltd.);
- Calculation of the per hour volumes and free sector prices;
- Calculation of the per hour volumes of the regulated sector;
- Calculation of the market participant's inadvertent deviations and its costs depending from the initiatives;

- Calculation of the reserve cost;
- Organisation of financial calculations in free sector and on the reserve service.

JSC "RAO UES INTERNATIONAL" (Inter RAO UES) is now the single commercial export/import operator (60% owned by RAO and 40% by "Rosenergoatom").

3. Transmission Network and System Issues

3.1 Status of international interconnections

Existing international interconnections

Country	Name of transmission	Voltage, kV	Length, km	Transmission capacity, MVA
Finland	Vyborg (Lenenergo) - Yullikyalya	400	2x43 as far as border	1000-1200
	Svetkogorsk HPP (Kola) - Imatra	110	20 as far as border	100
	Kaitakoski HPP-4 (Kola) - Ivalo	110	8,5 as far as border	50
Norway	Borisoglebsk HPP (Kola) - Kirkines	154	2,2 as far as border	90
Estonia	Kingisepp (Lenenergo) – Estonskaya TPP	330	61,7	1000
	Leningrad (Lenenergo) – Baltiskaya TPP	330	2x174,5	
	Pskov (Pskovenergo) - Tartu	330	137	350-400
Lanvia	Velikoretsk (Pskovenergo) - Rezekne	330	170,6	350
Lithuania	Sovetsk (Yantarenergo) - Klaipeda	330	101	450-700
	Sovetsk (Yantarenergo) –Yurbarkas (Kaunas)	330	60	
	Sovetsk (Yantarenergo) – Kaishyadorskaya HPSPP	330	200	
Belarus	Smolensk NPP (Centre) - Belorusskaya	750	417.7	1200-1600
	Talashkino (Centre) - Vitebsk	330	132,5	
	Roslavl (Center) - Krichev	330	106	
	Novosokolniki (Pskovenergo) - Polotsk	330	161	330-350
The Ukraine	Kursk NPP (Center) - Severoukrainskaya	750	187	2000 to the South 2200 to the North
	Novovoronezhskaya NPP (Center) - Donbass	500	345,6	
	Kursk NPP (Center) – Sumy Severnaya	330	129,4	
	Bekgorod (Center) – Zmiyevskaya TPP	330	132	
	Shebekino (Center) - Losevo	330	82	
	Valuiki (Center) - Zmiyevskaya TPP	330	185,5	
	Kursk NPP (Centre) - Shostka	330	161	
	Volgograd (Center) – Donbass (DC transmission)	400	415	180
	Shakhty (North Caucasus) - Pobeda	500	86	1500-1700
	Novocherkassk TPP (North Caucasus) - Yuzhnaya	330	152,8	
	Taganrog –15 (North Caucasus) - Amvrosiyevka	220	64	
	Sysoyevo (North Caucasus) – Vekikotsk	220	41	
	Sysoyevo (North Caucasus) – Lougansk TPP	220	82,4	
Georgia	Central (North Caucasus) – Ingouri HPP	500	411	350
	Psou (North Caucasus) – Bzybi	220	43,4	
Azerbaijan	Derbent (North Caucasus) – Yashma	330	231	±300
Kazakhstan	Kinel (Mid. Volga) – Uralskaya	220	250,4	390
	Golovnaya (Mid. Volga) – Stepnaya	220	247,3	
	Balakovo NPP (Mid. Volga) - Stepnaya	500 (switched on at 220 кV)	297,7	
	Novotroitskaya (the Urals) - Ulke	500 (switched on at 220 кV)	154	530
	Orsk (the Urals) – Kimpersay	220	89	

	Orsk (the Urals) – Aktyubinsk	220	170	
	Kourgan (the Urals) – Avrora	500	275,7	
	Chelyabinsk (the Urals) - Kostanay	1150 (switched on at 500 кV)	336	1500 to Kazakhstan 800-1000 to the Urals
	Irikla TPP (the Urals) - Zhitikara	500	196,4	
	Troitsk TPP (the Urals) - Sokol	500	164	
	Troitsk TPP (the Urals) - Priuralsk	220	44,5	
	Makoushino (the Urals) - Avrora	220	184	
	Ishim (the Urals) – Petropavlovskaya CHP-2	220	158	switched off
	Barnaul (Siberia) - Ekibastouz	1150 (switched on at 500 кV)	704	switched off
	Roubtsovsk (Siberia) – Ust-Kemenogorsk	500	149,7	300-500 to Kazakhstan 700-900 to Siberia
	Roubtsovsk (Siberia) – EEK	500	331	
	Tavricheskaya (Siberia) - Avrora	500	282	1000 to Omsk
	Irtyshs (Siberia) - EEK	500	254	
	Tavricheskaya (Siberia) – NPP Ekibastouz	500	371	
	Rayonnaya (Siberia) – Velikhanovo	220	110	100-150
	Urozhay (Siberia) – Mynkul	220	104	
	Irtysh (Siberia) - Velikhanovo	220	57	
	Irtysh (Siberia) – Mynkul	220	118	
Mongolia	Selenduma (Siberia) - Darkhan	220	2x191,5	300-350
	Kharanora TPP (Siberia) - Choibolsan	220 (switched on at 110 кV)	265	
China	Blagovechthensk (East) - Kheikhe	220 (switched on at 110 кV)	25,8	80-100

3.2 Network development plan

Characteristics of the substation equipment and overhead transmission lines operated by the JSC "Federal Grid Company of Unified Energy System" (FGC UES).

In 2005 the FGC UES provided functioning of the 364 transmission lines (220 – 1150 kV) with a total length of 45895.3 km and 135 substations including:

Substations (s/s):

- 2 s/s of 1150 kV with installed transformer capacity of 1002 MVA,
- 8 s/s of 750 kV – 20435.7 MVA,
- 82 s/s of 500 kV – 94204.5 MVA,
- 1 s/s of 400 kV – 4925.5 MVA,
- 36 s/s of 330 kV – 14640.5 MVA,
- 1 s/s of 220 kV – 375 MVA,
- 6 s/s of 110 kV – 56.3 MVA.

Transmission lines (TL):

- 2 TL of 1150 kV 820.2 km,
- 2 TL of 800 kV – 402.3 km,
- 13 TL of 750 kV – 2971.5 km,
- 195 TL of 500 kV – 31818.8 km,
- 3 TL of 400 kV – 126.4 km,
- 96 TL of 330 kV – 7894.2 km,
- 36 TL of 220 kV – 1798.9 km,
- 17 TL of 110 kV – 63 km.

A total installed capacity of the power transformers of 220 – 1150 kV operated at power plants of the FGC UES is 134382 MVA (excluding isolation and auxiliary transformers). The total capacity of reactor at the enterprises is 24822.4 MVA.

4. Electricity Market Structure

The process of restructuring of the industry started in 2000 with the elaboration of the Concept of reform of RAO UES. According to the Concept of Strategy of RAO UES for 2005-2008, the basic goal of the reform is improving efficiency of electric power enterprises and creating the conditions for further development on the basis of private investments.

The main goals and tasks of RAO UES restructuring are as follows:

- to provide reliability and sustainability of electricity and heat supply of consumers being a part of RAO UES during the transition period;
- to increase market cost of the Holding RAO UES and companies formed during the restructuring period;
- to improve current efficiency and develop profile types of business in RAO UES;
- to improve transparency of the company and the system of corporative management;
- To provide implementation of reform of RAO UES.

To achieve these goals, the splitting natural monopoly (electricity transmission, operative dispatch control) and competitive (electricity production and supply, repair and maintenance) functions are carried out, and the structures of separate activities are created instead of vertically integrated companies. Generating, supplying and repairing companies will become private and will compete.

At present, the creation of basic infrastructure organisations has been completed. The following structures have been created:

- JSC "FGC UES" – organisation for managing the Unified national (all-Russia) electric grid;
- JSC "SO–CDO UES" (System Operator) – organisation for providing services to the subjects of the wholesale market;
- Administrator of the trade system of the wholesale market (Non-commercial partnership).

In January 2006, generating companies were formed as a result RAO UES reforms and they began to operate on the wholesale market of electricity and power (FOREM) as independent market players. Simultaneously, with the electricity market development, the creation of the subjects of the market continues.

The process of separation of the network companies from the regional JSC "AO-energos» is continuing and 52 main network companies have been formed on the basis of the reorganized "AO-energos".

Beginning in 2006, one of the most important directions of the reform development in the electricity industry has been attracting foreign investments. In accordance with the proposal of RAO UES management, it is supposed that private investments will be attracted to heat generation by means of additional emission of shares of the generating companies. In 2006 the first tenders for attraction of funds within the mechanism of guaranteeing investments are planned to be held. Within the first investment projects it is planned to put into operation new generating capacities of 2850 MW.

Liberalisation of the retail market has moved forward together with the liberalisation of the wholesale one.

<u>Reorganisation of JSC "RAO UES of Russia"</u>

The main volume of transformations of the Holding "RAO UES of Russia" is planned to be completed in 2006; it will allow beginning the reorganisation of the parent company "RAO UES of Russia".

The reorganisation of "RAO UES of Russia" is planned to take place in two stages. During the first stage, 2-3 territorial generating companies from RAO UES are expected to be separated. During the second stage, the reorganisation will involve a splitting up together with the creation of companies of a special purpose structure of the sector of industry. The second stage is planned to be completed by mid-2008.

As a result of completing the second stage of reform, the structure of the electricity industry will include:

- JSC "Federal Grid Company of UES of Russia" (FGC UES);
- JSC "System Operator – Central Dispatching Office of UES of Russia" (SO–CDO UES);
- JSC "Federal Wholesale Hydro-generating Company" (Hydro);
- Six thermal wholesale generating companies (WGC) and 14 territorial generating companies (TGC);
- Holding of interregional network companies (IRNC);
- Holding of isolated AO-energo;
- JSC "Far East electric power company".

Generating companies

The wholesale generating companies (WGC) are created on the basis of the large federal power plants, which belong to RAO UES and "AO-energos". Territorial generating companies (TGC) will become the subjects of electricity wholesale market and retail market of electricity and heat. Seven WGCs have been created; six – on the basis of TPPs, one – on the basis of HPPs. Till the end of 2006 10 TGC of 14 are planned to be created.

JSC "Federal Grid Company of UES of Russia" (FGC UES)

The JSC "FGC UES" was created in June 2002. RAO UES is the only stockholder of this company. The main areas of activities of "FGC UES" are the following:

- control of united national electric grid;
- provision of services to the subjects of the electricity wholesale market;
- investment activity in the field of developing the united national electric grid;
- Maintenance of electric networks.

Interregional distributing network companies

At present, distributing network companies are created in the majority of AO-energos. In 2003-2008 these companies will be united in the holding companies – interregional distributing network companies. The creation of interregional network companies is carried out within the framework of the process of consolidation of the main network assets.

Development of electricity (power) market

Creating of competitive electricity market is one of the key tasks of the reform. The special purpose model of the wholesale and retail markets supposes:

- to form the common market space on the European territory of Russia;
- to create the efficient infrastructure of the wholesale market (administrator of trade system, system operator, sale company);
- To create three sectors of electricity trade; sector of long- and medium-term bilateral financial agreements, market for a day ahead, balancing market.

From the beginning of 2006, 44 generating companies have entered the wholesale market.
In the course of the reform, the energy sale companies have been created, the main function of which is supply of electricity purchased on the wholesale market to the final consumers.

At the present time the shares of energy sale companies are under trust management of territorial generating companies.

TURKMENISTAN

1. Basic capacity, generation and consumption data

		2004	2005
Installed capacity of power plants (MW)			
	Thermal	2900	3056
	Hydro	1	1
	Total	**2901**	**3057**
Electricity production (TWh)			
	Thermal	11.9	12.8
	Hydro	0	0
	Total	**11.9**	**12.8**
Electricity consumption (TWh)		**10.8**	**11.5**
Import (TWh)		**0**	**0**
Export (TWh)		**1.1**	**1.3**

2. Industry structure

2.1 Recent key developments

In Turkmenistan work is carried out to extend operation period and keep the operational possibilities of existing power units at a high level.

At the beginning of 2006 the renewed power unit of 200 MW was put into operation at the Maryiskaya TPP.

2.2 Main actors

<u>Transmission system operator</u>
The Central Dispatching Control (CDC), being a part of the Turkmen State power technological corporation "KUVVAT", plays the role of a transmission system operator.

<u>Main generators</u>

№	Power plants	Installed capacity, MW
Thermal plants		
1	Maryiskaya TPP	1250
2	Turkmenbashinskaya CHP	590
3	Ashkhabadskaya TPP	254
4	Abadanskaya TPP	248
4	Seidinskaya CHP	80
5	Balkanabadskaya TPP	46
Hydropower plants		
1	Gindukushskaya HPP	1,2

<u>Foreseen and ongoing projects</u>
The work on construction and installation of the second gas turbine of 123 MW at the Abadanskaya TPP and three gas turbines of 42 MW each at the Bakkanabadskaya TPP is continued by the US company "General

Electric" and Turkish company "Chalyk-Energy". The agreement was signed between the Government of Turkmenistan, "General Electric" company and "Chalyk-Energy" company, in force until 2011, with the objective of putting into operation generating capacities up to 1548 MW and increasing the total installed capacity of the power system up to 4654 MW.

3. Transmission networks and system issues

3.1 Status of international interconnections

Existing interconnections

Country	Substations	Voltage, kV	Length, km	Transmission capacity, MVA
Uzbekistan	Maryiskaya TPP - Karakul	500	369	1000
	Charjev – Karakul	220	67	120
	Talimardzhanskaya TPP - NS-3	220		200
Iran	Balkan - Aliabad	220		
	Shatlyk - Serakhs	220		

New substations and HV transmission lines constructed by Turkmen electric power engineers and workers will allow beginning electricity supply to Afghanistan. At present, the construction of 220 kV transmission line from Serkhetabad to Gherat is carried out.

3.2 Network development plan

Electric networks of Turkmenistan operate at voltages 35, 110, 220 and 500 kV. Total length of these transmission lines is 15000 km. The length of 0.4-10 kV distributing networks amounts to hundreds of thousands kilometres. Over 400 substations of 35-500 kV and over 10000 transformer stations of 10/6/0.4 kV are in operation in the country.

In 2002 four substations of 35-110 kV were put into operation. HV transmission lines at voltages of 35, 110 and 220 kV with total length of 110 km were built. The construction of 220 kV transmission line 230 km long from the town of Turkmenabata to the town of Atamurata began.

In 2001 the largest substation "Serdar-500" with total transformer capacity of 501 MVA was constructed and put into operation.

UKRAINE

1. Basic capacity, generation and consumption data (year 2005)

Installed capacity by fuel, MW		
	Thermal	33372.4
	Hydro	4735.6
	Nuclear	13835.0
	Renewables	74.8
	Total	**52017.8**
Yearly generation fuel by fuel, TWh		
	Thermal	84.121
	Hydro	12.320
	Nuclear	88.756
	Renewables	0.038
	Total	**185.236**
Annual consumption, TWh		**176.884**
Imports, TWh		**0**
Exports, TWh		**8.351**

2. Industry structure

2.1 Recent key developments

- There were no changes in the responsibilities of Ukrainian TSO
- National Electricity Regulatory Commission of Ukraine (hereinafter NERC) adopted "The Rules for Connection of Electricity Facilities to the Network" (Regulation No. 1137 of 14 December 2005)
- Regulation of NERC No. 910 of 17 October 2005 modified "The Rules for Electricity Usage"

2.2 Main actors

There are 275 enterprises of all forms of ownership at the Wholesale Electricity Market of Ukraine, i.e.:

Transmission System Operator
The Ukrainian TSO is National Power Company "Ukrenergo", which operates transmission power lines as well as cross-border lines and dispatches the Integrated Power System of Ukraine (hereinafter Ukrainian IPS).

Main generators
Electricity producers – NAEC "Energoatom" (4 nuclear plants), JSC "Ukrgidroenergo" (7 HPPs), 5 thermal generating companies (14 TPPs), 44 CHPPs and wind power plants.

Distributors
- 42 distributing companies of different forms of ownership, that supply power to the consumers on the regulated tariff;
- 171 private firms that supply power on the non-regulated tariff;

Main traders & other players
- Electricity Market
- 9 industrial users, that buy power directly at Wholesale Electricity Market

Main events

The parallel operation with the Belarus power system was restored in 2005 and from January 1, 2006 Ukraine exports about 2,5 TWh to it.
There were no outages or blackouts in the Ukrainian IPS during 2005-2006.

3. Transmission network and system issues

3.1 Status of international interconnections

Existing interconnections

FROM	TO	Type AC/DC Single/Double	U,kV	P,MW
Ukraine	**Russia**			
Myhailivka	Volzhskaya HPP	DC Single	± 400	360
Donbaska	Novovoronezhskaya NPP	AC Single	500	1732,1
Pobeda	Shakhty	AC Single	500	1732,1
Amvrosyivka	Taganrog	AC Single	220	417,3
Luganska TPP	Syisoevo	AC Single	220	956,4
Velikotsk	Syisoevo	AC Single	220	346,8
Velikotsk	Pryidonsk	AC Single	220	346,8
Pivdenna	Novocherkassk TPP	AC Single	330	1051,7
Pivnichnoukrainska	Kurskaya NPP	AC Single	750	2598,1
Zmyivska TPP	Belgorod	AC Single	330	1046,0
Zmyivska TPP	Valuiki	AC Single	330	1046,0
Losevo	Shebekino	AC Single	330	1143,2
Sumy Pivnichna	Kurskaya NPP	AC Single	330	1046,0
Shostka	Kurskaya NPP	AC Single	330	1143,2
Ukraine	**Belarus**			
Chernobyl NPP	Mozyr	AC Single	330	990,5
Chernigov	Gomel	AC Single	330	852,2
Ukraine	**Poland**			
Dobrotvir	Zamość	AC Single	220	381,1
Khmelnytska NPP	Rzeszów Widełka	AC Single	750	Disconnected
Ukraine	**Romania**			
Mukachevo	Rosiori	AC Single	400	1385,6
Ukraine	**Slovak Republic**			
Mukachevo	V. Kapusany	AC Single	400	1385,6
Ukraine	**Hungary**			
Zahidnoukrainska	Albertirsa	AC Single	750	997,7
Mukachevo	Sajószöged	AC Single	400	1385,6
Mukachevo	Tiszalök	AC Single	220	381,1
Mukachevo	Kisvárda	AC Single	220	381,1
Ukraine	**Moldova**			
Usatovo	Moldavian GRES	AC Single	330	1251,8
Kotovska	Moldavian GRES	AC Single	330	1051,7
Novoodeska	Moldavian GRES	AC Single	330	1051,7
Artsyz	Moldavian GRES	AC Single	330	1051,7
Kotovska	Rybnitsa no. 1	AC Single	330	1051,7
Kotovska	Rybnitsa no.2	AC Single	330	1051,7
Dnistrovska HPP	Beltsy	AC Single	330	1143,2

Ongoing studies in international/cross-border interconnections

FROM	TO	Type AC/DC Single/Double	U,kV
Pivdennoukrainska NPP	Isaccea (Romania)	AC Single	750
Rivnenska NPP	Mikashevichy (Belarus)	AC Single	330

Lines under construction (internal and cross-border)

FROM	TO	Type AC/DC Single/Double	U,kV	P,MW	Expected date for commissioning the line
Rivnenska NPP	Kyivska	AC Single	750	2598	2008
Adjalyk	*Usatovo*	***AC Single***	330	1051	2007
Novoodeska	Artsyz	AC Single	330	657	2008
Dnistrovska HPP	Bar	AC Single	330	1143	2008
Tashlykska HPSPP No. 1, 2	Pivdenno-ukrainska NPP	AC Single	330	1190	2007
Simferopol	Sevastopol	AC Single	330	657	2008

Future projected interconnections

- Reconstruction of OHL 750 kV Pivdennoukrainska NPP – Isaccea (Romania) along with construction of 750 kV Prymorska SS;
- Construction of OHL 330 kV Rivnenska NPP – Mikashevichy (Belarus) and then extend the line to 750 kV Belaruskaya SS and switch the line to 750 kV

Study needs

There is a need to develop the project documentation for the above-mentioned projects.

3.2 Network development plan

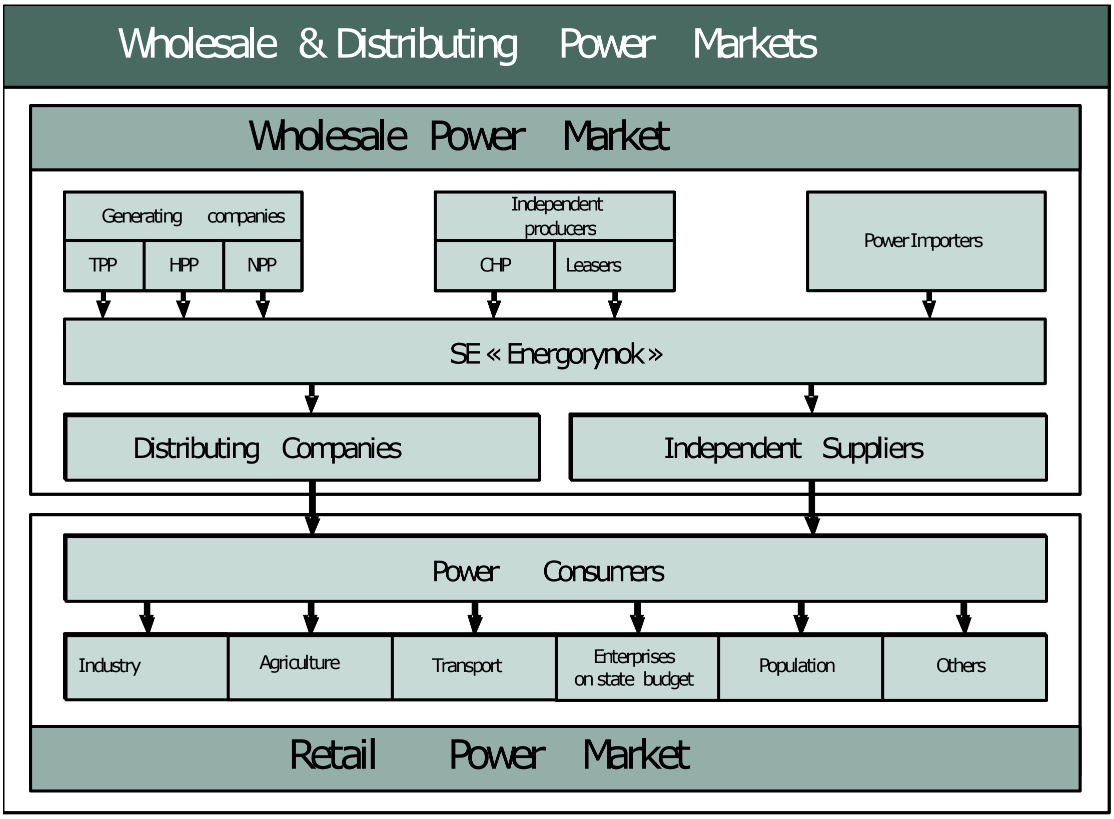
To date, “The Energy Strategy till 2030” was adopted, defining the main directions for the development of the Ukrainian power sector.

“The Road Map for the Development of Ukrainian IPS until 2010 with Prospects until 2015” is currently being developed, based on “The Energy Strategy until 2030”. This Road Map comprises the following issues:

- growth of the levels of power supply and power load at regions and significant knots;
- location and power of new power plants;
- balances of power and energy;
- Directions for development of transmission power network.

“The Road Map for the Regional Power Plants” is developed on the basis of “The Road Map for the Development of Ukrainian IPS”.

4. Electricity market structure



5. Other

Link	Company
www.ukrenergo.energy.gov.ua	National Power Company "Ukrenergo"
http://mpe.kmu.gov.ua/control/uk/index	Ministry of Fuel and Energy of Ukraine
www.nerc.gov.ua	National Electricity Regulatory Commission of Ukraine
www.er.gov.ua	State Enterprise "Energorynok"
www.uie.kiev.ua	State Foreign Trade Company "Ukrinterenergo"
www.energoatom.kiev.ua	National Nuclear Energy Generating Company "Energoatom"
www.naftogaz.com	National Joint-Stock Company "Naftogaz Ukrainy"

Arab Union

JORDAN

1. Basic capacity, generation and consumption data (year 2005)

Installed capacity by fuel, MW		
	Steam/ HFO	390
	Steam/Natural Gas	650
	Hydro	12
	Gas Turbine / Natural Gas	150
	Gas Turbine / Diesel	353
	Diesel Engines / Diesel	43
	Combined Cycle / Diesel	300
	Wind	1.4
	Biogas	1
	Total	**1900**
Yearly generation by fuel Type, GWh		
	Steam/ HFO	2681
	Steam/Natural Gas	5288
	Hydro	57
	Gas Turbine / Natural Gas	648
	Gas Turbine / Diesel	341
	Diesel Engines / Diesel	73
	Combined Cycle / Diesel	558
	Wind	3
	Biogas	5
	Total	**9654**
Annual consumption, GWh		**8712**
Imports, GWh		**982**
Exports, GWh		**0.3**

2. Industry structure

2.1 Recent key developments

Jordan has taken a number of significant steps to restructure and reform its power electricity sector, including:

- Transforming the former Jordan Electricity Authority (JEA) into National Electric Power Company (NEPCO), a share holding company owned totally by the government.
- Unbundling of NEPCO (mother company) into 3 companies :
  - NEPCO: National Electric Power Co.. It is the single buyer of the electrical power in Jordan as a shareholding co. owned by the government. It is responsible for transmission of electric power from the generation stations to the distribution companies and large consumers through the high voltage transmission lines. It is also responsible for controlling and supervising the operation of the generation units through the National Control Center, and for the electrical inter-connection with neighbouring countries.

- CEGCO: Central Electricity Generating Co., owned by the government, is responsible for electrical power generation from the existing power station.
- EDCO: Electricity Distribution Co. owned by the government, is responsible for the distribution of electrical power in the Southern and Eastern Parts of the country, and Jordan Valley.

The Electricity Regulatory Commission has been established as a new regulatory body organising the relation among the electric power companies and between the electric power companies and the consumers.

Two private distribution companies already exist:

Jordan Electric Power Co. (JEPCO)

It is responsible for electrical distribution in the central part of the country. It is completely owned by the private sector.

Irbid District Electricity Co. (IDECO)

It is responsible for electrical distribution in the Northern parts of the country. It is owned by the government and the private sector.

The single buyer model has been selected for the power sector of the country.

The Government of Jordan represented by the Executive Privatisation Commission and the Ministry of Energy and Mineral Resources (MEMR) completed the procedures for privatising the electricity generation and distribution activities. The assigned consultant by MEMR completed the first and the second stages of the privatisation study of the generation and distribution activities, which included studying the technical, financial, legal and environmental aspects of the electricity sector's structure, evaluating the electricity companies, preparing the privatisation strategy and the related tender documents and agreements.

The consultant prepared also the time schedule needed for privatising the Central Electricity Generating Company (CEGCO) and prepared pre-qualification conditions (Strategic Partnership) as well.

On 5 April 2004, the tender procedures for selling about (51%) of CEGCO were commenced. The investor's pre-qualification stage was started and then the data investigation stage was carried out by the qualified investors and finally ended by submitting the final offers which were received on 6/1/2005. These offers were evaluated and found to be lower than the required level.

Upon the willingness of some of the financial investors to purchase its part of CEGCO offered for selling, the Cabinet of Ministers took a decision in the session held on 21 June 2005 to give the financial investors a chance to participate in the bidding, and the participation should not be confined only to strategic partners. Accordingly, the consultant was requested to make the necessary modifications and update the tender documents of privatising this company in order to enable the participation of those financial investors in this bidding.

In addition to that, the Cabinet decided to start the privatisation process of Electricity Distribution Company (EDCO), in order to sell the whole company and to sell also the government's share in Irbid District Electricity Company (IDECO), which amounts to 55.4%. This process has to be done in parallel with the privatisation program of CEGCO without Waiting for achieving progress in implementing the generation privatisation process.

The privatisation of Samra Electric Power Generating Company (SEPGCO) will be implemented through a competitive tender.

The tender documents and the necessary agreements for the process of selling the company will be prepared through employing an international consultant by the Executive Privatisation Commission. The required procedures for preparing the terms of reference needed for employing this consultant are progressing. The tenders for privatising this company will be issued in due time.

Another task of the consultant is to study and to make recommendations in relation to the Transmission, Market Operation, and System Operation activities of NEPCO.

2.2 Main actors

Transmission system operator
During 2005, NEPCO continued in managing effectively the interconnected electric system in Jordan, and in providing electricity in accordance with the adopted specifications from all the available sources (CEGCO, the Egyptian electrical interconnection) at a least economical cost, while maintaining the security of the electric system. The operational studies necessary for the electric system were prepared, in addition to the operation manuals and implementation of the required maintenance plans and making the necessary calculations in regard to the electric interconnection lines.

Main generators
Main generating units in Jordan in 2005

1- CEGCO	**1636 MW**
Aqaba thermal power station	650MW + 6MW Hydro
Hussein thermal power station	396MW
Power Risha station	150MW
Rehab Power station	360MW
Marka Power station	100MW
Amman south power station	60MW
Karak Power station	24.5MW
Aqaba Central	10.5 MW
Tafila	1.5 MW
Ma'an & Remote Villages	2 MW
AL-Ibrahimiah	0.3 MW
Hofa	1.125 MW
2- Other Organisations	**138 MW**
Total	**1900 MW**

First IPP Project
Al-Samra Electric Power Generation Co (SEPGCO) was established in 2003, in accordance with the Companies Law, as a shareholding private company owned totally by the government. This company is responsible for electric energy generation activity alongside with the CEGCO. Its capital is JD (50) million with a total generating capacity of (300) MW as a first stage.
SEPGCO will be working as a combined cycle generation station burning natural gas. SEPGCO had worked as a simple cycle in 2005 and will be working as a combined cycle in year 2007.

Second IPP Project
An International consultant was employed in March 2002 to prepare the tender documents and agreements for the project which will be carried out on B.O.O basis with a generation capacity of 370 MW . The tender documents for the project were issued in 2005. This station is expected to be operational as a simple cycle in the summer of 2007 and as a combined cycle in the summer of 2008.

<u>Distributors</u>
There are Three Distribution Companies in Jordan operating the networks of 33kV, 11kV and 400v.

Jordan Electric Power Co. (JEPCO)
Irbid District Electricity Co. (IDECO)
Electricity Distribution Co . (EDCO)

<u>Main traders and other players (exchanges)</u>
NEPCO (National Electric Power Co.) acts as the single buyer.

3. Transmission network and system issues

3.1 Status of international interconnections

The most important achievements of NEPCO in the field of interconnection with the Arab neighbouring countries can be summarized as follows:

<u>Existing interconnections :</u>

- *The Jordanian – Egyptian interconnection*

AC interconnection
400kV
The interconnection tie line is a Submarine cable single circuit with capacity 550 MW which will be raised to 1100 MW when transferred to DC after 2010, from Aqaba S/S in Jordan to Taba S/S in Egypt. The Jordan – Egypt electric interconnection project was inaugurated and operated in 16/3/1999. In years 2003, 2004,2005 about 972,788 and 741 Gwh respectively were imported from the Egyptian electrical system.

- *The Jordanian – Syrian interconnection*

AC interconnection
400 kV
The interconnection tie line is a single circuit overhead transmission line form Amman North S/S in Jordan to Der Ali S/S/ in Syria with capacity of 800 MVA.The project was officially inaugurated on 14/3/2001. Electric energy exchange between the two networks continued in kind, it was agreed on the tariff of electric energy exchange between the two sides. In years 2004,2005 about 38 and 241 Gwh respectively were imported from the Syrian electrical system.The above two interconnections are part of the seven countries interconnection project (EIJLLST). This project includes also Turkey, Iraq, Libya and Lebanon in addition to Jordan, Egypt and Syria.

<u>Future projected interconnections</u>

- *The Electric Interconnection Project of the Mediterranean countries (MEDRING)*

Through a consortium which includes the electric entities of some EU Member States (Spain, France, Italy and Greece) and some countries of the Mediterranean region which are not members of the European Union (Jordan, Egypt, Syria, Algeria, Tunis and Turkey), NEPCO participated in conducting technical and economical feasibility studies for the electric interconnection of the Mediterranean countries. The final studies of the project have been completed and the final report was issued in middle 2003. The studies showed that the implementation of this project is feasible, both technically and economically.

- <u>Project of Pan Arab Electric Interconnection</u>

In 2005 NEPCO participated in preparing the draft terms of reference for studying the electrical interconnection between Arab countries and other countries, and for evaluating the usage of natural gas for exporting electricity. This aimed at conducting cost effective and technical feasibility studies to determine the optimal way for completing the interconnection of the electrical networks of the Arab countries, including those countries which are not yet joining the existing interconnection projects, and to review the existing interconnection projects and existing and future gas networks, and study alternatives for the usage of the natural gas in electricity generation and its export for the coming twenty years.

3.2 Network development plan

In 2005 NEPCO constructed and expanded the main substations of 400/132/33 kV and 132/33 kV, and 132 kV and 400 kV lines needed for connecting the main substations.

The added transforming capacities in 2005 were 496 MVA and the added transmission lines were 54 km-circuit, in addition to many transmission projects, constructing new main substations and expanding the existing substations.

3.3 Main events

On 21 and 26 December 2005 a fire occurred on generator transformers of Aqaba Thermal Power Station Units #5 and #4 respectively causing both transformers failure. Both failures occurred on the same phase (red) and exhibited the same failure mode, i.e. failure occurred at the 400 kV cable connection end of the transformer / oil bushing on generator feeders 5 and 4 with almost identical damage to surrounding equipment.

The failures were examined and analysed by local and international experts, who postulated several scenarios for the reason behind these failures. After long research and analysis it was found that the problem was a manufacturing defect in the transformer HV bushings.

By summer 2006 both failed units were back in service and the network was restored.

4. Electricity market structure

The single buyer model has been selected for the power sector in Jordan where NEPCO purchases electric energy from different sources and transmits and sells it to the distribution companies and the bulk supply consumers supplied from the national grid and exchange the electric energy with the neighbouring interconnected countries (Egypt, Syria).

5. Other

The government commissioned NEPCO to purchase natural gas from Gas Developer Company (Fajr) and sell it to all electric power stations in the Kingdom. Since the inauguration of the Jordanian-Egyptian gas pipeline in July 2003, burning natural gas started at the third unit of ATPS in August 2003, followed by the fourth and fifth units in September and October of the same year respectively. Rehab Power Station started burning natural gas in May 2006 working as a combined cycle system.

COMELEC

ALGERIA

1. Basic capacity, generation and consumption data (key data 2005)

Installed capacity by fuel, MW		
	Thermal	7161
	Hydro	209
	Diesel oil	175
	Total	**7545**
Yearly generation fuel by fuel, TWh		
	Thermal	32.691
	Hydro	0.555
	Diesel oil	0.281
	Total	**33.527**
Annual consumption, TWh		**31.870**
Imports, TWh		**0.247**
Exports, TWh		**0.275**

2. Industry structure

Since the nationalisation of 1947, SONELGAZ has had the monopoly for production, transport and distribution of electricity and gas in Algeria. The Algerian network was interconnected with the Tunisian network with 220 kV in 1975 and in 1988 with the Moroccan network. The three networks are synchronously interconnected to the European network since the underground liaison Morocco – Spain was brought into operation in 1997.

Trade between the 3 Maghreb countries has been carried out on the basis of annual or specific contracts. It is also important to point out that ONE and SONELGAZ are external operators on the Spanish electricity market. They buy and sell using bilateral contracts and/ or by contacting the Spanish market operator OMEL.

The key figures for SONELGAZ in 2005 are:

Installed capacity	7545 MW
Production	33.5 TWh
Electricity customers	5 602 480
Gas customers	2 061 941
Network length HT	16 778 km
Network length MT	100 510 km
Network length BT	127 830 km
Gas network length HP	6 105 km
Gas network length MP	28 620 km
Staff	19 779 agents

2.1 Recent key developments

The main provisions of the Law of 5 February 2002, which governs the sector of electricity are:

The opening of the electricity sector to private investments and in particular the competitive activities of electricity (production and supply) and natural gas, so as to achieve:

A reduction of costs
An improvement of the quality of service to customers
A creation of competition in the electricity sector

Any investor who so wishes, can produce electricity with a simple authorisation. For distribution, a system of concession is in place.

The State remains in charge of ensuring the quality of public service.

Access to transmission and distribution networks, regulated natural monopolies, is guaranteed for all.

In order to ensure that there is no discrimination between operators, the following bodies have been created:

An Independent System Operator
A Market Operator
A Regulatory Commission for electricity and gas

The latter, which must be independent and autonomous, has the following mission:

To control the public service
To advise public authorities on the organisation of the market
To control and monitor the respect of regulations by the operators.

2.2 Main actors

The main actor remains SONELGAZ. However, the electricity sector is in full change since the promulgation of the law of 5 February 2002. One of the main provisions of this law is the opening to competition of production and supply.

In this context, the production business has already noted the arrival of the following operators:

- Sonatrach (SUD) 300 MW
- Kahrama (Arzew) 345 MW
- SKS (Skikda) 825 MW
- SKB (Berrouaghia) 500 MW

It is also important to point out that SONELGAZ, currently vertically integrated, is now a holding company with legally independent subsidiaries for production, transmission and distribution of electricity and transport of gas.

Transmission system operator

Main generators

Ras Djinet station, Steam turbine - Natural Gas (4 units)	672 MW
Hamma station, Gas Turbine – Natural Gas (2 units)	418 MW
Marsat station, Steam turbine - Natural Gas (5 units)	840 MW
Jijel station, Steam turbine – Natural Gas (3 units)	588 MW
Hassi Messaoud West station, Gas Turbine – Natural Gas (3 units)	369 MW
M'sila station, gaz Turbine, Natural gas (25 units)	806 MW
Tiaret station, gas turbine, Natural gas (7 units)	420 MW
Hassi Messaoud North, Gas station (12 units)	392 MW
Arzew Desalination station, Gas turbine– Natural Gas (3 units)	345 MW
Skikda station, Combined Cycle - natural Gas (2 units)	825 MW

Foreseen/outgoing for new generating units

- Berrouaghia, Gas turbine – natural Gas (2 units) .... 500 MW, 2007
- Hadjret Ennous station Combined Cycle - natural Gas (2 units) .... 1200 MW, 2008

3. *Interconnection developments Transmission Network and System Issues*

3.1 Status of international interconnections

Existing interconnections (year 2005)

Country	Substation of	Country	Substation of	Type	Length (Km)	V (kV)	Thermal limit (A)
Algeria	Ghazaouet	**Morocco**	Oujda	AC-single	47	225	640
Algeria	Tlemcen	**Morocco**	Oujda	AC-single	66	225	640
Algeria	Djebel Onk	**Tunisia**	Metaloui	AC-single	59	150	510
Algeria	El Aouinet	**Tunisia**	Tajerouine	AC-single	62	225	640
Algeria	El Aouinet	**Tunisia**	Tajerouine	AC-single	60	90	510
Algeria	El Kala	**Tunisia**	Fernana	AC-single	48	90	510

Lines under construction (internal and cross-border)

Country	Substation	Country	Substation	Type	Length (Km)	V (kV)	Thermal limit (A)	Date of operation
Algeria	Hassi Ameur	**Morocco**	Bourdime	AC-double	250	400	2x1720	2007
Algeria	Hadjar	**Tunisia**	Djendouba	AC-single	160	400	1720	2007

Future projected interconnections

Country	Substation	Country	Substation	Type	V (kV)	Capacity (MW)	Date Of operation
Algeria	Hassi Ameur	**Spain**	Almeria	DC	500	1000 +1000	2008 potential project 2010 potential project
Algeria	Hadjar II	**Italia**	Cagliari Sud				2010 potential project

4. Electricity market structure

These plans rise from the provisions contained in the law of 5 February, 2002. The following are currently in progress:

The restructuring of SONELGAZ in a holding with subsidiaries responsible for specific activities (legal separation) since 1 January 2004.

The creation of an Independent System Operator where SONELGAZ will hold only 10% of the capital.

The preparation for setting up a regulatory authority whose members are nominated by the President of the Republic.

The preparation for setting up an Electricity Exchange within five years.

As of now, new system operators already established themselves into the production market.

For distribution, it is also foreseen to introduce competition with a system of concessions on the basis of specifications and tenders.

The law foresees that eligible customers can freely conclude with producers, sales representatives and/ or distributors and negotiate supply contracts.

Prices in use for the transmission and distribution networks are regulated and fixed by the

Regulatory Commission according to a specific procedure

Captive customers will pay an equal tariff throughout the whole country ("péréquation tarifaire")

The market will be made up of:

- Bilateral contracts between operators
- An electricity exchange to which producers, sales representatives and consumers will call upon day after day

In order to conform the electricity sector to this law, modifications will be introduced before 2008.

5. Other

Link	Company
www.sonelgaz.dz	SONELGAZ
www.mem-algeria.dz	Energy Ministry

LIBYA

1. Basic capacity, generation and consumption data (year 2005)

Installed capacity by fuel, MW		
	Thermal	5125
	Hydro	-
	Nuclear	-
	Renewable	0.209
	Total	**5125.209**
Yearly generation by fuel, TWh		
	Thermal	22.5
	Hydro	-
	Nuclear	-
	Renewable	-
	Total	**22.5**
Annual consumption, TWh		**18.89**
Imports, TWh		**0.105**
Exports, TWh		**0.195**

2. Industry structure

2.1 Recent key developments

Nowadays, General Electricity Company of Libya (GECOL) is the only power electrical utility in the country responsible for: Generation, Transmission and Distribution of the Electrical energy in the country. The main key figures (Year 2005) are as follows:

Peak Demand	3857 MW
Installed Capacity	5125 MW
Energy Generated	22500 GWh
Total length of the 220 kv Transmission System	13138 km
Total length of the 66 & 33 kV sub-transmission system	21410 km
Total length of the 11 kV distribution system	56228 km
Number of Customers	1184707
Per Capita Consumption	3119 Kwh/capita
Number of 220 kv Substations	64
220 kv Substation Capacity	11706 MVA
Number of 66 & 30 kv Substations	471
Total Capacity of 66 & 30 kv Substations	12039 MVA

<u>Future Perspectives of the Libyan Electricity:</u>

The peak load of electrical power in Libya is continuously increasing with a relatively high growth rate of 8% per annum. Accordingly, the power generation as well as the transmission network is also expanding.

The fundamental objective of the electrical Master Plan of the Libyan system is to secure and guarantee the electrical power supply to the growing demand of electrical energy to all sectors in the country. Recent studies have shown that the expected peak demand in Libya in the year 2010 will be about 6000 MW and the figure is expected to reach 8500 MW by year 2015 and around 10000 MW by 2020. Therefore, a total of about 5500 MW generation capacity needs to be added during the period 2006 - 2012 with a mixed generation options (Steam & Combined Cycle) using natural gas.

Year	2010	2015	2020
Total MW	6000	8400	9800

In order to transmit the electrical energy generated from the various power plants and to reinforce the local interconnections and interconnections with neighbouring countries (Egypt & Tunisia), the Future plan of the Libyan Transmission System is concentrated on the EHV 400 kV grid. The 400 kV network will be implemented by constructing: 20 (400/220kV) substations and about 5000 km of 400kv transmission lines.

2.2 Main actors

Transmission system operator(s) (TSO(s)):
GECOL is the operator of the national transmission network (220, 66 and 30kV). Within GECOL's organisation, there is a general department responsible for energy management and transmission. A 'three-level structure' control centre is under construction and will soon be put into operation. The national control centre equipped with the latest technologies such as AGC and EMS is based on a fibre optic network. This centre will control the HV and EHV networks in addition to generation plants and will also coordinate with the neighbouring national control centres for interconnection operation.

Libya is soon to have two regional control centres:
- Benghazi's regional control centre (BRCC), in operation since 2001 to control the 220kV system in the eastern region of the grid,
- Tripoli's regional control centre (TRCC), currently under construction and expected to be in operation with the national control centre (NCC) at the beginning of 2007. Furthermore, ten distribution control centres (DCCs) are scheduled during the next five years plan. These control centres will control the distribution network (66, 30 and 11kV) all over the country.

Main generators (No IPPs Exist):
Main generation in Libyan power system are:

Zawia (gas)	990MW
West mountain (gas)	624MW
Khoms (steam)	480MW
Khoms (gas)	600MW
Tripoli west (steam)	565MW
Trikpoli south (gas)	500MW
Musrata steel (steam)	507MW
Beghazi north (gas)	600MW
Derna (steam)	130MW
Tobruk (steam)	190MW
Zwitina (gas)	200MW

Foreseen/outgoing projects for new generating units (up to 2012):

Benghazi (heat recovery)*	2x150MW
Zawia (heat recovery)*	3x150MW
Tripoli west (steam)	4x325MW
Gulf (steam)	4x350MW
Musrata steel CC I	750MW
Benghazi west CC I	750MW
Musrata steel CC I	750MW
Sarir (Gas)	250 MW
Tubrok Cogeneration	500 MW

** The steam part added to convert existing gas turbine to combined cycle.*

Distributors:
General Electricity Company of Libya *(GECOL)* acts as a single distributor. GECOL also has a general department responsible for operation and maintenance of the distribution network. There are moreover ten regional departments carrying out the distribution job.

Main traders & other players (exchange etc.):
GECOL acts as a single trader in the electricity market.

2.3 Main events

During 2005, the commissioning and operation of the West Mountain Power plant (4 gas units of 156 Mw each, with a total installed capacity of 624 MW) took place. In addition, two gas units of 165 MW each were put into operation at the Zawia Power Plant bringing the total capacity of the plant to almost 1000 MW. Moreover, the first 400 kv transmission line and two 400/220 kv substations were put into operation, thus connecting the south-west of the country to the north via a 440 km EHV 400 kv line.

3. Interconnection developments:

3.1 Status of interconnections

Existing interconnections

From (Libya)	To	Type AC/DC Single/double	U, KV	P, MW (thermal)	Length (km)
Tobruk	Saloum (Egypt)	AC-Double	220	600*	165
Abukamash	Mednine (Tunis)	AC-Double	220	400	210
Rowis	Tatouini (Tunis)	AC-Double	220	200**	160

* *Due to technical limitation the maximum exchangeable power a bout 180MW.*
** *Expected to be in operation during 2007.*

Ongoing studies in international/cross-border interconnections:
GECOL and TERNA of Italy recently launched an economic and technical feasibility study to interconnect Libya and Italy via a sub-marine DC link across the Mediterranean Sea. This interconnection will reinforce the security of supply of the two countries and will enhance the electrical interconnection between Europe and North Africa.

Lines under construction:
Internal:

400kV lines

From	To	Type AC/DC Single/double	U,KV	P,MW	Length (km)	Expected date for Commissioning the line
Wadi Rabia	Homis Switching	AC-Single	400	1000	120	2008
Homis Switching	Misurata	AC-Single	400	1000	120	2008
Misurata	Sirt	AC-Single	400	1000	300	2008
Sirt	Hoon	AC-Single	400	1000	480	2010
Sirt	Gdabia	AC-Single	400	1000	240	2008
Gdabia	Gwarsha	AC-Single	400	1000	120	2008
Wadi Rabia	Rowis	AC-Double	400	1000	250	2010

220kV lines

From (Libya)	To	Type AC/DC Single/double	U,KV	P,MW	Length (km)	Expected date for Commissioning the line
Azzahra	Tripoli South	AC-Double	220	400	19	2007
Benghazi North	Gwarsha	AC-Double	220	400	45	2008

220kV Under Ground Cables

From(Libya)	To	Type AC/DC Single/double	U, KV	P, MW	Length (km)	Expected date for Commissioning the line
Tripoli West	Saraj	AC-Double	220	350	13.6	2010
Saraj	Sidi Hamid	AC-Double	220	350	7.5	2008
Sidi Hamid	National	AC-Double	220	350	8	2006
National	Souk Aljmaa	AC-Double	220	350	12.5	2006
Souk Aljmaa	Ain Zara	AC-Double	220	350	5.5	2006
Benghazi Power	Benghazi Center	AC-Double	220	350	15.5	2006

<u>Future projected interconnections</u>

<u>Libya and Egypt interconnection:</u>

It has been planned to connect the two systems at 400/500 kV in the future starting from year 2012

From(Libya)	To	Type AC/DC Single/double	U,KV	P,MW	Length (km)	Expected date for Commissioning the line
Gdabia	Toubruk	AC-Single	400	1000	375	2010
Gwarsha	Toubruk	AC-Single	400	1000	350	2010
Toubruk	Matroh (Egypt)	AC-Single	500	1000	250	2012

<u>Libya-Tunisia interconnection:</u>

From(Libya)	To	Type AC/DC Single/double	U,KV	P,MW	Length (km)	Expected date for Commissioning the line
Sorman South	Buchemma	AC-Single	400	1000	350	2012

<u>Planned internal 400 kV lines:</u>

From	To	Type AC/DC Single/double	U,KV	P,MW	Length (km)	Expected date for Commissioning the line
Wadi Rabia	Bani walid	AC-Double	400	2000	150	2010
Bani walid	Sirt	AC-Double	400	2000	260	2010
Sirt	Ras lanuf	AC-Double	400	2000	230	2010
Ras lanuf	Gdabia	AC-Double	400	2000	250	2010

TUNISIA

1. Basic capacity, generation and consumption data (year 2005)

Installed capacity by fuel, MW		
	Thermal	**3170**
	Hydro	**63**
	Nuclear	**--**
	Renewables	**19**
	Total	**3252**
Yearly generation fuel by fuel, TWh		
	Thermal	**11.903 9**
	Hydro	**0.1452**
	Nuclear	**--**
	Renewables	**0.0424**
	Total	**12.0915**
Annual consumption, TWh		**11.373**
Imports, TWh		**0.139**
Exports, TWh		**0.142**

2. Industry structure

2.1. Recent key developments

The new Tunisian law, allowing for private generation of electricity, was published on 1 April 1996. However, the Tunisian Electricity and Gas Company (STEG) remains the only electricity utility responsible for transmission and distribution in the country.

Another law, concerning the small power units of generation from the fatal gas, was published on 3 June 2002.

2.3. Main actors

Transmission system operator
STEG is the only transmission operator for Tunisia.

Main generators
SOUSSE: two steam thermal units of 320 MW plus a combined cycle of 364 MW.
RADES: four thermal units of 710 MW plus an IPP combined cycle of 471 MW.

Foreseen/ outgoing projects for new generating units:
One Gas turbine unit of 120 MW for 2007.
400 MW single-shaft combined cycle for 2009.

Distributors
STEG is the only distribution operator for Tunisia.

Main traders & other players
None

3. Interconnections development

3.1. Status of interconnections

<u>Existing interconnections:</u>

FROM (Tunisia)	TO	Type AC/DC Single/Double	U,kV	Thermal limit (A)
Tajerouine	El. Aouinet (Algeria)	AC-Single	225	620
Metlaoui	Jebel Onk (Algeria)	AC-Single	150	620
Fernana	El Kala (Algeria)	AC-Single	90	525
Tajerouine	El. Aouinet (Algeria)	AC-Single	90	450
Mednine	Abou Kamash (Libya)	AC-Double	225	620
Tataouine	Rowies (Libya)	AC-Single	225	620

<u>Ongoing studies in international/cross-border interconnections;</u>

STEG intends to participate in the study "ENCOURAGE' on the optimisation of future "energy corridors" between EU and neighbouring countries. This study will involve the European Union, the Southern & Eastern Mediterranean countries, Eastern Europe and Russia. It will be led by a consortium composed by the ECN (Energy Research Centre of the Netherlands), the OME, the CESI (Italy) and the Frauenhofer Institut (Germany).

The Feasibility Study Stage is now achieved by CESI in February 2006. The date for the realisation for this project is foreseen by 2010-2011.

<u>Lines under construction (internal and cross-border)</u>

FROM (Tunisia)	TO (Tunisia)	Type AC/DC Single/Double	U,kV	Expected date of operation
Mornaguia	Mateur	AC-Single	400 (*)	December 2006
Mateur	Jendouba	AC-Single	400 (*)	March 2007
Zahrouni	Mornaguia	AC-Double	90	December 2006
Korba	Menzel Temime	AC-Single	90	November 2007

(*) This line in 400 kV will be operated in 225 kV.

FROM (Tunisia)	TO	Type AC/DC Single/Double	U,kV	Expected date of operation
Jendouba	El. Hadjar (Algeria)	AC-Single	400 (*)	2006

(*) This line in 400 kV will be operated in 225 kV.

3.2. Main events

28 June 2005: putting into operation of the 400 kV line (exploited in 225kV) Jendouba-Hajjar (interconnection between Tunisia and Algeria).

21 November 2005: failure of the UCTE test for the closure of the interconnection Tunisia-Libya (due to the action of watt metric relays on the Tunisia-Algeria interconnection).

5. Other

Link	**Company**
www.steg.com.tn	STEG

Isolated systems

CYPRUS

1. Basic capacity, generation and consumption data (year 2005)

Installed capacity by fuel, MW		
	Thermal	1118
	Hydro	-
	Nuclear	-
	Renewables	-
	Total	-
Yearly generation fuel by fuel, TWh		
	Thermal	4.348
	Hydro	-
	Nuclear	-
	Renewables	-
	Total	4.348
Annual consumption, TWh		3.940
Imports, TWh		-
Exports, TWh		-

2. Industry structure

2.1 Recent key developments

The Electricity Market in Cyprus, in line with the new E.U Directive, has opened to approximately 35% since the 1 May 2004. A new law was enacted(N.122(I)/2003) and all the relevant rules and regulations have been issued (Transmission & Distribution Rules, Market Rules, Tariff Rules, License Regulations and Performance Indicators).

The Electricity Directive allows Member States to impose upon their electricity undertaking public service obligations in the general economic interest. These may relate to the following categories:

- Security
- Rural development
- Quality of supply
- Price of supply
- Environmental protection.

The Electricity Authority of Cyprus (EAC) has been restructured, thereby establishing the following :

- A generation business
- The transmission system operator independent in legal terms.
- The transmission business
- The distribution business, and
- The supply business.

In order to comply with the present EU Directive requirements, EAC has set up a separately identifiable Transmission and Distribution System Organisation within EAC. In addition, the area's responsibilities are separated in accounting terms between the supply function and the network function.

Business units are run as independent profit centres. Business unit managers are effectively managing independent business lines operating commercially at arm length from other business units of EAC. Managers are responsible for the financial performance of their business unit.

2.2 Main actors

Transmission system operator
Established on 14/04/2004

Main generators
EAC VASSILIKO P.S – 428 MW
EAC DHEKELIA P.S -360 MW
EAC MONI P.S – 330 MW

New Generation
Vassiliko P.S phase three, which includes the installation of one new combined cycle generator 220 MW capacity(Under construction – License for operation: 10/11/2005).

Vassiliko P.S phase four, which includes the installation of two new combined cycle generators of 440 MW total capacity(License for operation: 24/02/2006).

Conventional Generation under License for operation : 303 MW

Renewable Energy Sources(RES) Generation under License for operation : 122 MW

Distributors
Distribution for the whole of Cyprus remained within EAC but unbundled in accounting terms following a decision by the Government of Cyprus in line with the provisions of the EU Directive for small isolated systems.

Main traders & other players
Not applicable for Cyprus

3. Transmission network and system issues

3.1 Status of interconnections: Internal only (to be completed within the next 2 to 3 years)

- Vassilikos – Tseri double circuit line (twin conductor).
- Tseri – Lakatamia circuit underground cable.
- Kophinou - Mari circuit overhead line.
- Tseri – Strovolos circuit underground cable.
- Ipsonas – Trimiklini double circuit overhead line.
- Akoursos – Poli double circuit overhead line.
- Tee Off to Ayios Athanasios double circuit underground cable.
- Dhasoupolis – Strovolos circuit underground cable.

3.2 Network development plan

According to the law provisions, the Electricity Authority of Cyprus is the owner of the distribution and transmission networks and the TSO is the system operator as from 1 May 2004. The TSO has the responsibility for producing a development plan for the grid, issue terms for connection to the transmission network and oversee that EAC develops the network in accordance with the published development plan and takes every step in maintaining the grid to industry standard.

The TSO has to submit yearly to the Regulatory Authority an updated ten-year plan for the development of the transmission network. Following the approval of the Regulatory Authority, EAC has the responsibility to implement the development plan.

The main milestones that EAC needs to go through in order to construct a new transmission link are the following:

- Detailed design including environmental study
- Town planning approval (including approval from all affected local Authorities)
- Government approvals
- Wayleaves (compulsory from District Officer)
- Actual construction

To complete a new overhead transmission link (from inception to final commissioning) can take approximately 3 to 4 years but usually it takes more than 5 years and sometimes 8 to 10 years.

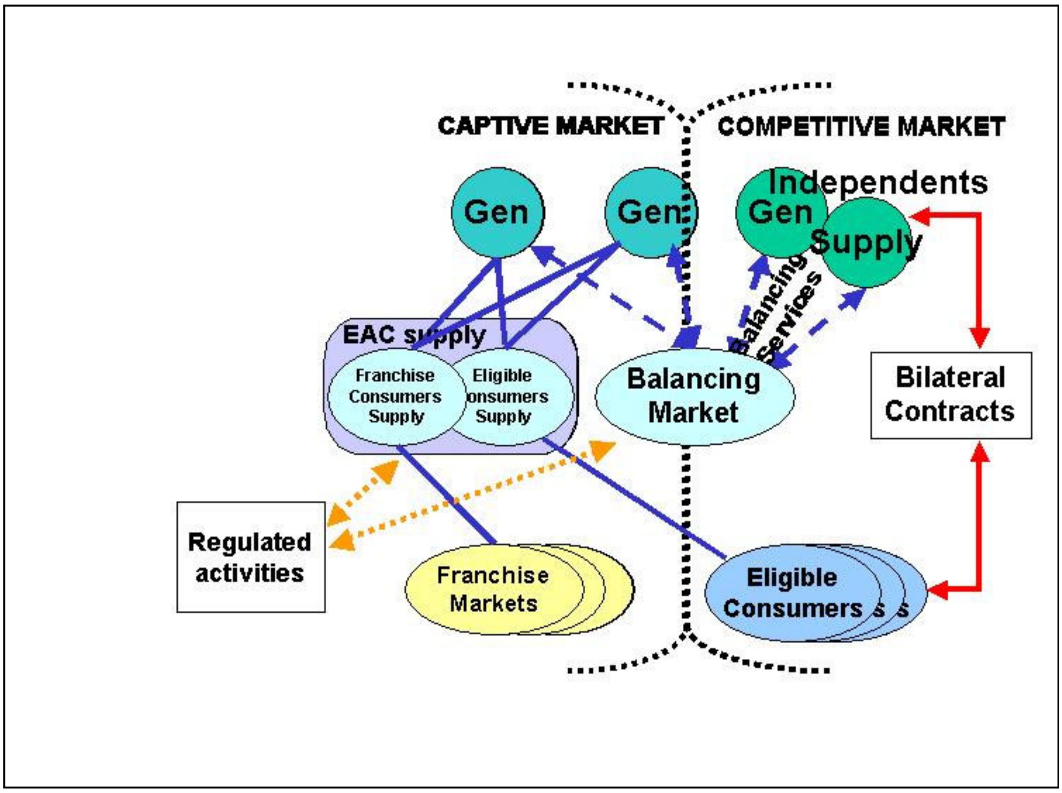
3.3 Main Events

Nothing worthy of mentioning.

4. Electricity market structure

The electricity market in Cyprus opened for 35% of the annual consumption .The market is expected to function according to the following guiding principles:

- The TSO, independent in legal terms, shall operate the Transmission system and the market.
- The bulk of energy shall be traded through bilateral contracts between the generators/customers.
- The balancing market shall operate ONLY for the half-hourly energy deficiencies or surplus using the most economic options available to the TSO through bits and offers of the available generators.
- The ancillary services shall be traded by the TSO using long term offers from available generators.
- All conventional generators above 1 MW and renewable generators above 5 MW are to be scheduled daily through the TSO.
- The drawing below shows schematically how the electricity market is expected to operate:



5. Other

Link	Company
Http//www.eac.com.cy	Electricity Authority of Cyprus

ISRAEL

1. Basic capacity, generation and consumption data (year 2005)

Installed capacity by fuel, MW		
	Thermal	**10,318**
	Hydro	**7**
	Nuclear	**0**
	Renewables	**9**
	Total	**10,334**
Yearly generation fuel by fuel, TWh		
	Thermal	**48.4**
	Hydro	**0.02**
	Nuclear	**0**
	Renewables	**0.02**
	Total	**48.44**
Annual consumption, TWh		**44.3**
Imports, TWh		**0**
Exports, TWh		**0**

2. Industry structure

2.1 Recent key developments

Currently, the Israel Electric Corp. (IEC) is a government owned monopoly. The IEC operates the generation, transmission and distribution systems. A share of the generation expansion plan is allocated to IPPs through governmental auction.

In May 2003, the Israeli Parliament certified a new law for a reform in the electricity industry that was planned to take place at the beginning of March 2006. The target is to restructure the industry as follows:
Generation – competitive
Transmission – a natural monopoly
Distribution – regional monopoly

At the same time trade in electricity will be developed.

In March 2006, the government decided to postpone the implementation of the reform to March 2007.

During the transition period, IEC will own generation, transmission and distribution in a holding company with subsidiaries.

2.2 Main actors

Transmission system operator

Since the IEC is a government-owned vertically integrated electric utility, the TSO functions as a central dispatch centre.

Main generators
Nominal capacity of existing generating units by type of fuel:

Fuel Type/Unit Type	*Nominal Capacity (MW)*
Coal	***4840***
Fuel oil	***1766***
IPPs	***30***
Jet Engines	***512***
Gas Turbines – heavy duty	***1798***
Combined cycle	***1372***
Total	*10318*

2.3 Main events

The most important event is that Israel has now begun using natural gas for its electricity production.

3. Interconnections development

Not relevant. Israel is an island system, not interconnected with any other electrical system.

4. Electricity market structure

Currently, the Israel Electric Corp. (IEC) is a government-owned vertically integrated electric utility.

According to Electricity Sector Law of March 1996, the Public Utility Authority (PUA) – Electricity was established. Its main functions are as follows:
- Determining tariffs and the methods of updating them,
- Determining specifications for the level, standard and quality of service supplied by the essential service supplier (currently IEC).

In June 2003, the Israeli government decided to reform the electricity industry as follows:

- First step: IEC will be functionally unbundled into generation, transmission, local distribution and customer services.
  Generation – competitive
  Transmission – a natural monopole
  Distribution – regional monopoles
- Second step: deregulation and privatisation of wholesale generation and customer services. T&D services will remain regulated but will be available to all T&D users under mandatory access.

A share of the expansion power plan is allocated to IPP's through governmental auction. Two private owned combined cycle generators of approximately 350MW each, won two separate auctions. These generators are planned to be constructed according to the system generation expansion plan before 2010. (See also section 2.1 above)

5. Other

Link	Company
www.israel-electric.co.il (Investor relations)	IEC

MALTA

1. Basic capacity, generation and consumption data (year 2005)

Installed capacity by fuel, MW		
	Thermal	571
	Hydro	0
	Nuclear	0
	Renewables	<0.1
	Total	**571**
Yearly generation fuel by fuel, TWh		
	Thermal	2.263
	Hydro	
	Nuclear	
	Renewables	
	Total	**2.263**
Annual consumption, TWh		**2.263**
Imports, TWh		**0**
Exports, TWh		**0**

2. Industry structure

2.1 Recent key developments

The Malta Resources Authority was set up by Act of Parliament in 2000, as a public corporate body to regulate the use of water, energy and mineral resources in Malta. The MRA has recently published an 'energy plan' for Malta (online access on www.mra.org.mt). This compliments the Generation Plan previously published by Enemalta Corporation (online access on www.enemalta.com.mt).

Generation of electricity in Malta is liberalised subject to operating licences from the regulatory authorities. At present the only generator is Enemalta Corporation.

Transmission and distribution of electricity is under the responsibility of the Distribution System Operator – Enemalta Corporation. The transmission system is at present negligible since it consists of two circuits at 132kV, and Malta is classified as a 'Small Isolated System, therefore at present Malta has no transmission System Operator.

2.2 Main actors

Transmission system operator
Malta is classed as a Small Isolated System and Enemalta Corporation is the Distribution System Operator

Main generators
Enemalta Corporation is the main generator. There are plans for Enemalta to add 100MW of local generating capacity by 2009.

Distributors
As stated above, Enemalta Corporation is the DSO.

Other players
MRA – Energy Regulator

3. Transmission network and system issues

3.1 Status of international interconnections

Ongoing studies in international/cross-border interconnections

From	To	Type AC/DC Single/Double	U,kV	P,MW	Date for study completion	Expected date for commissioning the line under study
Malta	Sicily	DC (double)	200	200	2007	2010

Study needs
There is a need to undertake a detailed study of interconnection with Sicily and North Africa.

3.2 Network development plan

The network plan is developed by Enemalta after considering the local rate of growth at substation and distribution centre level, projected developments, both in terms of increased load and of new generation capacity, and present condition of the system (from fault and outage statistics). This plan is referred to the regulatory authority for endorsement.

3.3 Main events

During the period 2005-06, the system was able to deliver the required power. A number of feeder circuits are now rated below their required n-1 rating, implying that feeder outages may result in prolonged outages to consumers until the feeders are repaired. There were no major events during this period.

4. Electricity market structure

The present market structure is a de-facto vertically integrated system, with the sole generator supplying the distribution system. There are no significant generators apart from Enemalta, and no distribution or retail companies except for Enemalta.

The Distribution system is modelled as a 'Single buyer', and although generation is liberalised, there is only one major generator.

5. Other

Institutions/companies	Links
Enemalta Corportion	www.enemalta.com.mt
Malta Resources Authotity Ministry of Investment, Industry and IT	www.mra.org.mt www.miti.gov.mt

ANNEX 2: Abbreviations

AC	Alternating current
ATC	Available transmission Capacity
AUPTDE	Arab Union of Producers, Transmission & Distribution Companies
COMELEC	Maghreb association of the electricity sector
CDO	Central Dispatching Organisation
CENTREL	Organisation for the synchronous interconnection of the electric power systems of the Czech Republic, Slovakia, Poland and Hungary with the UCTE power systems
CEER	Council of European Energy Regulators
CHP	Combined Heat and Power
CIGRE	International Council on Large Electric Systems
CIS	Commonwealth of Independent States
DC	Direct current
ETSO	European Transmission System Organisation
EU	European Union
GW	Gigawatt
HVDC	High-voltage direct current
IPS	Integrated Power System
kV	Kilovolt
MEDELEC	Mediterranean Liaison Committee
MW	Megawatt
NETA	New Electricity Trading Arrangements
NSI	North Sea Interconnector
NORDEL	Organisation for Nordic power cooperation
NPP	Nuclear Power Plant
OME	Observatoire Méditeranéen de l'Energie
PS	Power System
TEAS	Turkish Electric Generation and Transmission Company
TEN	Trans-European Network
TESIS	Trans-European Synchronously Interconnected System
TSO	Transmission System Operator
SUDEL	Regional group for the coordination of electricity transmission in the
	South-East European Interconnected System

SYSTINT	Joint EURELECTRIC and UCTE working group dealing with system development
SYSTMED	Working group dealing with network developments around the Mediterranean Sea
TWh	Terawatt hour
UNIPEDE	International Union of Producers and Distributors of Electrical Energy
UCPTE	Union for the Co-ordination of Electricity Generation and Transmission
UCTE	Union for the Co-ordination of Transmission of Electricity
UES	Unified Energy Systems of Russia
UPDEA	Union of Producers and Distributors of electricity in Africa
UPS	Unified Power System

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