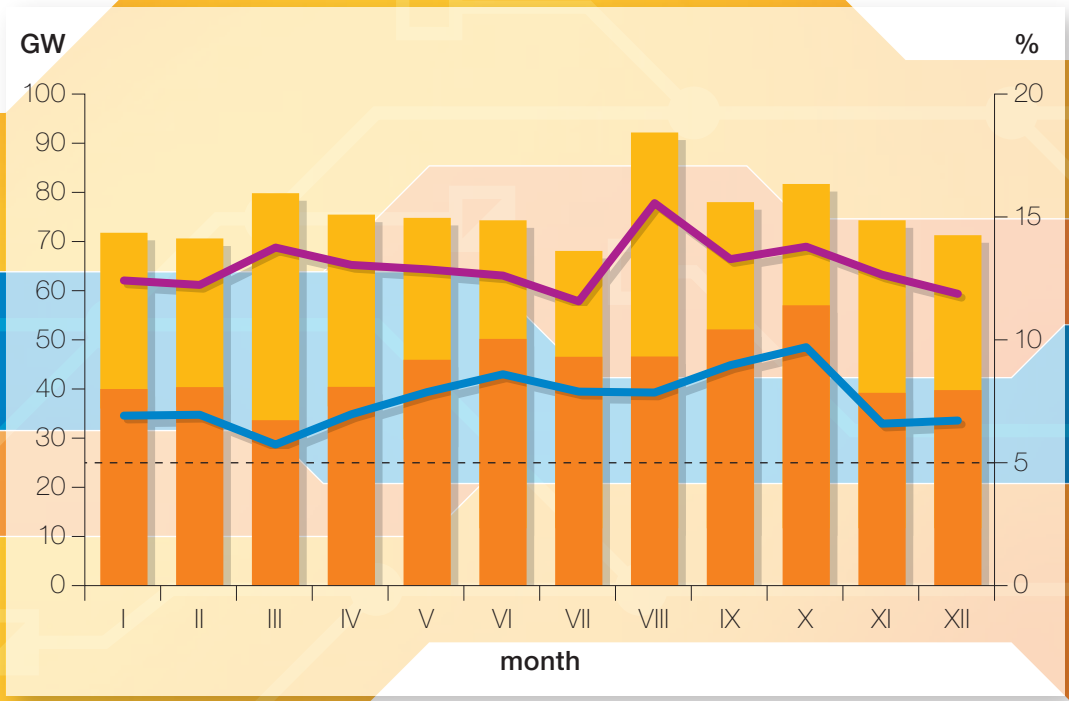
UCTE



System Adequacy Retrospect 2004

union for the co-ordination of transmission of electricity

June 9th, 2005

UCTE SYSTEM ADEQUACY RETROSPECT 2004

Union for the Co-ordination of Transmission of Electricity

UCTE SYSTEM ADEQUACY
RETROSPECT OF THE YEAR 2004

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EXECUTIVE SUMMARY

Executive summary

This UCTE System Adequacy retrospect report aims at providing all players of the European power market with an overall overview of:

- generation and demand in the UCTE system in 2004, on the point of view of power balance and margins and on the point of view of the energy mix evolution
- the main incidents that have affected the UCTE system and their possible influence on system security, the situation and main changes in the UCTE Transmission grids, a focus on the congestion on interconnection tie-lines.

This report is based on synthesis of questionnaires filled by UCTE countries representatives.

Power Balance

Power balance analysis is made at the reference time 11 am (CET) on the third Wednesday of every month. Reliably available capacity is calculated from generating capacity deducing unavailable capacity. It is compared to load at the reference time point.

Total generating capacity on UCTE grid is 593.2 GW in December 2004. This figure is higher than 2003 by 24 GW thanks to new commissioning (and also partly because of a change in data perimeter). Most of capacity developments were made of combined cycle plants and of renewable power sources, whose capacity increased by more than 20% in 2004, especially thanks to wind energy development.

The availability of generating plants was higher than in December 2003, as well as imports from outside UCTE.

In 2004, the reference load is 360,6 GW, 12 GW higher than 2003 partly, because of perimeter change in some countries.

In these conditions, the remaining capacity including exchanges was higher in December 2004 than in December 2003 by approximately 9 %, leading to a less constrained situation than in previous year.

Table 1 UCTE – Power balance, Retrospect 2004

	December 2003	December 2004	*variation 2004 / 2003*	
	GW	**GW**	***GW***	***%***
Total generating capacity	569.1	593.2	*24.1*	*4.2*
Reliably available capacity	414.2	431.6	*17.3*	*4.2*
Load at 11 a.m.	348.2	360.6	*12.4*	*3.6*
Remaining capacity without exchanges	**66**	**70.6**	***4.6***	***6.9***
Balance of physical exchange	1.6	3.4	*1.8*	*112.1*
Remaining capacity with exchanges	**67.7**	**74.0**	***6.3***	***9.3***

It is usually admitted in the provisional approaches that the remaining capacity without exchange, after covering a margin against the peak load, must be at least 5% (or 10% for some countries) of the global generating capacity.

When calculated *ex-post,* this remaining margin (i.e. remaining capacity without exchange minus margin against peak load) is not supposed to fulfil the provisional adequacy reference margin of 5%. Nevertheless, it is interesting to calculate it in percentage of generating capacity, as an indicator of the overall system margin met in the year.

In December 2004, this margin was about 6.8% of generating capacity. The lowest rate over the year 2004 has been reached in March (5.8%); it is similar to the lowest values observed in the previous years.

Energy Balance

Consumption in UCTE system reached 2434 TWh in 2004. The global increase in the electricity consumption in 2004 is 1.7%. This is less than in 2003 thanks to mild weather conditions in 2004. The highest growth rates were reached in Spain, Portugal, Greece, Poland, Czech Republic, Romania.

Total generation in UCTE reached 2494 TWh in 2004.

Favourable hydro conditions have dumped the increase of hydroelectric generation in South East and eastern Europe. A slight decrease due to droughty conditions is observed in Iberian countries. As a consequence, conventional thermal power generation in these countries was higher than in 2003.

Non-hydro renewable generation has once again increased by more than 30 %, mainly thanks to wind generation development. The overall part in the UCTE consumption of renewable energy, including hydro generation, is now approximately 16 % (the global European Union target being 22 % in 2010). This strong evolution is specially noticed in Spain and in Germany. This development also has significant impacts on transmission system (see below).

Overall UCTE remains approximately balanced in energy, as total amount of net exports is negligible compared to overall consumption.

Table 2	**UCTE – Energy balance, Retrospect 2004**			
	energy 2003	**energy 2004**	***variation 2004 / 2003***	
	TWh	**TWh**	***TWh***	***%***
Generation				
Hydro power stations	312.5	321.3	*8.8*	*2.8%*
Nuclear power stations	788.1	797.5	*9.4*	*1.2%*
Conventional thermal power stations	1 271.1	1 293.4	*22.3*	*1.8%*
Renewable energy	54.8	72.3	*17.5*	*31.9%*
Not clearly identified*	27.0	9.4	*- 17.6*	*-65.3%*
Total generation	**2 453.5**	**2 493.9**	***40.4***	***1.6%***
Physical exchanges balance (import - export)	- 13.5	- 11.5	*2.0*	*-14.6%*
Consumption from pumped storage	44.7	43.8	*- 0.9*	*-2.1%*
Consumption**	**2 394.6**	**2 434.5**	***39.9***	***1.7%***

* high change in "not clearly identified energy sources" are due to a change in French data perimeter.
** including losses

Table 3	**UCTE – generation mix evolution**	
	2003	**2004**
Hydro power stations	12,9 %	13,0 %
Nuclear power stations	32,5 %	32,1 %
Conventional thermal power stations	52,4 %	52,2 %
Renewable energy	2,2 %	2,7 %

Transmission System Adequacy

The UCTE system did not meet as critical situations as in 2003. Two incidents leading to black-out must nevertheless be mentioned:
in Greece on July the 12th, black-out occurred in Athens and southern part of Greece at the time of the peak load.
in Luxembourg on September 2nd, following lines and substation triggering in Germany.

Very bad weather conditions affected the eastern part of UCTE in November, especially Poland and Czech Republic which lost their interconnection at this occasion. Another interconnection loss occurred on July 18th between Hungary and Croatia due to unforeseen line outages in Hungary.

Strong increases of wind generation in Germany lead to high unscheduled flows on interconnections around Germany, towards Poland, the Netherlands, Belgium and France. These unforeseen situations lead to stress security limits of the grid in these area and caused the curtailment or reduction of commercial contracts.

Congestion in the eastern part of UCTE are stronger than in 2003, especially between Germany, Austria and Poland, Czech Republic, Hungary. This underlines the need for grid reinforcement in this area.

As far as system development is concerned, interconnection capacities have been reinforced particularly between Spain and Portugal, Hungary and Croatia and between Germany and Nordel through the Baltic cable.

A most significant event is the successful reconnection of synchronous zones 1 and 2 of UCTE, on October 10th 2004. UCTE system is now again a single synchronous zone.

Market development

Prices on markets were more stable in 2004 than in 2003, as no extraordinary event as 2003 heatwave occurred.

The internal exchanges between UCTE countries are very active: sum of imports of all UCTE countries represent 270 TWh and sum of exports represent 281 TWh. This shows that, as an average, 11,5 % of UCTE countries national consumption come from imports from other UCTE countries.

The main changes concern:

- the decrease of exports of France and their increase in Germany and Czech Republic,
- Spain, Slovenia who were net importing countries in 2003 became net exporting in 2004,
- Switzerland was net exporter in 2003 and became importer in 2004.

For many countries, all the non domestic customers are now eligible since July 1st, 2004.

INTRODUCTION AND METHODOLOGY

1

1 Introduction and methodology

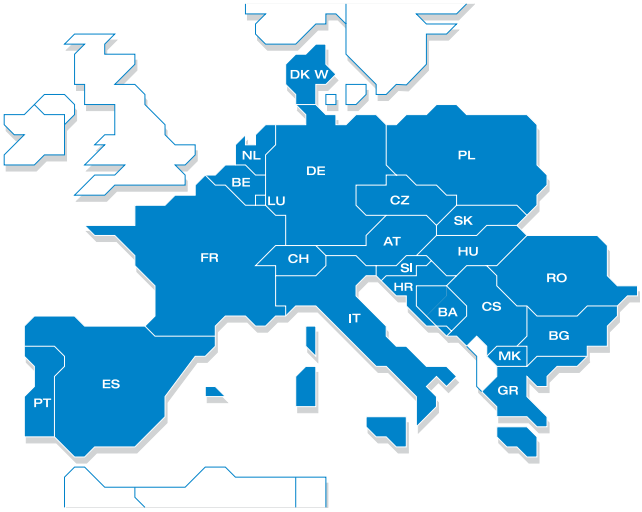
1.1 Presentation of UCTE

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 maintain 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 terms of the quality of synchronous operation of interconnected power systems.

Through the networks of the UCTE, 450 million people are supplied with electric energy; annual electricity consumption exceeds 2400 TWh.

With regard to the other members of ETSO (European Transmission System Operators, 36 Transmission System Operators in 23 countries), the geographical perimeter of UCTE in 2004 is represented in the picture below:



Optimal Co-operation requires joint action

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 to set standards in terms of security and reliability in the future as well as in the past.

The UCTE – Security of electric power supply and promotion of competition

From the very outset of liberalisation in the European electricity markets, the UCTE has intensively pursued the development of schemes for the promotion of competition in the electricity sector. The aim is to support the electricity market without accepting restrictions in the security of supply.

The liberalisation of electricity markets cannot be implemented without a transparent and non-discriminatory opening up of electric networks. The UCTE sets the prerequisites that enable a compromise to be ensured between competition and security of supply.

As of June 2004, the member companies of the UCTE come from the following countries:

Table 4 UCTE countries

Complete name	Abbreviation 2003	Abbreviation 2004
Belgium	B	BE
Germany	D	DE
Spain	E	ES
France	F	FR
Greece	GR	GR
Italy	I	IT
Slovenia	SLO	SI
Croatia	HR	HR
Former Yugoslav Republic of Macedonia	FYROM	MK
Serbia Montenegro	SCG	CS
Luxembourg	L	LU
Netherlands	NL	NL
Austria	A	AT
Portugal	P	PT
Switzerland	CH	CH
Czech Republic	CZ	CZ
Hungary	H	HU
Poland	PL	PL
Slovak Republic	SK	SK
Bosnia Herzegovina	BIH	BA
Romania	RO	RO
Bulgaria	BG	BG
Western Ukraine	BI-UA	UA-W
Western Denmark	DK	DK-W

NB: For this retrospect 2004, new country abbreviations are used.

1.2 Objectives of the retrospect

This UCTE System Adequacy Retrospect aims at presenting an overall view of:

- the main results concerning generation and demand in the UCTE system, on the point of view of power balance and margins and on the point of view of the energy mix evolution,

- the main incidents that have affected the system and their possible influence on system security, the main development in the UCTE Transmission grids, the status of congestion on international interconnections.

These elements are collected from UCTE representatives in each countries by the mean of a questionnaire. Synthesis of all answers are presented here-after, completed by comments and notes of national correspondents.
Additional information concerning network and generation developments and significant events which occurred in the UCTE network in the year 2004 can also be found in the report of the UCTE sub-group “TSO-Forum” (see UCTE web site – living grid).
Specific reports on security and incidents, as well as the monthly statistics of UCTE, may also be consulted on UCTE web site www.UCTE.org.

1.3 Definitions

In this note, CIGRE definitions for reliability, adequacy and security are used.

Reliability – a general term encompassing all the measures of the ability of the system, generally given as numerical indices, to deliver electricity to all points of utilisation within acceptable standards and in the amounts desired. Power system reliability (comprising generation and transmission facilities) can be described by two basic and functional attributes: adequacy and security.

Adequacy – a measure of the ability of the power system to supply the aggregate electric power and energy requirements of the customers within component ratings and voltage limits, taking into account planned and unplanned outages of system components. Adequacy measures the capability of the power system to supply the load in all the steady states in which the power system may exist considering standards conditions.

Security – a measure of power system ability to withstand sudden disturbances such as electric short circuits or unanticipated losses of system components or load conditions together with operating constraints. Another aspect of security is system integrity, which is the ability to maintain interconnected operations. Integrity relates to the preservation of interconnected system operation, or the avoidance of uncontrolled separation, in the presence of specified severe disturbances.

The above definitions are described in detail in the following two CIGRE reports:
Power System Reliability Analysis – Application Guide, Paris, 1987,
Power System Reliability Analysis – Composite Power System Reliability Evaluation, Paris, 1992.

Hydroelectric power and renewable energy sources:
Although hydroelectric power is a renewable energy source (according also to the definition from the relevant EU Directive n° 2001/77/EC dated September 27th, 2001), it is shown separately on the grounds that hydroelectric capacity is foreseeable and contributes substantially to the reserve capacity available to transmission system operators.

“Renewable energy sources” and “not clearly identifiable energy sources” comprise capacities which, as a function of the primary energy used, do not correspond to the categories of hydro power stations, nuclear power stations and conventional thermal power stations, and which can be used for public/general supply and can thus be transported across the distribution and/or transmission networks.
“Renewable energy sources” comprise the following primary energies:

- wind energy,
- photovoltaics/solar energy,
- geothermal energy,
- energy from biomass and waste (e. g. biogas, damp gas, municipal waste, industrial waste, wood and waste of wood).

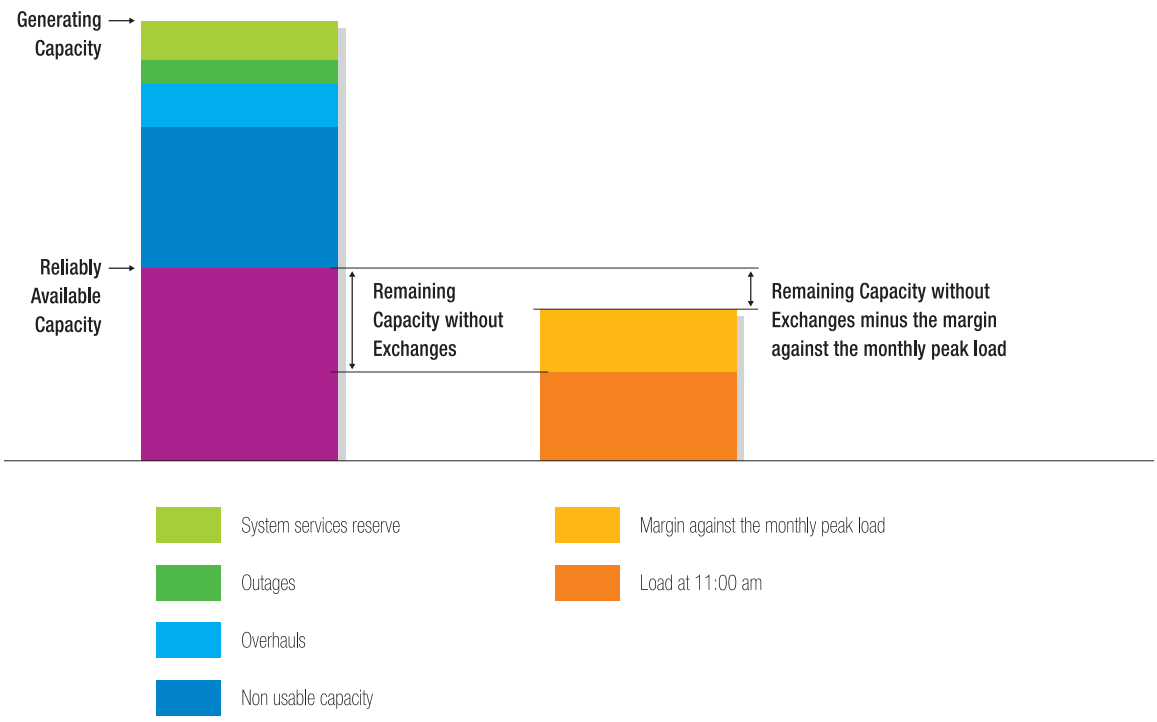
Other explanation concerning system adequacy methodology and terms used may be found on UCTE web site – statistics.

1.4 Methodology for margin assessment

The power balance analysis aims at determining global margin on UCTE system. Scheme below summarises the methodology for comparing generation to load:

- Reliably available capacity is the available generation once taken into account non usable capacity, overhauls, outages and system reserve,
- Load at the reference time (3rd Wednesday of each month at 11:00 am) is completed by a margin against the monthly peak load to take into account the fact that reference time does not coincide with exact peak load.

Figure 1 **Margin calculation methodology**



As a simplification of language, the “remaining capacity without exchanges minus margin against monthly peak load” will be referred to as “remaining margin”.
This value may be compared to the amount of 5% or 10% of generation capacity that is supposed to be the provisional margin used in the forecast to assess generation adequacy.

This method is obviously very simplified and may contain uncertainties (see below) but its interest is to allow to follow the evolution in time - or at least, so will it be once a sufficient historic on stable perimeter is available.

1.5 Caution concerning data representativeness

Statistical data used for the year 2004 are in most countries still provisional, as “official” data are available only many months later. For the same reason data of the year 2004 can differ from the data published in last year report because they have been updated in the meantime.

Moreover, for statistical reasons, data on electricity supplies in a number of countries are not completely recorded by TSO’s. Depending upon the country concerned, the sectors included may represented only a part of total consumption and / or total generation.

Table below gives these indexes for 2003 and 2004 when they differ from 100% or when changes occurred in the perimeter covered in the present retrospect compared to the previous one.

Table 5	**Representativeness of consumption and generation data**	
	index 2003	**index 2004**
BE	99%	99%
DE	100% *	100% *
ES	94%	94%
FR	**97%**	**100%**
GR	**99%**	**100%**
MK	n.a.	n.a.
CS	96%	96%
LU	Generation: 96% Consumption: 98%	Generation: 96% Consumption: 98%
NL	Generation: 100% Consumption: 85%	Generation: 100% Consumption: 85%
AT	Generation: 90% Consumption: 100%	Generation: 90% Consumption: 100%
PT	**92%**	**94%**
BA	99%	99%
UA-W	100%**	100%**
Others	**100%**	**100%**

* 100% of Public / Common supply for generation and consumption

** Western Ukraine is the part of Ukraine synchronously working with the UCTE. The representativeness of the results in consumption, peak load and generation as part of UCTE is 100%. But as a part of the overall Ukrainian power system, Western Ukraine represents only 2% of energy consumption, 4 % of the peak load and 4% of generation.

All data indicated in the power and energy balances are supposed to be net values, that is:

- excluding auxiliary consumption concerning generation data
- including losses concerning consumption data.

Nevertheless, in some mentioned cases, this principle is not respected.

For all these uncertainties concerning data, following warnings must be kept in mind:

1. *Comparison between 2003 and 2004 figures must be carefully considered due to change in perimeter of data between both studies.*

2. *An uncertainty on figures of the overall generation / load of UCTE of about 5 GW is highly probable. As a consequence, the value of UCTE margins given in the report must be considered with plus or minus 10 % uncertainty.*

Note: due to rounding of figures, slight differences may be observed in following tables between the sum of individual values and the associated total value of lines or columns.

POWER BALANCE RESULTS 2

2 Power Balance results

2.1 Generating capacity

The maximum national generating capacity represents the maximum potential net generating capacity of electric utility companies and auto-producers in the countries concerned.

At the end of 2004, the total generating capacity of UCTE was 593.2 GW. This value is higher than previous year by 24 GW, partly because of a more complete depiction of the perimeter (especially in France), but also due to significant commissioning of new plants:

- in Spain with the development of wind generation and of combined cycle plants,
- in Italy with a strong increase in combined cycles releases and
- in Germany with the development of wind generation.

The most remarkable trend is the continuous increase of generation from renewable sources: plus 27% in 2004.

Table 6 Generating plant mix and changes in capacity

	Capacity December 2003		Capacity December 2004		*Variation 2004/2003*	
	GW	**%**	**GW**	**%**	***GW***	***%***
Hydro power stations	130.0	22.8	132.6	22.4	*2.7*	*2.1*
Nuclear power stations	113.1	19.9	113.3	19.1	*0.2*	*0.2*
Conventional thermal power stations	298.8	52.5	312.6	52.7	*13.8*	*4.6*
Renewable energy sources	25.8	4.5	32.9	5.5	*7.1*	*27.4*
Not clearly identified sources	1.9	0.3	1.8	0.3	*- 0.1*	*- 5.8*
Total generating capacity	**569.1**	**100**	**593.2**	**100**	***24.1***	***4.2***

Figure 2 Generating plant mix

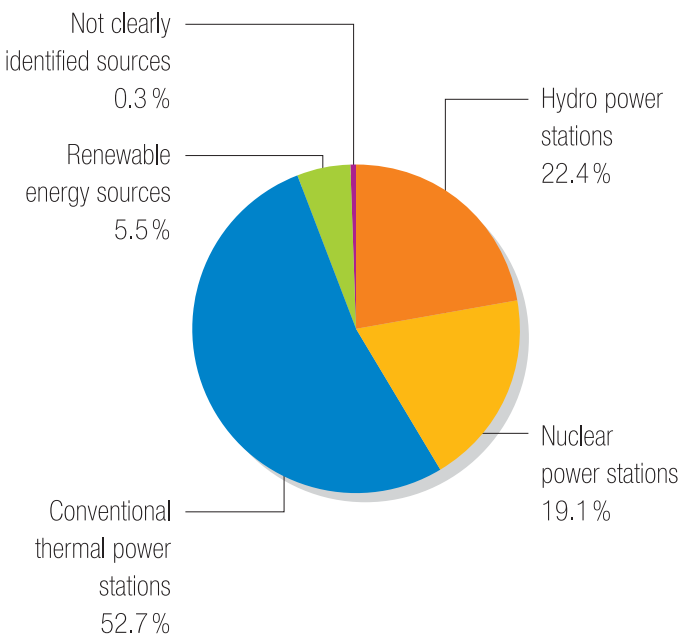


Table 7	National generating capacity - situation December 2004							
	Hydro power stations	Nuclear power stations	Conventional thermal plants	Renewable energy sources	Not clearly identified sources	National generating capacity	*Variation 2004 / 2003*	
	GW	GW	GW	GW	GW	GW	*GW*	*%*
BE	1.4	5.8	8.1	0.4	0.0	15.8	*0.1*	*0.6*
DE	9.0	20.5	68.1	17.3	0.0	114.9	*3.7*	*3.3*
ES	18.0	7.9	32.9	8.6	0.0	67.3	*7.5*	*12.5*
FR	25.4	63.4	26.9	1.0	0.0	116.7	*5.6*	*5.0*
GR	3.1	0.0	7.2	0.4	0.0	10.7	*0.3*	*2.5*
IT	20.8	0.0	59.2	1.7	0.0	81.7	*4.4*	*5.7*
SI	0.9	0.7	1.3	0.0	0.0	2.8	*0.0*	*0.8*
HR	2.1	0.0	1.7	0.0	0.0	3.7	*- 0.3*	*-6.8*
MK	0.5	0.0	0.9	0.0	0.0	1.4	*0.1*	*6.4*
CS	3.5	0.0	6.4	0.0	0.0	9.9	*0.0*	*0.0*
LU	1.1	0.0	0.5	0.1	0.0	1.7	*0.0*	*1.2*
NL	0.0	0.4	18.3	1.5	0.4	20.7	*0.9*	*4.5*
AT	11.2	0.0	5.6	0.6	0.0	17.4	*0.2*	*1.2*
PT	4.7	0.0	6.2	0.8	0.0	11.7	*1.1*	*9.9*
CH	13.2	3.2	0.6	0.3	0.0	17.3	*0.0*	*0.0*
CZ	2.1	3.5	10.6	0.0	0.0	16.2	*0.0*	*0.0*
HU	0.0	1.8	5.7	0.1	0.7	8.3	*0.3*	*3.5*
PL	2.2	0.0	29.3	0.1	0.0	31.7	*0.1*	*0.2*
SK	2.4	2.6	2.3	0.0	0.7	8.0	*- 0.1*	*-0.8*
BA	2.1	0.0	2.0	0.0	0.0	4.0	*0.2*	*4.8*
RO	6.0	0.7	10.1	0.0	0.0	16.7	*0.3*	*2.1*
BG	2.9	2.9	6.4	0.0	0.0	12.2	*- 0.1*	*-0.6*
UA-W	0.0	0.0	2.5	0.0	0.0	2.5	*0.0*	*0.0*
UCTE	**132.6**	**113.3**	**312.6**	**32.9**	**1.8**	**593.2**	***24.1***	***4.2***

National comments:

BE 66.4 MW of the installed capacity of the conventional thermal power stations in 2003 were reallocated to installed capacity of renewable energy sources in 2004 since these power plants are now partially fired with wood and waste of wood

ES In conventional sources, 2800 MW of combined cycle plants have been installed. Also, approximately 2000 MW of new wind power plants have been commissioned. Approximately 300MW of natural gas power plant have been shut down in Besos 2.

DE Two 265MW machines in the pump-storage power station of Goldistahl was commissioned in June. The Arzberg fossil fuel power station (500MW) was shut down in 2004. Approximately 2000MW wind power generation were commissioned in 2004. The total capacity in wind power amounts to 16 600MW.

FR Comparison with 2003 results is not relevant because of a change in data perimeter (integration of all producers and Corsica Island).
A cogeneration plant has been commissioned in 2004 spring for a generation capacity of approximately 800 MW.
The total capacity of wind farms connected on both public transmission and distribution networks reached 337 MW at the end of 2004.

GR The first power plant owned by an independent generator other than PPC is the fossil fuel power plant of IRON (3 x 50 MW gas turbines). The new power plant was put into commercial operation in December 2004.
The gas turbines power plant in Lavrion (installed capacity of 106 MW) was put into operation to face the high demand and the low level of tension during the summer in the area of Athens.

IT A sensible amount of conventional thermal power plant (including the repowering) has been put into service in 2004. The increase of generating capacity is due to legislative measures which enable the building up of new power capacity under simplified authorisation procedure. Furthermore approximately 1700 MW of conventional thermal units have been shut down and most of this generation is going to be repowered.

HR Ravne 1 (5MW) is the first commercial wind power plant installed in Croatian power system.

LU Solar and wind power plants have been commissioned and contribute for approx. 21 MW generating capacity (13MW Wind Farm Kehmen, 8MW Solar energy).

NL 810 MW of conventional thermal power-generators have been commissioned during the summer.

PT While a 47 MW conventional thermal power plant (Tapada Outeiro) has been shut down, 390 MW of combined cycle and 120 MW of hydro generator have been commissioned in 2004.

CZ A fossil fuel unit (66 MW) has been commissioned in December 2004.

HU Two CCG units have been commissioned (140MW) and a conventional thermal unit (100MW) has been shut down in 2004

PL 160 MW of conventional fossil fuel units were commissioned during 2004, 1MW of hydroelectric power and 75MW of renewable**.**

BA A hydroelectric power station of 30MW has been commissioned in December 2004.

RO Five conventional power plants (representing 300MW) and three hydro power stations (representing 40MW) were commissioned during 2004.

BG Small hydro projects have been commissioned - total capacity 198 MW. Old thermal units have been shut down – total capacity 279 MW.

2.2 Unavailable capacity and reserves management

The generating capacity is not completely available. In the power balance, unavailable capacity is divided into:

- *non-usable capacity,*
- *capacity which is not available in thermal power plants as a result of overhauls or outages,*
- *reserve capacity for network services.*

2.2.1 Non-usable capacity

Non-usable capacity is the part of generating capacity which cannot be scheduled, for different reasons: a temporary shortage of primary energy sources (hydroelectric plants, wind farms), power plants with multiple functions, in which the generating capacity is reduced in favour of other functions (co-generation, irrigation, etc.), reserve power plants which are only scheduled under exceptional circumstances, unavailability due to cooling-water restrictions, etc.

Non-usable capacity for all UCTE countries reached its lowest value in January and its highest value in August. These values respectively represent a rate of 17,5% and 20.3% of the total UCTE generating capacity. These relatively high values, especially in comparison with 2003, may partly be explained by the increase of wind power in the generation mix which is only partly usable.

Table 8	**Non usable capacity**											**GW**
	Jan.	**Feb.**	**March**	**April**	**May**	**June**	**July**	**August**	**Sept.**	**Oct;**	**Nov.**	**Dec.**
BE	0.8	0.8	0.8	0.8	0.8	0.9	1.0	1.0	0.9	0.8	0.8	0.8
DE	17.9	17.7	18	17.6	17.8	18.1	20.5	19.7	17.4	17.8	18.1	19.1
ES	15.6	16.4	16.7	16	16.3	15.9	18.1	17.9	18.8	18.3	18.6	20.2
FR	24.8	24.8	26.6	27.9	27.8	29.5	30	33.7	30.8	26.5	26.7	26
GR	1.1	1.0	1.1	1.1	1.1	1.2	1.1	1.2	1.1	1.2	1.1	1.1
IT	16.8	16.8	16.4	15.6	15.5	16.2	16.8	16.3	16.4	15.6	16.3	16.8
SI	0.3	0.4	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.3	0.2	0.3
HR	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
MK	-	-	-	-	-	-	-	-	-	-	-	-
CS	1.5	1.4	2.3	1.9	1.7	2.6	1.8	2.3	1.8	2.0	1.8	1.2
LU	-	-	-	-	-	-	-	-	-	-	-	0.3
NL	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
AT	3.0	3.0	3.0	5.0	5.0	5.0	4.0	4.0	4.0	3.0	4.0	4.0
PT	1.2	1.1	1.3	1.4	1.9	2.4	2.7	2.6	2.6	1.3	1.5	2.3
CH	2.5	3	4.2	4.1	3.2	3.3	3.1	2.8	2.5	3.4	2.8	2
CZ	2.5	2.4	2.5	2.2	2.5	2.1	2.2	2.5	2.5	2.2	2.5	2.7
HU	1.0	1.0	1.2	1.3	1.3	1.3	1.5	1.5	1.2	1.1	1.0	1.0
PL	2.2	2.1	2.8	3.3	3.8	3.6	3.4	3.6	3.6	2.5	2.2	2.2
SK	1.7	1.6	1.5	1.8	1.7	2.5	2.2	2.4	2.5	2.2	2.2	2
BA	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
RO	4.6	4.4	4.4	4.9	5	4.8	5.0	4.8	4.6	4.7	4.4	4.5
BG	1.4	1.5	1.6	1.7	1.6	1.6	1.8	1.4	1.7	1.7	1.4	1.5
UA-W	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
UCTE 2004	**100.7**	**101.4**	**106.6**	**108.6**	**109**	**112.8**	**117**	**119.8**	**114.4**	**106.4**	**107.6**	**109.7**
UCTE 2003	*84.8*	*87.6*	*98.6*	*103.5*	*102*	*106.9*	*111.4*	*111.9*	*108.1*	*97.5*	*95.3*	*92.5*

National comments:

DE The share of renewable energy sources in generating capacity has again considerably increased in 2004. This increase also explains the high level in non-usable capacity.

ES The hydro conditions in 2004 have been worse than in 2003, so the hydro production has decreased 23%. After summer 2004 the hydro conditions are very dry so the hydro production is under minimum values.

FR Non usable capacity has been lower in January and February, and higher from June to September. This is partly due to differences in hydro and weather conditions.

GR The energy capability factor ranged from 0,6 in December 2004 to 1,41 in December 2004. The hydro reserves were sufficient during the whole year and the hydro production was high due to favourable conditions.

IT Apart the first two months the remaining period of the year has been marked with a good hydro conditions with resulting in a large availability in the reservoir capacity.

SI Hydro conditions were below average in January and February, and above average conditions in July. Hydro production was 27% higher than in 2003. Most overhauls were finished between January and March.

CH At the end of June limitations of hydro generation were necessary due to overhauls in the transmission network

RO Due to the fact that 2003 was droughty and 2004 was normal (from the pluri-annual average point of view), the operating conditions was in normal limits**.**

2.2.2 Thermal power plant overhauls

In the UCTE countries, non-available capacity due to overhauls reached a synchronous peak of 56.5 GW in May which represents 18% of the generating capacity of thermal power plants for that month.

This value is higher than in 2003 and in previous years.

Table 9	Thermal power plant overhauls											GW
	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
UCTE 2004	11.6	18.5	31.9	45.8	56.5	52.8	47.6	51.7	41.5	36.6	25.2	7.9

Table 10	Characteristic values of overhaul programs in the UCTE					
	Max. capacity nuclear & conv. thermal plant December 2004	Overhaul capacity, 3rd Wednesdays at 11:00 a.m.				
		Average value		Maximum Value		
	GW	GW	%	GW	%	month
BE	13.9	0.9	6.3	1.5	10.8	IV
DE	88.6	5.9	6.7	11.5	13.0	VI
ES	40.7	0.9	2.3	2.5	6.0	V
FR	90.3	10.4	11.5	16.9	18.7	VIII
GR	7.2	0.6	8.0	1.2	16.3	III
IT	59.2	4.3	7.3	6.3	10.6	V
SI	1.9	0.1	6.3	0.7	34.7	IX
HR	1.7	0.1	7.2	0.4	22.6	V
MK	0.9	0.1	12.4	0.3	34.6	VI
CS	6.4	1.3	20.9	2.3	36.6	VII
LU	0.5	0.0	0.0	0.0	0.0	n.a
NL	18.7	1.1	6.1	2.5	13.5	V
AT	5.6	0.6	10.0	1.2	20.0	VI
PT	6.2	0.2	2.7	0.6	10.2	IX
CH	3.8	0.3	8.6	1.8	48.6	VIII
CZ	14.1	1.6	11.5	2.7	19.1	VI
HU	7.4	0.8	11.4	1.3	17.6	V
PL	29.3	2.3	7.9	4.9	16.8	VI
SK	4.9	0.6	12.1	1.1	22.4	IV
BA	2.0	0.2	12.2	0.7	35.8	VI
RO	10.7	1.2	11.1	1.9	18.1	VII
BG	9.3	2.1	22.2	3.2	34.4	VI
UA-W	2.5	0.4	14.7	0.6	23.2	IX
UCTE	**425.9**	**35.6**	**8.4**	**56.5**	**13.3**	**V**

National comments:

FR The overhaul program in 2004 was more charged than in 2003.

HU Overhauls in July were covered by import.

GR There is no significant difference between the performed and the scheduled overhauls.

IT In 2004 there is sensible reduction of the overhauls. This is the result of better revisions in the maintenance and better working and availability of power plants.

SI During September the nuclear power plant was out of the operation.

HR Overhauls were reasonably rescheduled in accordance with favourable hydro conditions, consumption and capabilities of production units during the year 2004.
Overhaul of TPP Rijeka was moved from middle of the year (that was the schedule in 2003) to the end of the year (from October to December 2004).

LU The overhaul was scheduled for 10 days in July, but in fact it was performed during 8 days in Mai and 5 days in December. In 2003 the overhaul took 6 weeks and in 2004 only 13 days.

NL Only scheduled overhauls are given, TenneT isn't informed about performed overhauls.

AT The TSO has no complete and detailed information about overhaul programs. To integrate Austrian overhauls to UCTE total results an average value has been taken.

HU Overhauls caused temporary shortage in July. It was covered by import.

RO In summer there has been more overhauls than scheduled due to rescheduled overhauls of some thermal units that couldn't be realised in 2003 (as this was a droughty year and the hydro production was reduced).

BG The scheduled maintenance of the units in the system for 2004 was met 95 %

UA-W In comparison to System Adequacy Forecast 2004-2010 in June, 3 conventional thermal units were in overhaul instead of 2 scheduled.

2.2.3 Thermal power plant outages

In 2004, the maximum value of not available capacity in the UCTE as a result of outages was 20.2 GW in September. This figure represents 5% of the nuclear and conventional thermal generating capacity for the same month. This figure was of 7 to 5% in the previous years.

Table 11	Thermal power plant outages											GW
	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
BE	0.7	0.6	0.6	0.6	0.4	0.5	0.4	0.5	0.6	0.5	0.7	0.7
DE	4.2	3.9	3.0	2.6	2.9	2.6	2.0	2.8	3.2	3.4	2.8	3.6
ES	0.6	0.9	2.4	1.4	2.4	0.6	2.0	1.7	2.0	2.6	1.9	1.2
FR	3.1	5.5	5.5	4.0	5.3	2.4	5.4	6.2	7.5	3.3	1.4	2.7
GR	0.6	0.3	0.6	0.3			0.3	0.2	0.2	0.4	0.1	0.4
IT	2.1	1.8	1.9	3.1	2.1	2.6	1.2	1.9	1.4	0.9	1.5	1.4
SI	-	-	-	-	-	-	-	0.2	-	-	-	-
HR	-	-	-	-	-	-	-	-	-	-	-	-
MK	-	-	-	-	0.2	-	-	-	-	-	-	-
CS	0.8	1.0	1.7	0.9	0.8	0.6	0.8	0.6	0.9	1.6	0.8	0.9
LU	-	-	-	-	-	-	-	-	-	-	-	-
NL	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
AT	-	-	-	-	-	-	-	-	-	-	-	-
PT	0.0	-	-	0.1	-	0.3	0.1	-	0.1	0.5	0.2	0.0
CH	-	-	-	-	-	-	-	-	-	1.1	-	-
CZ	0.2	0.1	0.2	-	0.1	1.1	0.1	-	-	-	-	-
HU	0.2	0.0	0.1	0.1	0.0	0.3	0.3	0.2	0.1	0.4	0.1	0.5
PL	0.5	0.7	0.6	0.5	1.0	0.2	0.5	0.2	1.9	0.3	0.8	1.9
SK	-	-	0.1	0.2	-	-	0.2	-	-	0.1	-	0.2
BA	-	-	0.3	-	0.1	-	0.3	0.2	0.3	0.2	-	0.1
RO	0.7	0.8	0.5	0.4	0.3	0.6	0.5	0.8	0.6	0.8	0.9	0.8
BG	0.4	0.6	0.7	0.6	0.2	0.2	0.2	0.5	0.3	0.2	0.3	0.2
UA-W	-	-	-	-	-	-	-	-	-	-	-	0.1
UCTE	**15.2**	**17.2**	**19.2**	**15.7**	**16.8**	**13.1**	**15.2**	**16.9**	**20.2**	**17.1**	**12.4**	**15.8**

National comments:

GR Since the forced outage is a random event, sometimes there are differences from the forecast.

IT Sensible reduction of outages partly because of better revisions in the maintenance.

SI Outage of the nuclear power plant Krsko (600 MW) occurred on August, 27th, and in the same time thermal power plant Sostanj (300 MW) was in outage.

NL As TenneT isn't informed about outages, an average estimation for outages of thermal power plants is given based on historical known values.

CZ The extremely high value which was observed in June was caused by the outage of NPP Temelin (950 MW).

RO From April to August the number of outages was lower than in the same period of 2003. We consider that this event happened because there were a lot refurbished units in the previously years and the programs of maintenance were more efficient.

BG The total duration of forced outages was 2 % less than the forecasted value.

2.2.4 Reserve for system services

The reserve for system services is the estimated reserve capacity which is required for system operation, for example to face outages above average conditions or abnormal load situation. It is therefore the reserve capacity which is available to TSOs from power plant operators, and includes the following specific elements:

- *The "second reserve" and the "minute reserve", which are made available to TSOs under the contractual terms of the network frequency control service, using the requisite technical facilities;*
- *"Other reserves", such as reserves for voltage control or the management of bottlenecks, which are managed by TSOs under the terms of contracts.*

However, the reserve for system services does not include reserves for long-term outages, which are to be covered by power plant operators.

During 2004, the reserve for system services ranged from 26.2 GW in September (approximately 8.4% of the synchronous load) to 31.5GW in January (approximately 9.1% of the synchronous load). These values are stable over the years because they are the result of the application of the UCTE rules.

Table 12	**Reserve for system services**											**GW**
	Jan.	**Feb.**	**March**	**April**	**May**	**June**	**July**	**Aug.**	**Sept.**	**Oct.**	**Nov.**	**Dec.**
BE	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
DE	7.5	6.9	7.0	7.1	7.1	7.6	6.7	7.0	7.8	7.7	8.0	7.4
ES	0.8	0.7	0.9	0.8	0.8	0.9	0.9	0.9	0.9	0.8	0.9	0.7
FR	4.4	4.3	4.2	4.3	4.0	2.9	2.9	3.1	3.0	3.9	4.3	4.4
GR	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.4	0.4	0.4
IT	3.9	2.4	3.0	2.5	2.2	3.0	3.4	5.2	1.3	3.1	4.3	3.5
SI	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
HR	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
MK	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
CS	1.2	0.8	0.5	0.4	0.5	0.3	1.0	0.9	1.3	0.6	0.9	0.7
LU	-	-	-	-	-	-	-	-	-	-	-	-
NL	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
AT	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
PT	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7
CH	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
CZ	1.0	1.0	1.3	1.3	1.1	0.8	0.8	0.7	0.8	1.0	0.8	0.9
HU	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
PL	2.6	2.3	2.4	1.9	1.5	1.8	1.2	1.8	1.3	2.6	2.1	1.2
SK	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
BA	0.3	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3
RO	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.1	1.1	1.1
BG	1.4	1.3	1.2	1.3	1.2	1.1	1.0	1.0	1.1	1.1	1.2	1.4
UA-W	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
UCTE	**31.5**	**28.3**	**29.1**	**28.2**	**27.0**	**27.0**	**26.6**	**29.3**	**26.2**	**29.3**	**31.0**	**28.7**

National comments:

DE The TSO's system services reserve shows a relatively constant value over the year, between 6% and 7% of the generating capacity.

ES The system service reserve established by the operation market rules has been affected in some hour due to the quick changes in the wind power production, with a maximum increase/decrease of 800 MW/hour. (10% of the wind power capacity)

GR System services reserve is estimated. All the available generating capacity is kept as a reserve, according to the financial offers submitted by the generators, in order to use it for voltage and flow congestion.

HR Favourable hydro conditions during the year 2004 contributed to higher production of hydro units and more flexible operation of Croatian power system.

NL The given system services reserve is only a part of the total capacity for system services reserve. About 300 MW is available as sheddable load.

RO After the resynchronisation of the two UCTE zones, the value for the primary control was diminished in accordance with the UCTE requirements.

BG The values correspond to the predefined optimal values calculated on the basis of probability models.

UA-W Load shedding 45 MW agreed with distribution companies in case of reserve; deficiency may be added to reserve.

2.2.5 Reliably Available Capacity

Reliably available capacity is obtained by deducting non-usable capacity, overhauls, outages and system reserve from the national generating capacity.

Reliably available capacity represents the capacity which is available to power plant operators and electricity traders for meeting their clients' demand.

The Reliably available capacity in the UCTE reached a peak value of 431.2 GW in December – this figure represents 72% of the total generating capacity (593.3 GW in December). The lowest value of 371.3 GW was reached in August – this represents 63% of the total generating capacity (589.2 GW in August). These figures are quite similar to the ones observed in the previous years.

Table 13 **Monthly Reliably available capacity** **GW**

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
BE	12.8	11.8	11.7	11.5	12.6	12.2	12.6	12.0	11.6	12.0	12.2	12.7
DE	82.0	82.9	82.1	79.1	74.2	74.0	73.8	75.3	78.8	79.3	83.6	84.5
ES	45.3	44.3	40.9	42.8	41.5	46.5	43.9	45.3	43.1	43.0	44.0	45.2
FR	81.5	75.5	69.1	67.1	63.9	65.8	63.5	56.7	63.3	72.3	76.9	83.6
GR	7.8	7.9	7.1	7.5	7.8	8.5	8.7	8.7	8.3	7.7	8.0	8.8
IT	51.3	53.8	52.9	52.5	53.2	54.9	55.8	51.9	58.5	57.3	54.2	56.2
SI	2.1	2.1	2.3	2.1	2.1	2.2	2.2	1.9	1.5	2.2	2.3	2.2
HR	3.2	3.2	3.2	3.2	2.8	3.1	3.2	3.2	3.2	2.9	2.9	2.9
MK	1.1	1.1	1.0	1.0	0.8	0.7	1.0	0.8	0.8	0.9	1.2	1.2
CS	6.0	6.4	4.7	5.0	4.6	4.2	4.0	4.0	4.0	4.6	5.8	6.7
LU	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.4
NL	16.2	15.8	16.1	15.2	14.7	15.6	17.7	18.1	17.0	17.1	17.6	17.7
AT	13.5	13.5	13.5	11.6	11.6	11.6	12.6	12.6	12.6	13.6	12.6	12.7
PT	9.0	9.1	8.7	8.6	8.6	7.8	8.0	7.9	7.6	9.1	9.3	8.7
CH	13.9	13.5	12.2	12.3	13.2	11.8	12.9	11.7	13.5	11.9	13.6	14.4
CZ	12.3	11.3	10.4	10.8	9.9	9.4	10.4	10.7	11.0	11.6	11.9	12.4
HU	5.6	5.6	5.4	4.9	4.9	5.1	4.9	4.8	5.3	5.3	6.2	5.9
PL	26.2	26.4	24.8	23.1	22.0	21.2	22.0	21.2	22.0	24.8	25.6	25.9
SK	5.4	5.5	4.8	4.0	4.8	3.8	3.6	3.9	3.7	4.1	4.5	4.9
BA	3.4	3.4	3.1	3.3	3.2	2.9	2.9	3.2	3.1	3.0	3.3	3.2
RO	9.2	9.3	9.5	8.7	8.5	8.0	7.8	8.2	8.8	8.8	9.4	9.9
BG	8.4	8.0	6.9	6.2	6.1	6.2	6.1	6.5	6.8	7.0	7.8	8.7
UA-W	1.5	1.5	1.5	1.5	1.3	1.1	1.2	1.2	1.2	1.4	1.4	1.4
UCTE	**419.4**	**413.6**	**393.4**	**383.7**	**373.8**	**378.4**	**380.3**	**371.3**	**387.4**	**401.5**	**416.0**	**431.2**

2.3 Load

The load at the reference point for the UCTE countries reached a maximum of 360.6 GW in December. This figure is 5 GW higher than the maximum reference load recorded in 2003 (February).

Table 14	**Load in net values at the reference time 11:00 a.m. third Wednesday of every month**											**GW**
	Jan.	**Feb.**	**March**	**April**	**May**	**June**	**July**	**Aug.**	**Sept.**	**Oct.**	**Nov.**	**Dec.**
BE	12.3	11.9	11.2	11.2	10.8	10.7	8.0	10.9	11.1	11.6	11.7	12.4
DE	70.7	70.5	66.7	67.9	67.0	66.5	67.2	64.8	67.8	69.9	72.3	72.5
ES	33.8	33.3	31.8	30.2	29.8	30.4	33.1	27.6	31.5	30.0	33.8	34.5
FR	71.7	68.7	59.8	59.9	54.4	55.1	55.8	48.6	55.3	61.3	69.7	77.3
GR	6.8	7.4	6.2	6.5	6.2	7.6	8.3	7.2	6.9	6.3	6.6	7.5
IT	49.0	49.6	46.3	45.4	44.7	47.6	52.4	34.1	49.1	47.7	48.0	48.0
SI	1.7	1.8	1.7	1.7	1.7	1.6	1.7	1.6	1.6	1.7	1.8	1.9
HR	2.4	2.3	1.9	1.9	1.6	1.8	2.1	2.0	1.9	2.0	2.1	2.4
MK	1.1	1.1	0.9	0.9	0.8	0.7	0.8	0.8	0.8	0.8	1.0	1.2
CS	6.2	6.2	4.8	4.8	4.5	4.1	4.1	4.1	4.2	4.7	5.6	6.6
LU	0.9	0.9	0.9	0.8	0.8	0.8	0.9	0.7	0.9	1.0	1.0	0.9
NL	13.8	13.3	13.0	12.8	12.6	12.7	13.4	13.2	12.9	13.4	13.8	15.1
AT	8.5	8.3	7.7	7.3	7.3	7.5	7.4	7.3	7.8	7.8	8.5	8.9
PT	6.9	6.6	6.1	6.2	6.1	6.4	6.3	5.2	5.9	6.2	6.5	6.9
CH	9.3	9.0	8.6	8.2	8.1	8.5	7.8	8.3	8.5	8.7	9.1	9.4
CZ	9.1	8.8	7.9	7.5	7.3	7.1	6.9	7.1	7.4	8.1	7.8	9.6
HU	5.1	5.1	4.6	4.6	4.7	4.7	5.2	4.8	5.0	4.9	5.2	5.5
PL	19.0	18.8	17.1	15.9	15.8	15.6	15.8	15.9	16.1	17.7	18.4	19.1
SK	4.2	4.1	3.7	3.3	3.2	3.2	3.2	3.5	3.5	3.8	4.0	4.3
BA	1.5	1.5	1.3	1.3	1.2	1.2	1.2	1.3	1.2	1.3	1.5	1.6
RO	7.1	7.1	6.6	6.0	6.2	6.0	6.3	5.8	5.8	6.4	6.9	7.5
BG	6.2	6.0	5.0	4.3	4.1	4.2	4.1	4.3	4.4	4.7	5.7	6.4
UA-W	0.8	0.8	0.7	0.5	0.6	0.6	0.6	0.5	0.6	0.6	0.8	0.9
UCTE	**348.1**	**343.1**	**314.6**	**309.1**	**299.4**	**304.6**	**312.7**	**279.7**	**310.2**	**320.5**	**342.0**	**360.6**

Peak loads were observed in fourteen countries between the 15th and 24th of December. Ten countries met their historical peak load in 2004 (bold lines in table 15). Only Greece has its peak load occurring during summer period.

The simultaneity factor (the common reference load of December divided by the sum of the individual peak loads) in the UCTE countries was 92.6%. As the synchronous peak load of UCTE may be higher than the common reference load, the actual simultaneity factor may be a little higher than this value.

Table 15 **Time of maximum load in the various UCTE countries in 2004**

	Day	Date	Time Maximum	Peak load	Difference from 2003 peak load	Observed T°C	Deviation form average T°C	Historical Peak Load
				MW	%	°C	°C	MW
BE	**Monday**	**20/12/04**	**6:30 PM**	**13 708**	**1.0**	**-1.4**	**-5.1**	**13 708**
DE	Thursday	16/12/04	6:00 PM	77 200	1.2	0.8	0.2	79 700
ES	**Tuesday**	**02/03/04**	**9:00 PM**	**37 724**	**1.3**	**5.0**	-6.0	**37 724**
FR	Wednesday	22/12/04	6:00 AM	81 400	-2.0	2.3	-2.7	83 080
GR	**Monday**	**12/07/04**	**11:30 AM**	**9 370**	**3.6**	**35.0**	**3.0**	**9 370**
IT	**Thursday**	**16/12/04**	**5:00 PM**	**53 606**	**0.4**	**7.6**	**-0.7**	**53 606**
SI	**Thursday**	**25/11/04**	**7:00 PM**	**2 006**	**4.2**	**-1.0**	**-3.0**	**2 006**
HR	Thursday	23/12/04	6:00 PM	2 793	4.5	_	_	2 796
MK	**Friday**	**31/12/04**	**6:00 PM**	**1 432**	_	**4.0**	**-12.0**	**1 432**
CS	Friday	13/02/04	8:00 PM	7 187	-0.7	-9.9	-11.8	7 799
LU	**Thursday**	**18/11/04**	**12:00 PM**	**994**	**3.6**	**6.9**	**2.5**	**994**
NL	**Tuesday**	**21/12/04**	**5:30 PM**	**15 601**	**7.8**	**-2.7**	**-6.3**	**15 601**
AT	**Thursday**	**16/12/04**	**5:30 PM**	**8 962**	**3.1**	_	_	**8 962**
PT	**Thursday**	**09/12/04**	**7:45 PM**	**8 261**	**2.7**	**6.9**	**-2.2**	**8 261**
CH	Wednesday	15/12/04	6:00 PM	9548	_	_	_	9 592
CZ	Thursday	16/12/04	5:00 PM	10 157	-1.1	-4.5	-3.3	10 309
HU	Monday	15/12/04	4/00 PM	6 012	3.5	-2.7	-2.2	6 060
PL	Thursday	23/12/04	5:00 PM	21 146	1.0	2.0	-7.0	24 685
SK	Thursday	16/12/04	5:00 PM	4 319	0.3	-3.6	-6.6	4 471
BA	Friday	24/12/04		1 890	1.9	_	_	_
RO	Monday	15/12/04	5:00 PM	8 508	12.8	-1.0	-1.8	10 248
BG	Thursday	08/01/04	6:00 PM	6 394	-4.8	-6.2	-4.0	8 332
UA-W	Monday	13/02/04	6:00 PM	980	-0.3	-11.0	-10.2	1 018

National comments:

DE The temperatures observed during the day of the peak load and during the whole month have been lower as compared with the previous year. This may be the main reason for the increase.

ES The increase of the peak demand has been only 1,3% due to the fact that January and February have been very warm and it has been in March, when the days are longer, when the peak demand was reached.

FR The peak load was reached in 2004 at the end of December. In 2004 the meteorological conditions were less contrasted than in 2003. So the peak load in 2004 was lower than in 2003.

GR In 12/7/2004 the annual peak load was recorded. The average temperature observed during the day in Athens was 35°C but the highest was 40°C. (blackout on the south of Greece)

IT 53.606 MW represents the maximum historical value for Italy.
In the summer period very high temperatures and humidity has been recorded on July, with consequent increase of the demand. In that period, a maximum peak of the load has been reached.

SI Usually peak load is reached during December (temperatures were not as low as in 2003). In 2004 the peak load was reached in November because external temperature were below normal.

HR There is no much sense in providing temperatures data for Croatian especially average temperature and deviation from it. Because of the data large diversity across country.

NL The peak load of 2004 is 7,8 % higher than the peak load of 2003, but only 3,7 % higher than the peak load of 2002. The average day temperature was 0,7% lower than last year and there was no precipitation**.**

CZ Relatively very high difference between peak load and load at reference time in November was caused by high temperature difference between these days (i.e. 7,7 °C).

SK The average temperature of the winter period during the past several years was 2,95 °C.

RO The annual peak load was higher than in 2003 with +12.81 %.

PL Historical peak load is given as a gross value.

2.4 Analysis of margins

2.4.1 Remaining capacity without exchanges

This value is obtained by deducting the reference load from the reliably available capacity and corresponds to the surplus of capacity available to power plant operators.

However, this should not be classified as an over-capacity. In practice, power plant operators need to have reserve capacity available in addition to the capacity for system service reserve. This capacity is required by power station operators to guarantee the reliability of supply to their clients, and compensate, for instance, longer power plant failures.

The lowest values of remaining capacity are observed in December, January, February and July (12 %), but more than 10 GW higher than in 2003.

The remaining capacity observed at the monthly reference points was sufficient to meet the reference adequacy margin for the whole UCTE level (i.e. provide a 5% generation reserve while at the same time covering the peak load).

The gap noticed during summer period between 2003 and 2004 data can partially be attributable to the heat period of 2003. The reliably available capacity was quite lower during summer 2003 than 2004.

Table 16	**Remaining capacity without exchanges 2004**											**GW**
	net values at the reference time 11:00 a.m. every month											
	Jan.	**Feb.**	**March**	**April**	**May**	**June**	**July**	**Aug.**	**Sept.**	**Oct.**	**Nov.**	**Dec.**
Reliably Available Capacity	419.4	413.6	393.4	383.7	373.8	378.4	380.3	371.3	387.4	401.5	416.0	431.2
Load	348.1	343.2	314.7	309.0	299.4	304.6	312.7	279.7	310.2	320.7	341.9	360.5
Remaining capacity without exchanges in 2004	**71.2**	**70.5**	**78.9**	**74.6**	**74.4**	**73.8**	**67.6**	**91.6**	**77.2**	**80.9**	**74.0**	**70.6**
Remaining capacity without exchanges in 2003	*60.2*	*55.1*	*71.5*	*70.7*	*62.0*	*54.9*	*53.8*	*75.3*	*68.7*	*72.7*	*70.5*	*66.0*

When looking at the situation of individual countries, it can be noticed that remaining capacity without exchanges has met negative values in winter and summer period for Serbia and Montenegro, Slovenia in September and Hungary in July. At these periods the supply of these countries partly relied on imports.

Table 17	**Remaining capacity without exchanges 2004**											**results in GW**
	net values at the reference time 11:00 a.m. every month											
	Jan.	**Feb.**	**March.**	**April**	**May**	**June**	**July**	**Aug.**	**Sept.**	**Oct.**	**Nov.**	**Dec.**
BE	0.5	**-0.1**	0.5	0.3	1.8	1.5	4.6	1.1	0.5	0.4	0.5	0.3
DE	11.3	12.4	15.4	11.2	7.2	7.5	6.6	10.5	11.0	9.4	11.3	12.0
ES	11.5	11.0	9.1	12.6	11.7	16.1	10.8	17.6	11.6	13.0	10.2	10.6
FR	9.7	6.8	9.3	7.2	9.5	10.7	7.7	8.1	8.0	11.0	7.2	6.3
GR	1.1	0.5	0.9	1.0	1.5	0.9	0.3	1.5	1.4	1.3	1.4	1.2
IT	2.3	4.2	6.6	7.1	8.5	7.3	3.4	17.8	9.4	9.6	6.2	8.2
SI	0.4	0.3	0.5	0.4	0.4	0.5	0.5	0.3	**-0.1**	0.4	0.4	0.3
HR	0.9	0.9	1.3	1.3	1.2	1.3	1.2	1.3	1.3	0.9	0.8	0.5
MK	**0.0**	**0.0**	0.2	0.1	0.0	**0.0**	0.2	0.0	0.1	0.1	0.1	**0.0**
CS	**-0.2**	0.2	**-0.1**	0.2	0.1	0.1	**-0.2**	**-0.2**	**-0.2**	**-0.1**	0.2	0.1
LU	0.8	0.7	0.8	0.8	0.8	0.8	0.8	0.9	0.8	0.7	0.7	0.5
NL	2.4	2.5	3.1	2.4	2.1	2.9	4.3	4.9	4.2	3.7	3.8	2.6
AT	5.0	5.2	5.8	4.3	4.3	4.0	5.2	5.3	4.8	5.8	4.1	3.8
PT	2.1	2.4	2.6	2.4	2.5	1.4	1.7	2.8	1.7	2.9	2.8	1.8
CH	4.6	4.5	3.6	4.1	5.1	3.3	5.1	3.4	5.0	3.2	4.5	5.0
CZ	3.2	2.5	2.5	3.3	2.6	2.3	3.5	3.6	3.6	3.5	4.1	2.8
HU	0.5	0.5	0.7	0.3	0.2	0.4	**-0.3**	0.0	0.3	0.4	1.0	0.4
PL	7.2	7.6	7.7	7.3	6.2	5.6	6.1	5.3	5.9	7.1	7.2	6.8
SK	1.2	1.4	1.1	0.7	1.6	0.6	0.4	0.4	0.2	0.3	0.5	0.6
BA	1.9	1.9	1.8	2.0	2.0	1.8	1.6	1.9	1.9	1.7	1.8	1.6
RO	2.1	2.3	2.9	2.7	2.3	2.0	1.5	2.3	2.9	2.3	2.4	2.4
BG	2.2	2.0	1.9	1.9	2.0	2.1	1.9	2.2	2.3	2.3	2.0	2.3
UA-W	0.7	0.7	0.8	0.9	0.7	0.6	0.6	0.7	0.6	0.7	0.6	0.5
UCTE	**71.2**	**70.5**	**78.9**	**74.6**	**74.4**	**73.8**	**67.6**	**91.6**	**77.2**	**80.9**	**74.0**	**70.6**

When considered as a proportion of national generation capacity, values lower than 5% have been met for Belgium in winter, Greece in February and July, Italy in January and July, Hungary all year except in from January to March and November, Slovak Republic in July, September and October:

Table 18	Remaining capacity without exchanges 2004											result in %
	net values at the reference time 11:00 a.m. every month											
	Jan.	**Feb.**	**March.**	**April**	**May**	**June**	**July**	**Aug.**	**Sept.**	**Oct.**	**Nov.**	**Dec.**
BE	3.2	-0.6	3.2	1.9	11.5	9.6	29.5	7.1	3.2	2.5	3.2	1.9
DE	10.0	11.0	13.6	9.9	6.3	6.6	5.8	9.2	9.6	8.2	9.9	10.4
ES	18.4	17.7	14.4	19.9	18.4	25.3	16.6	26.8	17.6	19.6	15.2	15.8
FR	8.4	5.9	8.0	6.2	8.1	9.2	6.6	6.9	6.8	9.5	6.2	5.4
GR	10.3	5.0	8.5	9.9	14.8	8.6	3.1	14.2	13.3	12.9	13.8	11.6
IT	2.9	5.4	8.4	9.0	10.7	9.2	4.3	22.0	11.6	11.8	7.6	10.0
SI	13.5	11.1	19.4	15.9	14.5	18.8	19.4	9.0	-3.7	15.7	15.4	10.3
HR	22.9	24.3	34.8	35.8	32.1	34.6	30.8	33.5	34.6	25.1	21.2	12.3
MK	-0.9	-0.8	15.8	9.1	2.8	-1.6	16.6	3.6	6.9	10.9	10.7	-2.4
CS	-2.1	1.5	-1.2	1.6	1.3	1.1	-1.6	-1.6	-1.9	-1.1	2.2	1.3
LU	47.8	43.7	46.6	50.2	49.2	51.1	47.8	56.0	47.5	42.9	42.8	29.8
NL	12.2	13.0	15.8	12.1	10.7	14.9	20.9	23.7	20.2	18.0	18.3	12.6
AT	29.0	30.2	33.5	24.9	24.8	23.3	29.9	30.4	27.8	33.5	23.7	21.9
PT	19.2	22.6	23.3	22.3	22.1	12.7	14.7	24.2	14.8	25.4	23.8	14.9
CH	26.5	25.7	21.0	24.0	29.3	19.2	29.4	19.8	29.0	18.2	25.9	29.1
CZ	19.9	15.5	15.5	20.5	16.1	14.3	21.7	22.2	22.2	21.6	25.3	17.3
HU	5.8	6.0	8.7	3.7	2.5	4.7	-3.2	0.2	3.2	4.6	12.1	4.9
PL	22.8	24.0	24.2	22.8	19.6	17.6	19.4	16.7	18.8	22.5	22.8	21.6
SK	15.0	17.5	13.8	8.8	20.0	7.5	5.0	5.0	2.5	3.8	6.2	7.5
BA	48.2	47.9	44.6	50.5	49.7	44.0	41.3	47.6	48.3	43.6	45.2	39.0
RO	12.8	13.8	17.7	16.1	13.9	12.1	9.2	14.0	17.6	13.9	14.5	14.1
BG	17.9	16.7	15.5	15.5	16.6	16.8	15.8	17.6	19.1	19.2	16.5	18.8
UA-W	27.1	26.1	30.3	36.0	28.9	22.3	24.7	26.5	23.9	28.4	23.3	20.0
UCTE	**12.3**	**12.2**	**13.6**	**12.8**	**12.8**	**12.6**	**11.5**	**15.6**	**13.1**	**13.7**	**12.5**	**11.9**

National comments:

DE During all the months, the remaining capacity without exchanges totalled more than 5 % of the generating capacity. It was higher than anticipated in the forecast of January 2004 due to the fact that the real load was lower than expected. The remaining capacity without changes in July 2004 was also higher than expected, because reliably available capacity was higher than expected (i.e. overhauls, outages and system services reserves were lower than expected).

ES The remaining capacity has increased due to the new capacity commissioned (2800 MW of combined cycle plants and 2000 MW of wind plants) but decreased due to the fact that the year has been very dry and the availability of hydro power has decreased.

FR The evolution of the remaining capacity during the year is similar to the previous years (in winter the remaining capacity is lower). However, a global fall of the remaining capacity has been observed.

GR The remaining capacity without exchanges is low in heavy load periods and not sufficient for the safety of the system at peaks. Imported electrical energy covers the peaks of the load.

IT A major availability of power and operational reserve. This is a result of actions performed by GRTN. Better revisions in the maintenance and working of the power plants, and good hydro conditions result in a major availability of hydraulic production and new power plants on duty.

SI The remaining capacity without exchanges was negative in September because the nuclear power plant was out of the operation.

NL The given remaining capacity has a limited significance, because values of exact outages are not available, and as the load of the monthly statistics represents about 85% of the total load of the Netherlands.

RO The remaining capacity was over 1514 MW , that is over 19% of the Reliably Available Capacity

2.4.2 Remaining capacity without exchanges minus margin against peak load

It is interesting to analyse the remaining capacity without exchanges in comparison with two figures:

- *a margin against peak load, which is the difference between the actual peak load (unknown) and the load at reference time, thus necessary to face the actual peak load.*
- *a 5% of generating capacity availability which is considered by many operators as the level necessary to guarantee the reliability of supply to their clients, and compensate, for instance, longer power plant failures.*

As a simplification, remaining capacity without exchanges minus margin against peak load is called "remaining margin". Expressed as a percentage of generating capacity, this quantity is checked to be at least 5%.

Let us finally note that the objective to have a 5% margin on the provisional point of view may be respected even if the realised margin is eventually lower.

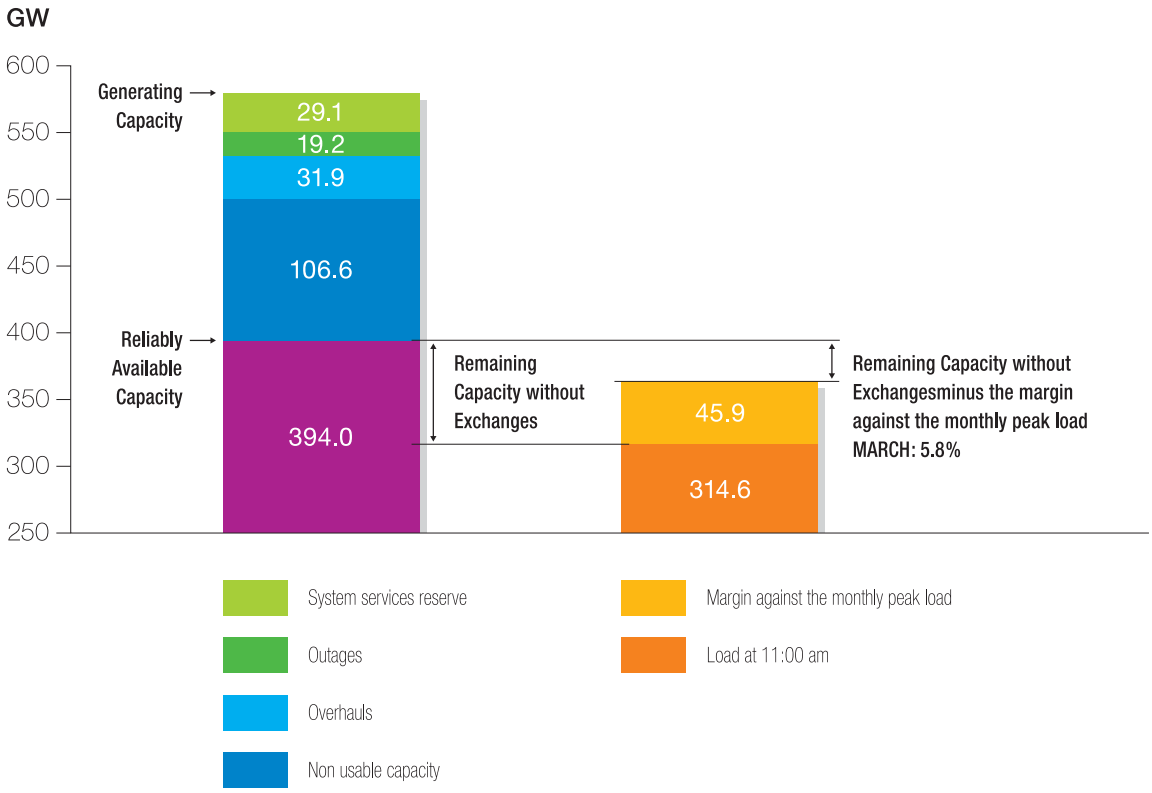
The remaining margin (remaining capacity without exchange minus margin against peak load), as a proportion of total generation capacity, has reached its lowest level in March (5.8%), November and December (6.8%).

These values, together with the margin against peak load, expressed as a proportion of the monthly peak load, are shown in Figure 3. This margin provides an estimate of the potential fluctuations in demand which the remaining capacity would be required to cover.

Table 19	**Remaining margin**											**GW**
	Jan.	**Feb.**	**March**	**April**	**May**	**June**	**July**	**Aug.**	**Sept.**	**Oct.**	**Nov.**	**Dec.**
Remaining capacity without exchanges	71.2	70.5	78.9	74.6	74.4	73.8	67.6	91.6	77.2	80.9	74.0	70.6
Margin against the monthly peak load	31.5	30.4	45.9	34.7	29.0	24.1	21.1	45.3	25.4	24.4	35.2	31.0
Remaining margin	**39.7**	**40.1**	**33**	**39.9**	**45.4**	**49.7**	**46.5**	**46.3**	**51.8**	**56.5**	**38.8**	**39.6**

Figure 3 | **Remaining capacity and margins**

Figure 4 | **Remaining Capacity minus margin against the peak load in March**

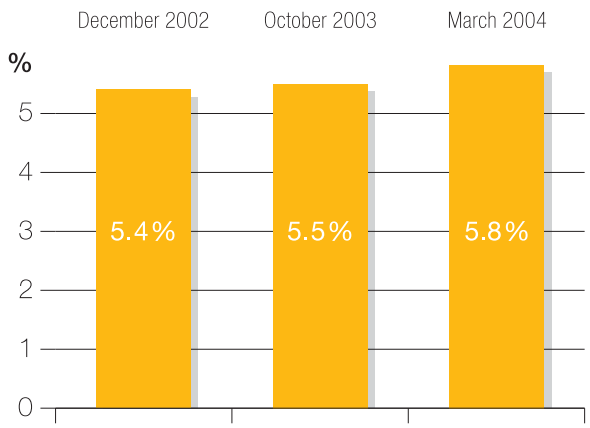


As shown in tables and chart bars above the remaining capacity was sufficient during the whole year. The lowest value was met in March with 5.8% of the global generation capacity.

This indicator of 5.8% may be compared with the level of 5% targeted for constitution of provisional margin and followed along years.

Nevertheless it must be handled carefully: representativeness of every country is variable and total UCTE perimeter covered in this note is not 100% of load. In fact the error of estimation may be around 5 GW on total UCTE load and generation at 11:00 am, so that the actual margin in March would better be presented as 5.8 % ± 1%.

Figure 5 **Lowest values of remaining capacity minus margin against the peak load as proportion of total grid generation capacity from 2002 to 2004**

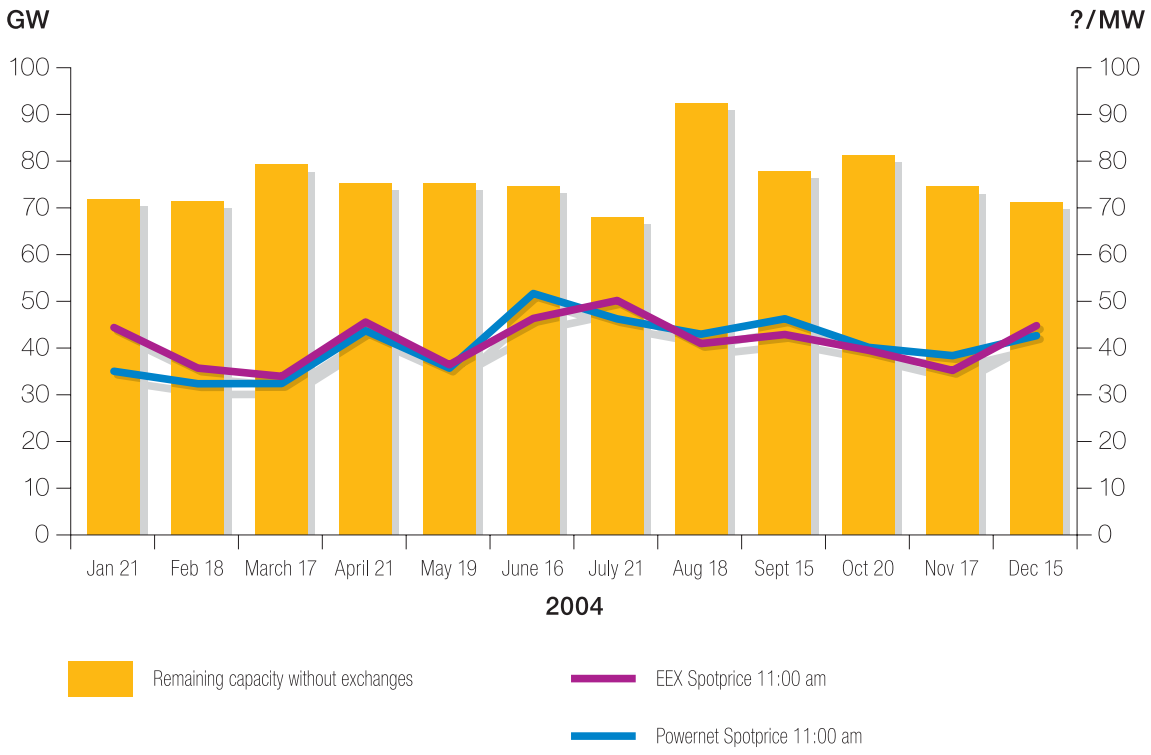


2.4.3 Correlation between margin and market prices

Figure 6 shows the correlation between spot market prices on EEX and Powernext and remaining capacities without exchanges for monthly hours at reference time.

During year 2004 a partial correlation, less remarkable than in 2003, can be observed between prices and remaining capacities without exchanges. When remaining capacities are increasing from a month to an other price are slighting decreasing (this is noticeable from March to December).

Figure 6 | **Market prices – remaining capacity without exchanges**



2.5 Balance of physical exchanges

The balance of physical exchanges represents the net exchange in the UCTE as a whole.

The UCTE balance of physical exchanges is generally import – oriented except from June to October.

Table 20	Balance of physical exchanges											GW
	net values at the reference time: 11:00 a.m. every month negative values correspond to exports											
	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
BE	1.0	1.4	1.1	1.2	1.2	0.9	-0.9	1.6	1.6	1.8	1.3	1.3
DE	3.8	3.1	3.3	3.0	4.3	1.7	3.9	1.7	0.2	1.1	2.3	0.9
ES	-0.9	-1.0	0.9	-1.9	-0.7	-1.3	0.6	-1.4	0.8	-1.0	0.1	1.1
FR	-9.3	-6.5	-8.2	-6.5	-7.9	-5.6	-5.4	-5.4	-5.2	-9.1	-5.3	-5.9
GR	0.5	0.2	0.2	0.4	0.3	0.5	0.9	0.9	0.2	0.2	0.2	0.2
IT	6.1	6.3	6.5	5.9	5.2	5.0	4.7	2.6	5.7	6.5	6.5	6.4
SI	0.1	0.0	-0.1	-0.4	-0.3	-0.2	-0.1	0.1	0.1	-0.2	-0.4	0.0
HR	0.6	0.3	0.2	0.3	0.3	0.3	0.4	0.3	0.2	0.7	0.5	0.8
MK	0.3	0.1	0.1	0.0	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.2
CS	0.9	0.6	0.7	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4
LU	0.2	0.3	0.7	0.1	0.1	0.3	0.4	0.1	0.3	0.3	0.3	0.4
NL	3.0	2.7	2.5	2.4	2.1	2.8	1.5	1.5	1.5	2.3	1.9	2.9
AT	-0.8	-0.5	0.6	-0.1	0.4	-0.9	-0.1	0.1	-0.4	0.6	0.2	0.6
PT	0.7	0.7	0.4	0.9	0.8	0.8	0.4	0.9	0.5	0.8	0.0	0.0
CH	-0.1	-0.4	-1.0	-0.8	-2.6	-2.3	-4.0	-0.7	-1.8	-0.9	0.3	-1.1
CZ	-1.6	-1.4	-1.5	-1.7	-1.4	-1.1	-1.8	-2.2	-1.7	-1.8	-1.7	-1.4
HU	1.1	1.2	1.2	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	0.8
PL	-2.0	-1.8	-2.1	-1.6	-1.3	-1.2	-1.7	-1.5	-2.2	-2.2	-1.9	-1.8
SK	-0.1	-0.1	-0.1	0.1	-0.3	-0.3	0.1	0.0	-0.2	-0.1	-0.2	0.0
BA	-0.5	-0.3	-0.5	-0.1	-0.2	0.0	-0.1	-0.2	-0.2	-0.4	-0.3	-0.3
RO	-0.3	-0.3	-0.2	0.0	-0.1	-0.1	-0.1	-0.1	-0.2	-0.4	-0.7	-0.5
BG	-0.9	-0.8	-0.6	-0.4	-0.5	-0.6	-0.5	-0.8	-0.8	-0.9	-0.8	-0.9
UA-W	-0.5	-0.5	-0.5	-0.4	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
UCTE	**1.2**	**3.4**	**3.7**	**1.8**	**0.3**	**-0.4**	**-0.8**	**-1.2**	**-0.5**	**-1.5**	**3.6**	**3.4**

National comments:

DE During all months of the year 2004, a positive exchange balance at reference time could be observed such as during the previous years.

FR As far as France is concerned, it should be noticed that the instantaneous balance of exchanges remained largely export-orientated throughout the whole of 2004, including during maximum consumption periods.

GR There is a slight increase in imports compared to 2003.

IT As regards to 2003 the export has signed a sensible decrease (-9.8%). This reduction, particularly pronounced in the Italian western border, it is resulting from a revision in the exporting scheduled energy after the black-out occurred September 2003, the 28th.
Limits of the maximum transfer (NTC) have changed during the year with daily fluctuations both at night and during the day.

SI The similar mounts of exchanges were observed as in the previous year. Exchanges balance varies from -246 MW to 433 MW.

HR Exchanges between Croatia and neighbouring countries were higher mainly due to increased transits and import of cheaper electrical energy.
Transits through Croatian power system were approximately 7.4% higher than in the year 2003. They were higher especially from January to April 2004 and from November to December 2004 (after reconnection of UCTE 1st and 2nd synchronous zones and start of trading between two former UCTE zones). Energy was mostly transited from Bosnia and Herzegovina to Slovenia and from Hungary to Slovenia. However, a large part of physical exchanges between Croatia and neighbouring countries were loop flows

PL Last year we noticed an increase in exchanges in export.

RO The import of energy was higher than in the previous year but the export remain at the same level**.**

UA-W In comparison to 2003 total level of exchange program was increased from 450MW to 500MW.

2.6 Remaining capacity with exchanges

For the UCTE, the remaining capacity including exchanges ranges from 66.8 GW in July to 90.5 GW in August.

These values are 10GW higher than in 2003.

Table 21	**Remaining capacity with exchanges**											**GW**
	Net values at the reference time: 11:00 a.m. every month											
	Jan.	**Feb.**	**March**	**April**	**May**	**June**	**July**	**Aug.**	**Sept.**	**Oct.**	**Nov.**	**Dec.**
BE	1.5	1.3	1.6	1.5	3.0	2.4	3.7	2.7	2.1	2.2	1.8	1.6
DE	15.1	15.5	18.7	14.2	11.5	9.2	10.5	12.2	11.2	10.5	13.6	12.9
ES	10.5	10.1	10.0	10.7	10.9	14.8	11.3	16.3	12.4	12.0	10.3	11.8
FR	0.4	0.3	1.1	0.7	1.6	5.1	2.3	2.7	2.8	1.9	1.9	0.4
GR	1.5	0.7	1.1	1.5	1.8	1.4	1.2	2.4	1.6	1.5	1.7	1.4
IT	8.4	10.5	13.1	13.0	13.7	12.3	8.1	20.4	15.1	16.1	12.7	14.6
SI	0.4	0.3	0.5	0.0	0.1	0.3	0.4	0.4	0.0	0.2	0.1	0.2
HR	1.5	1.3	1.5	1.7	1.5	1.6	1.5	1.6	1.5	1.7	1.3	1.2
MK	0.3	0.1	0.3	0.2	0.2	0.1	0.4	0.2	0.2	0.3	0.3	0.2
CS	0.7	0.7	0.5	0.4	0.3	0.3	0.0	0.1	0.1	0.2	0.5	0.6
LU	1.0	1.0	1.4	0.9	0.9	1.1	1.1	1.1	1.0	1.0	1.0	0.9
NL	5.4	5.2	5.6	4.7	4.2	5.7	5.8	6.3	5.7	6.0	5.7	5.5
AT	4.2	4.7	6.4	4.2	4.7	3.1	5.0	5.4	4.4	6.3	4.3	4.4
PT	2.8	3.1	3.0	3.4	3.3	2.2	2.1	3.7	2.2	3.8	2.8	1.7
CH	4.5	4.1	2.6	3.3	2.5	1.0	1.1	2.7	3.2	2.3	4.8	3.9
CZ	1.6	1.1	1.0	1.6	1.2	1.2	1.7	1.4	1.9	1.7	2.4	1.4
HU	1.6	1.6	1.9	1.4	1.4	1.5	1.0	1.3	1.4	1.6	2.2	1.3
PL	5.2	5.8	5.6	5.7	4.9	4.4	4.4	3.8	3.7	4.9	5.3	5.0
SK	1.1	1.3	1.0	0.8	1.3	0.3	0.5	0.4	0.0	0.2	0.3	0.6
BA	1.4	1.7	1.3	1.9	1.8	1.8	1.5	1.7	1.8	1.3	1.5	1.3
RO	1.8	2.0	2.7	2.6	2.2	1.9	1.4	2.3	2.7	1.9	1.8	1.9
BG	1.3	1.3	1.3	1.5	1.5	1.5	1.4	1.4	1.5	1.5	1.2	1.4
UA-W	0.2	0.2	0.3	0.5	0.2	0.1	0.1	0.2	0.1	0.2	0.1	0.0
UCTE	**72.4**	**73.9**	**82.6**	**76.4**	**74.7**	**73.3**	**66.8**	**90.5**	**76.6**	**79.4**	**77.6**	**74.0**

National comments:

ES The remaining capacity has decreased due to the change of the exchanges from imports to exports, but not much. As Spain has more wind power every year, the availability of remaining capacity is decreasing, as we consider that only 8-10% of wind power installed are equivalent to the availability of thermal plants. The fluctuation of wind power production is making more difficult the calculation of availability.

GR The remaining capacity is higher in retrospective than in the forecast due to:
the load is lower in the retrospect
the non usable capacity is lower due to favourable hydro conditions
due to the commissioning of the new power plant in Lavrion during summer
The remaining capacity consisted mostly of hydro capacity . The favourable hydro conditions during the whole year enforced the availability of the remaining capacity.

SI Remaining capacity is not significantly different than in 2003, but actually the trend is slowly decreasing.

NL The remaining capacity in some summer months of 2004 was higher than in 2003 because there were no cooling water restrictions in 2004
For several reasons it isn't possible to compose an exact image of the power balance for the Netherlands. Therefore the results in terms of remaining capacity should be considered with a limited significance.
TenneT isn't informed properly about the availability of plants and their maximum output, and only receives information about day-ahead programs and power available for system balancing within a bidding system.
Furthermore there are hundreds of relative small cogeneration-producers in industry and agriculture who bring their surplus power on the network, but exact amounts of this decentralised power are not known as it appears as load diminution and as the volume can vary according to industrial activity, climatologic conditions, etc.
It should be remarked also that the load as observed by TenneT concerns only the load of the high voltage grid. Embedded and dispersed generation and the connected load in lower voltage networks isn't detected. This generation and load is estimated to be about 15% of the national load.

PT In January and July the remaining capacity with exchanges is higher than expected due the high imports verified. In January the load was much lower than expected due to very mild temperatures observed.
Despite the lower hydro conditions the remaining capacity is still acceptable due to the new installed capacity.

PL Remaining capacity is available continuously.

CZ Remaining capacity was higher than 1000 MW during all the year 2004. (It was a bit higher than previous year.) But this remaining power couldn’t be exported by reason of the deficit of the transmission capacities from Czech Republic to Germany and Austria. (There was 100% congestion on these interconnections – see part Transmission System Adequacy.)

BG: A strong decrease is observed in 2004 compared to 2003 (-23%). This is due to an higher exchange negative balance**.**

RO In July the remaining capacity was lower than the forecast because of the higher refurbishment program approved after the forecast.
The remaining capacity was permanently higher than the margins against the monthly peak load.

UA-W Change in comparison to 2003 is connection with bringing calculation of system service reserves (line 10) in accordance with UCTE requirements.

ENERGY BALANCE RESULTS 3

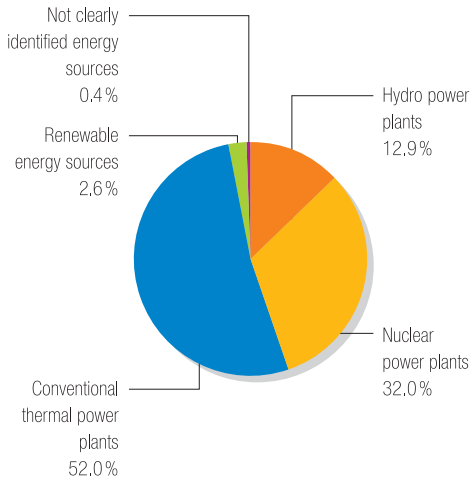
3 Energy Balance results

3.1 Electricity production

In 2004, total generation in the UCTE countries was 2492 TWh, which represents an increase of 1.7% compared to 2003 (2452 TWh).

Graphic below shows the weight of every kind of generation in 2004. 84% of total UCTE generation is covered by conventional and nuclear thermal power plants.

Figure 7 | Generation mix



3.1.1 Hydroelectric power plants

The capacity utilisation factor (in %) is calculated as the ratio of electricity produced over the period considered to the theoretical electricity production under conditions of maximum potential capacity.

In 2004, the production has been characterised by higher hydro conditions in Eastern and Southern Europe.

Figure 8 | Electricity production by hydroelectric power plants

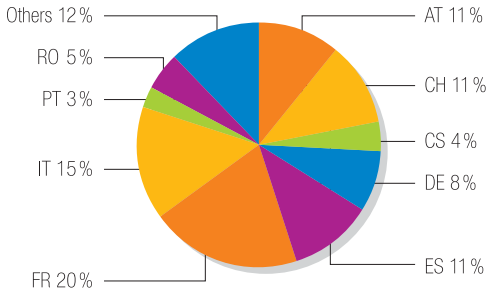


Table 22	Hydro power plants					
	Maximum capacity January		Production		Capacity utilisation	
	2003	2004	2003	2004	2003	2004
	GW	GW	TWh	TWh	%	%
BE	1.5	1.5	1.3	1.6	9.9	12.2
DE	8.7	8.7	23.8	26.7	31.2	35.0
ES	18.0	18.3	43.0	33.9	27.3	21.2
FR	25.4	25.4	60.4	64.5	27.1	29.0
GR	3.1	3.1	5.2	4.9	19.4	18.3
IT	20.7	20.7	43.6	47.9	24.0	26.4
SI	0.9	0.9	2.7	3.6	35.3	47.7
HR	2.1	2.1	4.9	7.0	26.6	38.1
MK	0.4	0.4	1.4	1.5	37.4	40.3
CS	3.5	3.5	10.7	13.4	34.9	43.7
LU	1.1	1.1	1.0	0.8	9.6	8.4
NL	0.0	0.0	0.1	0.1	30.9	30.9
AT	11.2	11.2	32.2	34.4	32.8	35.1
PT	4.6	4.6	15.6	9.9	38.8	24.6
CH	13.2	13.2	36.4	35.1	31.5	30.4
CZ	2.1	2.1	1.8	2.6	9.8	14.1
HU	0.0	0.0	0.2	0.2	49.6	49.6
PL	2.2	2.2	3.1	3.5	16.2	18.2
SK	2.4	2.4	3.5	4.0	16.6	19.0
BA	2.0	2.0	4.6	6.0	25.8	33.7
RO	6.0	6.0	13.0	16.3	24.9	31.1
BG	2.9	2.9	2.7	3.3	10.7	12.9
UA-W	0.0	0.0	0.1	0.1	42.3	59.2
UCTE	**132.1**	**132.3**	**312.5**	**321.3**	**27.0**	**27.7**

National comments:

DE Hydraulicity increased to 1.04 (after the severe drought in summer 2003) and was thus slightly above the multi-annual average. Consequently, there was an increase in hydro generation of about 12% as compared to the previous year.

ES The hydro production has decreased 23% as the year has been much dryer than 2003, specially after summer.

FR The energy capability factor in France was 6 points higher in 2004 compared to 2003 but remained 10 points less than the value in normal hydro conditions.
The hydro-electric generation rose by 0.4 % compared with 2003.

GR There is a slight decrease in hydro generation with respect to the previous year but it remains high. There is also an increase in renewable generation.

SI Better hydro conditions in 2004, 27% higher hydro generation with the respect to the year 2003.

HR Production of hydro power stations was much higher (approximately 43% higher than in the year 2003) due to favourable hydro conditions during the year 2004.

NL Hydro is only a small share, the given value is an estimation, no specific information available.

PT Contrariwise to last year the hydro power production was reduced. The hydroelectric capacity factor which had been 1.33 in 2003 was just 0.81 in 2004.

CH Medium hydro conditions have lead to a lower hydro generation (3,6 % less) compared with the year 2003.

SK Better hydro conditions in 2004 compared to 2003 allowed an increasing production.

RO The production in Hydro Power Plants was higher by 25.1% than in the previous year due to the fact that 2004 was a normal hydrological year compare to 2003 which was a droughty one.

3.1.2 Nuclear power plants

Generation from nuclear power stations has been approx. 9 TWh higher in 2004 as compared to 2003, because of better availability in France, Spain and Germany.

Table 23	**Nuclear power stations**					
Country	**Maximum capacity January**		**Production**		**Capacity utilisation**	
	2003	**2004**	**2003**	**2004**	**2003**	**2004**
	GW	**GW**	**TWh**	**TWh**	**%**	**%**
BE	5.8	5.8	44.9	44.9	88.4	88.4
DE	20.5	20.5	156.4	158.4	87.1	88.2
ES	7.7	7.9	59.2	60.9	87.8	88.3
FR	63.4	63.4	420.0	426.8	75.6	76.8
GR	-	-	-	-	-	-
IT	-	-	-	-	-	-
SI	0.7	0.7	5.0	5.2	84.6	88.8
HR	-	-	-	-	-	-
MK	-	-	-	-	-	-
CS	-	-	-	-	-	-
LU	-	-	-	-	-	-
NL	0.4	0.4	3.8	3.6	96.6	91.5
AT	-	-	-	-	-	-
PT	-	-	-	-	-	-
CH	3.2	3.2	26.9	25.4	96.1	90.7
CZ	3.5	3.5	24.4	24.8	79.6	80.9
HU	1.8	1.8	10.4	11.2	67.6	72.9
PL	-	-	-	-	-	-
SK	2.6	2.6	16.5	15.7	72.4	68.9
BA	-	-	-	-	-	-
RO	0.7	0.7	4.6	5.1	79.5	89.7
BG	2.9	2.9	16.0	15.4	63.6	61.0
UA-W	-	-	-	-	-	-
UCTE	**113.1**	**113.3**	**788.1**	**797.5**	**79.5**	**80.4**

National comments:

DE Nuclear power generation increased by about 1% as compared with the preceding year. Accounting for 28% of electricity production it still has the highest share of the total generation.

ES The nuclear production has increased 2,4%, related with scheduled maintenance in 2004

FR The energy availability factor of nuclear power stations was stable in 2004 compared to 2003. The nuclear power stations generation grew by 1.7 %.

SI Overhaul of the nuclear power plant was finished before planned as well as no outages – in the year 2003 an outage of the nuclear power plant occurred in the end of August.

HU After all safety measures had been taken, Unit 2 of Paks Nuclear Power Plant (468 MW), that was out of service since April 2003 when some fuel assemblies mechanically damaged in the cleaning tank, has been being operational since September 2004.

RO The nuclear production was 12.7% higher than in 2003. In 2003 nuclear production had been switched off during 25 days due to the lack of cooling water.

3.1.3 Conventional thermal power plants

In 2004, electricity production from conventional thermal power plants in the UCTE was 1293.4 TWh, which represents an increase of 22 TWh (+1.75%) with regards to the previous year.

A strong increase in Spain can be observed over 2003 / 2004 (+18 TWh).

Table 24	Conventional thermal power plants					
	Maximum capacity January		Production		Capacity utilisation	
	2003	2004	2003	2004	2003	2004
	GW	GW	TWh	TWh	%	%
BE	8.1	8.1	34.5	34.8	48.6	49.0
DE	67.8	68.1	354.0	352.2	59.6	59.0
ES	27.9	29.3	110.6	129.4	45.3	50.4
FR	26.1	26.1	43.3	51.8	18.9	22.7
GR	7.1	7.1	42.6	43.2	68.8	69.8
IT	54.6	56.0	229.0	231.8	47.9	47.3
SI	1.3	1.3	4.6	4.6	41.5	41.4
HR	1.7	1.7	6.7	5.4	46.1	37.1
MK	0.9	0.9	4.9	4.7	61.7	59.5
CS	6.4	6.4	25.8	25.3	46.0	45.1
LU	0.5	0.5	2.6	3.1	61.3	73.7
NL	17.5	17.5	85.7	86.4	56.0	56.5
AT	5.6	5.6	23.8	17.2	48.6	35.1
PT	5.7	5.7	24.0	27.8	47.9	55.5
CH	0.6	0.6	2.9	2.9	55.0	55.9
CZ	10.5	10.5	50.5	50.5	54.9	54.9
HU	5.7	5.7	18.6	16.6	37.3	33.3
PL	29.4	29.4	135.7	138.3	52.6	53.6
SK	2.3	2.3	6.2	6.0	30.8	29.8
BA	2.0	2.0	6.6	6.6	38.5	38.5
RO	9.8	9.8	34.0	30.5	39.5	35.5
BG	6.4	6.4	17.2	16.7	30.6	29.7
UA-W	2.5	2.5	7.3	7.5	33.2	34.2
UCTE	**300.3**	**303.4**	**1271.1**	**1293.4**	**48.3**	**48.7**

National comments:

BE The generation of conventional thermal power plants includes the generation from plants fired with biomass and waste.

DE The generation of conventional thermal power stations has decreased by about 2%.

ES All the thermal generation has increased the production because of the dry conditions and the increase of the demand.

FR French increase corresponds to the integration of conventional independent producers. The fossil fuel power stations generation decreased by 3 % due to its role of achieving balance between demand and generation.

GR In 2004 the fossil fuel generation was higher than in 2003. The total fossil fuel generation represents 87,89% of total generation. The contribution of the different fuels was: lignite 75,18%, natural gas 18,6% and oil 6,22%.

HR Production of fossil fuel power stations was approximately 20% lower than in the year 2003 due to higher production of hydro power stations and lower prices of electricity. In addition, new fossil oil/gas production units in combined thermal power plant TE-TO Zagreb produced less than planned because of additional warranty testing.

NL The given share is derived from data of National Statistics Organisation. TenneT isn't informed with specific information such as fuelling, performance and constraints.

PT With the commissioning of the 2nd unit of Ribatejo (Combined cycle power station), the natural gas installed power equalled the value of the coal installed power. In consequence, the natural gas production has grown by 70% and fuel oil production was reduced by 25%, the latter just representing 4% of the total consumption in 2004.

RO The production in thermal units was 10.1% lower than in 2003.

3.1.4 Renewable energy sources generation

Electricity production from renewable sources accounts for 72.3 TWh in 2004; it represents a nearly 32% increase compared to 2003.

The overall part of renewable energy, including hydro generation, is now approximately 16% of UCTE consumption[1] (the global European Union target being 22 % in 2010).

Table 25	Renewable energy	
	Production	
	2003	2004
	TWh	TWh
BE	0.1	0.1
DE	25.8	32.8
ES	14.3	18.7
FR	1.0	3.5
GR	0.7	1.0
IT	6.4	6.9
SI	0.0	0.0
HR	0.0	0.0
MK	0.0	0.0
CS	0.0	0.0
LU	0.0	0.1
NL	3.6	4.0
AT	0.6	1.4
PT	1.1	1.7
CH	0.8	0.9
CZ	0.0	0.0
HU	0.1	0.8
PL	0.3	0.4
SK	0.0	0.0
BA	0.0	0.0
RO	0.0	0.0
BG	0.0	0.0
UA-W	0.0	0.0
UCTE	**54.8**	**72.3**

National comments:

DE Due to an increase of about 2000 MW and better wind conditions than in the previous year, wind power generation increased by more than 30%. Its share in total production amounted to approx. 4%.

[1] This figure is only indicative, especially because "not clearly identified energy sources" is likely to include renewable. Furthermore, the method used by European Union to compute this ratio is slightly different as it includes the consumption of the power plants auxiliaries.

ES There has been an increase of 25% in installed capacity of renewable, mainly due to the new wind power plants.

FR Though the variation between 2004 and 2003 figures is manly due to a change in data perimeter, renewable energy sources generation actually rose by 15 %, of which wind generation's rise achieve 40 %.

GR There was no significant contribution of the renewable generation to the total generation. In the monthly statistics the renewable generation is included in the figures showing the conventional thermal generation since there is no appropriate field for these figures.

IT The production increased by 6.8% between 2003 and 2004. These generations are taken into account in the monthly statistics and included in the thermal balance voice. In the national energy plan, the wind energy is foreseen in the next 10 years of total capacity around 200 MW.

NL The given value is an estimation, no specific information is available.

PT The thermal generation from renewable energy sources and wind production increased 50% compared to previous year. The wind production increased by 60%, reaching 1.7% of the consumption. The thermal renewable production is included in the conventional thermal production.
The wind production is added to hydroelectric production in order to close the monthly consumption.

CZ The rate of the renewable energy sources is quite negligible.

PL A slight increase of renewable energy sources generation has been noticed.

SK The production of wind power plants was 7 712 MWh in 2004.

BG Renewable energy resources are included in hydro generation

3.2 Electricity consumption

Electricity consumption in the UCTE countries in 2004 reached 2434.5 TWh and exceeded last year's consumption by +39.9 TWh (+1,7%). This demand growth rate is lower than in 2003.
Fig 9 and Table 26 show that in many countries this growth rate is limited. At the UCTE level the growth rate is of the same order of magnitude in winter and in summer.

Table 26	Electricity consumption			
	2003	2004	Variation 2004/2003	
	TWh	TWh	TWh	%
BE	85.8	87.5	1.7	2.0%
DE*	550.0	554.0	4.0	0.7%
ES*	225.9	235.1	9.2	4.1%
FR*	467.3	477.2	9.9	2.1%
GR	50.3	51.2	0.9	1.8%
IT*	320.7	322.0	1.3	0.4%
SI	12.4	12.6	0.2	1.6%
HR	15.4	16.0	0.5	3.4%
MK	7.3	7.4	0.1	1.5%
CS	39.2	39.9	0.7	1.8%
LU	6.1	6.3	0.2	2.7%
NL*	109.8	111.1	1.3	1.2%
AT*	55.6	56.6	1.0	1.8%
PT	43.1	45.5	2.4	5.6%
CH*	58.9	60.0	1.1	1.9%
CZ	60.0	61.5	1.5	2.5%
HU	38.4	38.3	-0.1	-0.3%
PL	126.7	130.6	3.9	3.1%
SK	26.4	26.3	-0.1	-0.4%
BA	11.2	10.7	-0.5	-4.5%
RO	49.4	50.7	1.3	2.7%
BG*	30.6	29.5	-1.1	-3.6%
UA-W	4.1	4.4	0.3	7.3%
UCTE	**2 394.6**	**2 434.5**	**39.9**	**1.7%**

** 2003 data were updated since UCTE – System Adequacy Retrospect 2004*

National comments:

FR The weather conditions in 2004 were not as pronounced as those in 2003. However, there was a relative cold spell from February to May and then at the end of the year 2004.

Compared with 2003, the 2004 national consumption rose by 2.1 % (10 TWh), (about 0.4 points are due to a number of working days in 2004 greater than in 2003 - 29th of February and four bank holidays situated on week ends against one in 2003).
This increase is also linked to a greater use of heating equipment because of the 2004 temperatures, that were colder than in 2003 by 0.8 °C on average.

GR The increase is 1.8% in consumption in 2004 as regard as 2003.

IT A decrease of 1,1 % in the summer semester which confirm of a standard season with respect the same period of 2003.

SI Consumption was not so much higher with the respect to the year 2003 as it was in the year 2003 with the respect to the year 2002. Mild winter and not too hot summer are the main reasons for that.

HR Increase of consumption was 3.4%, which is slower increase rate than the one observed last year (4.76%).
Consumption growth in winter semester was somewhat higher (3.6%) than in summer semester (3.1%) mostly because of higher consumption in February and March 2004 due to low temperatures.

NL The growth of the consumption in the last two years is lower than in previous years and in winter semester 2004 slightly higher than normal, but no exceptional trends towards climatic conditions can be concluded

CH The of increase of consumption is mainly due to the increase of 1,7 % of Gross Domestic Product (GDP) and increase of population in Switzerland of 0,7 %. The effect of one day more in 2004 is estimated to 0,3 %.

PL Increased consumption (compared to 2003) was covered by fossil fuel power stations. That is why generation slightly increased.

SK The weather in October and November 2004 was rather warm and the summer was not so hot in 2004 as it was in 2003.

RO The consumption in 2004 was 2.7 % higher than in the previous year.

3.3 Electricity exchanges

The internal exchanges between UCTE countries are very active: sum of imports of all UCTE countries represent 269.6 TWh and sum of exports represent 281.2 TWh. This shows that, as an average, 11.5 % of UCTE countries national consumption come from imports from other UCTE countries.

The resulting balance of electricity exchanges (imports - exports) in the UCTE countries in 2004 represented 11.5 TWh export, lower than the corresponding figure for the previous year by 2TWh. From this point of view, UCTE area may be considered as well balanced as the net export of UCTE is less than 0.5% of total consumption.

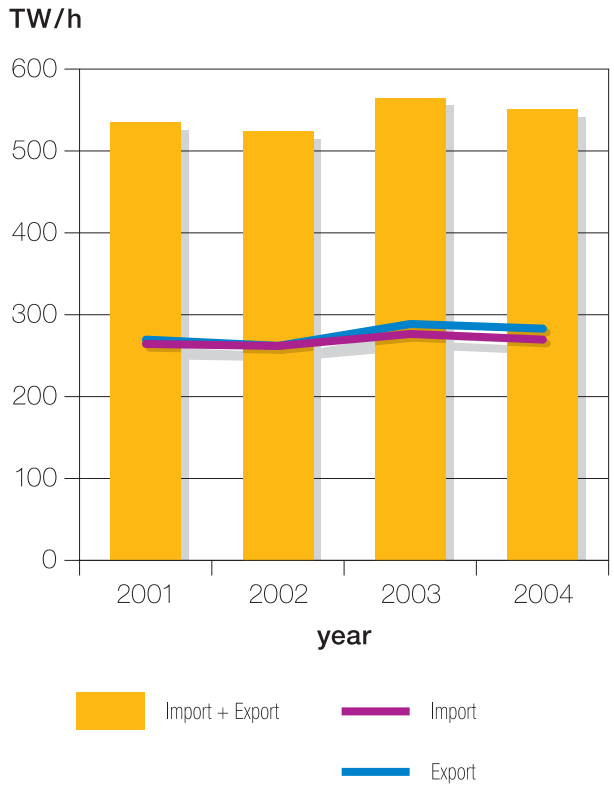
The trend observed in 2003 is confirmed concerning the importing or exporting nature of countries. Especially Germany confirms its level of export, Spain becomes exporting (towards Portugal) and Switzerland importing.

Table 27 Balance of physical exchanges

	Imports		Exports		Balance (Import-export)		Balance as % of national consumption	
	2003 TWh	2004 TWh	2003 TWh	2004 TWh	2003 TWh	2004 TWh	2003 %	2004 %
BE	14.7	14.6	8.3	6.8	6.4	7.8	7.5	8.9
DE*	45.8	44.2	53.8	51.5	-8.1	-7.3	-1.5	-1.3
ES*	9.5	8.1	8.3	11.1	1.2	-3.0	0.5	-1.3
FR*	6.5	6.6	73.1	68.7	-66.6	-62.1	-14.8	-13.0
GR*	4.2	4.9	2	2.0	2.1	2.8	4.2	5.5
IT*	51.4	46.5	0.5	0.8	50.9	45.7	15.9	14.2
SI	4	4.3	3.8	5.0	0.2	-0.8	1.3	-6.1
HR	8.9	10.1	5	6.4	3.9	3.7	25.2	22.9
MK	0.1	2.0	1	0.8	1.0	1.2	13.2	15.9
CS	6.2	6.0	3.1	4.0	3.1	2.0	7.9	5.0
LU	6.6	6.5	2.8	3.1	3.8	3.4	61.4	53.5
NL*	20.8	21.4	3.8	5.2	17.0	16.2	15.4	14.7
AT*	18.7	16.5	12.6	13.3	5.6	3.2	9.0	5.6
PT	5.9	8.6	3.1	2.1	2.8	6.5	6.5	14.3
CH*	29.1	26.1	30.9	25.3	-3.1	0.8	-5.3	1.4
CZ	10.1	9.8	26.3	25.5	-16.2	-15.7	-27.0	-25.5
HU	14	13.8	7.1	6.3	6.9	7.5	18.0	19.6
PL	5	5.3	15.1	14.6	-10.2	-9.3	-8.0	-7.1
SK	8.6	8.7	10.8	10.6	-2.2	-1.9	-8.3	-7.2
BA	2	1.7	3.1	3.6	-1.1	-1.9	-10.9	-17.8
RO	1	1.7	3	3	-2.1	-1.1	-4.2	-2.2
BG	1.3	0.7	6.8	6.6	-5.5	-5.9	-18.1	-19.8
UA-W	1.31	1.6	4.58	4.9	-3.3	-3.3	-79.0	-73.8
UCTE	**275.7**	**269.6**	**288.9**	**281.2**	**-13.5**	**-11.5**	**-0.6**	**-0.5**

** 2003 data were updated since UCTE – System Adequacy Retrospect 2003*

Figure 10 | **Physical exchanges (import and export)**



National comments:

DE In 2004, the export surplus of 7.3 TWh accounts for more than 1% of the total German electricity generation. The exchange volume (i.e. the sum of imports and exports) corresponds to approx. 16% of Germany's total generation.

In 2004, electrical energy imports totalling 44.2 TWh had a share of about 7% in the electricity output of total supply in Germany. As compared to the preceding year, imports slightly decreased by 1.5 TWh, i.e. -3%. A distinct increase was recorded for imports from Sweden (+128%), Poland (+58%), Austria (+34%) and Denmark (+33%) (physical flows). A strong decrease was registered for imports from France (-24%), Switzerland (-11%) and Luxembourg (-10%). Despite a distinct decrease of imports from France by almost 5 TWh, France remains the country with the highest exports to Germany, measured against physical energy flows across national frontiers. Its share in Germany's total imports amounts to 35%, followed by the Czech Republic (30%), Denmark (12%), Austria (10%) and Switzerland (6%).

Germany's physical exports to neighbouring countries slightly decreased as well by -4% to 51.5 TWh as compared to the previous year. The highest increase in percent was recorded for exports to the Czech Republic (+177%), France (+161%) and the Netherlands (+15%). Yet, France and the Czech Republic account for only 1% of Germany's total exports. This contributes to a qualification of the high rates of change in percent. The highest share in German exports was registered for the Netherlands with 34%, followed by Switzerland (23%) and Austria (17%). However, Germany's physical exports also include transits from other countries through Germany. In particular, large parts of the physical imports from France are likely to have passed through Germany over Switzerland and Austria to Italy, or through Germany to the Netherlands.

ES In 2003 Spain had a balance of importation of 1,26 TWh and in 2004 it has been a balance of exportation of 3 TWh. There has been a change due to the energy exported from Spain to Portugal

FR The values of exchanges with countries outside the UCTE include the exchanges with abroad countries (UK and Jersey Island).
The level of French physical exportation is decreasing for the second consecutive year. Contractual exports towards Belgium, Germany, Switzerland and Italy have globally decreased by 5%, while contractual imports have significantly increased, especially from Germany. With Spain, exports and imports both increased. With United Kingdom, only exports increased.

IT A slight decrease of import (-9,8%) has been noted for the 2004 . For the export, on the contrary, Italy reached a strong amount for the physical energy flows (+52,7%).

SI Physical exchanges balance is mostly export, excepted for January, February and September, but the situation is slightly different when half of the production of the nuclear power plant of Krško was delivered to Croatia during the whole year.

HR Croatian balance of physical exchanges stayed in the year 2004 at approximately same level as it was in the year 2003. However, it must be emphasised that Croatian import comprises imports due to long term contract with Slovenia (import from NPP Krško) and medium term contract with Bosnia and Herzegovina (from TPP Kakanj and TPP Tuzla). The contracts are results of Croatian investments in these power plants in former Yugoslavia. These imports amounted to approximately 20% of Croatian consumption in the year 2004.

PT With the liberalisation of the market the exchanges with Spain have been strongly increased. In 2004 the exchanges with Spain duplicated the previous year values. The exchanges balance was responsible of 14% of the Portuguese consumption.

CH Exchange balance resulting in import of 769GWh instead of a net exporting situation in 2003.

CZ The exchange balance (export) remains relatively high and without significant changes (15717 GWh in 2004, 16213 GWh in 2003). The possibility of the export increasing has been limited by the lack of the transmission capacity.

PL The existing surplus of generating capacity as well as adequate transmission capacities within Poland allowed to cover the internal electricity demand without periods of extraordinary high prices on Polish Power Exchange or balancing market last year. The increase of exchanges was noticed, especially the export to Sweden.

SK The import decreased by -17%, while exports increased by 22% .
The import of energy was higher than in the previous year but the export remain at the same level.

BG The exchange balance for the last 5 years is as follows:

2000:	-4559 GWh	2003:	-5502 GWh
2001:	-6924 GWh	2004:	-5884 GWh
2002:	-6295 GWh		

Global exchange balance increases in 2004 by 7%.
In 2004 imports have decreased by 42.2 % and exports have decreased by 2.2% compared to 2003

UA-W In Line “Exchange” of energy balance for whole year and every month energy transmitted through transmission line 35 kV Uzgorod-Sobranci is not included. Total energy for 2004 transmitted from Ukraine to Slovakia through this line is 50 GWh.

4 TRANSMISSION SYSTEM ADEQUACY

4 Transmission System Adequacy

Transmission system adequacy is analysed regarding three aspects:

- *the **main developments** of the network during the year with information about the newly commissioned lines or transmission devices having a direct or indirect impact on the interconnections and on congestion (by increasing the NTC, by reducing or increasing constraints, by decreasing congestion costs, …). Appendix 1 shows in detail these main developments in the different UCTE countries,*
- *the **main disturbances** which have affected the transmission lines: this information is partly issued from the UCTE "TSO-Forum" sub-group's Report,*
- *the situation of the transmission system during the year, considering the main **congestion** observed, especially on the internal interconnections. **Information is given about the criticality of congestion seen by each country on interconnection, according to a common index** (see here below: "representation of congestion").*

4.1 Main results

4.1.1 Main developments

The NTC between Portugal and Spain is largely improved thanks to two new 400 kV interconnection circuits, Alto Lindoso – Cartelle 2 and Alqueva – Balboa.
Interconnection between Croatia – Hungary has been reinforced with the pose of the second circuit of Héviz-Zerjavinec.
The reinforcement of the grid connection from the DC-link Baltic Cable increased the exchange capacity between Germany and Nordel for max. 600 MW.

A significant event is the successful reconnection of synchronous zones 1 and 2 of UCTE, including Albania, Bulgaria, FYR of Macedonia, Greece, Romania, Serbia and Montenegro, on October 10th 2004. UCTE system is now again a single synchronous zone.

4.1.2 Main disturbances

The UCTE system did not meet as critical situations as in 2003. Two incidents leading to black-out must nevertheless be mentioned:
in Greece on July the 12th, black-out occurred in Athens and southern part of Greece at the time of the peak load,
in Luxembourg on September 2nd, following lines and substation triggering in Germany .

Very bad weather conditions affected the eastern part of UCTE in November, especially Poland and Czech Republic which lost their interconnection at this occasion. Another interconnection loss occurred on July 18th between Hungary and Croatia due to unforeseen line outages in Hungary.

During the most part of 2004, and especially during the winter, high unscheduled flows from the north to the south were observed through the Netherlands and Belgium grid. These transports, mostly caused by high wind-generation in Germany and Denmark, had such magnitude that transmission grid were stressing the security limits. For example, maximum unscheduled flow reached 3329 MW in Belgium on March 21st. Also on December 30th, due to extreme high power flows from North to South (Northern Germany / Eastern Europe -> France / Switzerland) caused by large wind generation, the n-1 criterion could not be maintained. These unforeseen situations lead to curtailment or reduction of commercial contracts.

4.1.3 Overall view of congestion on interconnection tie lines

The Retrospect report includes an overview of the congestion on interconnections. This gives information on how these congestion are managed, and presents the main congestion on national networks.

Congestion are still very important towards Italy.

On the eastern side, congestion have increased between Germany, Poland, Czech republic and Austria and Hungary.

The effect of large amount of wind generation has effects on exchanges between Germany and its neighbours.

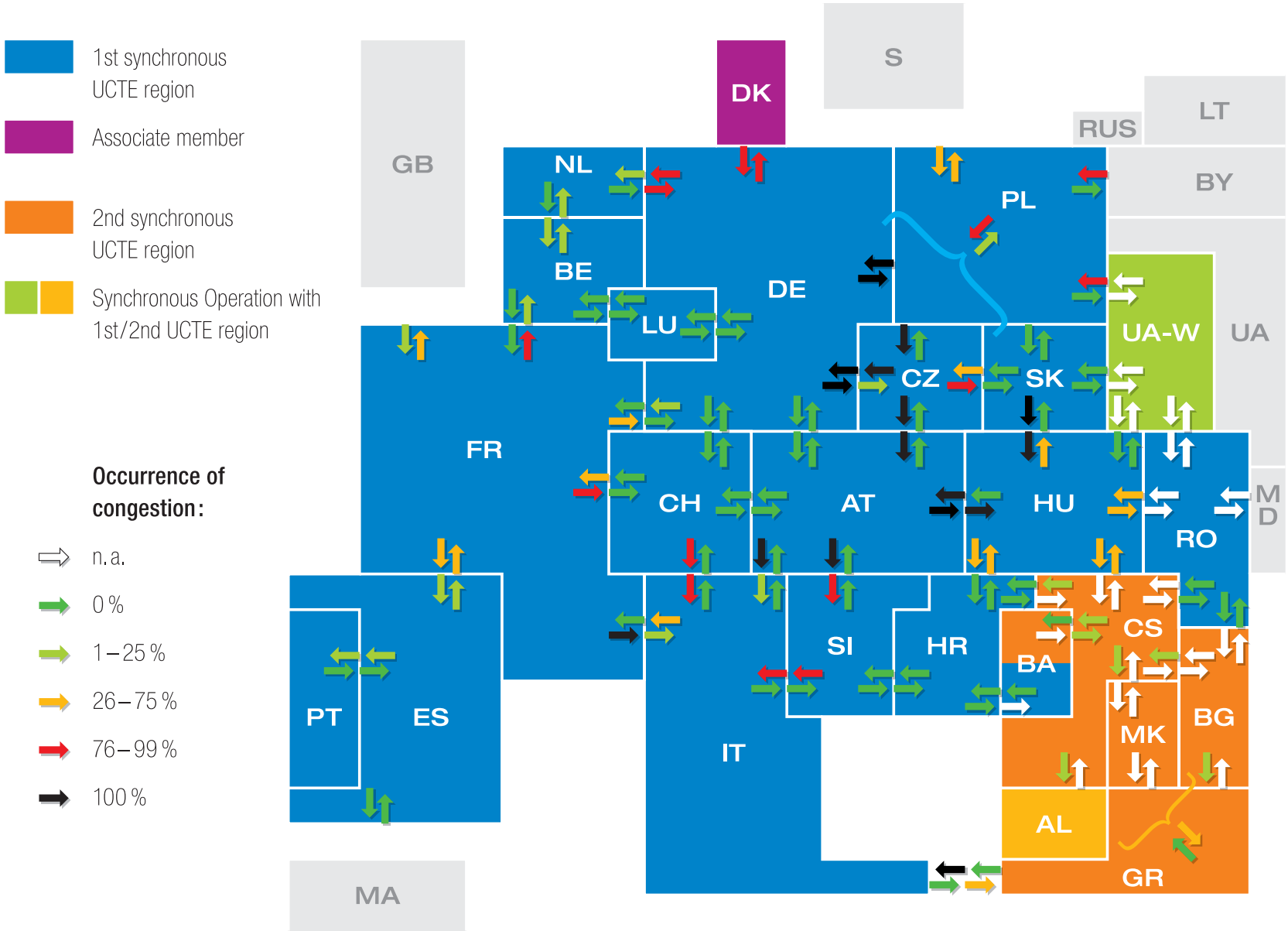
In the following comments, details are given about the state of congestion for each country with its interconnected neighbours; for each border, and each direction through it, the nature of congestion seen by countries involved is appreciated according to the following index:

Severity Index	Arrow's colour	Annual Frequency of Occurrence
na	White	na
0	Green	0%
1	Blue	1-25%
2	Orange	26-50%
3	Orange	51-75%
4	Red	76%-99%
5	Black	100%

In order to qualify more precisely the congestion, the table here below has been used to classify more precisely when possible the occurrence according to the season, and hour of the day:

Season	Hours
Never (**N**)	Never (**N**)
Spring (**Sp**)	Varying (**V**)
Autumn (**A**)	Peak hours (**P**)
Summer (**Su**)	Night hours (**Ni**)
Winter (**W**)	Day hours (**D**)
All year (**AY**)	All day (**A**)

Figure 11	Trans-border congestion on UCTE transmission system



4.2 Detailed comments

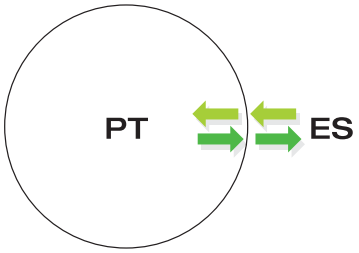
In order to provide a more comprehensive view of the situation in the European power system, the following comments are organised on a geographical logic taking into account the different areas issued from the congestion observed in the UCTE system. Methods for congestion management in each country are specified.

PT

Congestion

The trade on the Portugal/Spain interconnection is liberalised.
A pro-rata method is used to solve the congestion.
With the implementation of the Iberian market this rule could change soon.

Border		Severity of congestion
From	To	
PT	ES	0
ES	PT	1/AY/A



A few bottlenecks-congestion occurred on the internal transmission grid, which consisted in the limitation of transport from North to South, in the drainage of energy produced by the hydro power plants on the Cavado river basin, and in the supply of electricity to the Algarve. This last situation led to a re-dispatch with more significant costs due to the compulsory use of the Tunes open cycle gas turbines.
It is noted that a heavy use of the North interconnection, between Galiza (Spain) and Minho (Portugal) imposed by an excess of generation in Galiza, can lead to some reduction on the interconnection capacities. These situations, associated with high hydro generation in the North of the country, cause a deficit of reactive energy in the south, and therefore, in order to maintain that high interconnection level and proper quality standards, the use of more expensive thermal power plants in the south.

Development

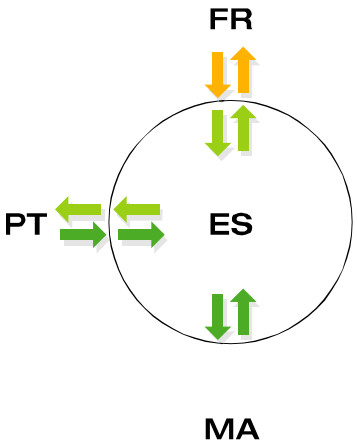
The two new interconnection circuits, Alto Lindoso – Cartelle 2 and Alqueva – Balboa will improve largely the NTC between Portugal and Spain. They are also essential in order to guarantee minimal conditions for MIBEL. Although in minor degree, Pereiros – Zezêre line will also contribute to improve NTC values. Basically it will increment the transmission capacity inside Portugal (from North to Centre/South).

ES

Disturbances

During winter, a new maximum demand value was reached at the beginning of March.

During summer, due to the high temperatures there were consequent higher than typical demand values - new maximum summer demand value was reached in June (36950 MW peak power). Some important generating units were unavailable because of breakdown. These abnormal operating conditions cause zone operation problems.
Also significant were the highly atypical decrease in demand values happened during the 12.03.2004 demonstration against the 11.03.2004 Madrid terrorist attacks. As a consequence, over 5000 MW had to be redispatched in less than 45 minutes.



Border From	Border To	Severity of congestion
FR	ES	W,A,SU 1 SP 0
ES	FR	W, A, SU 0 SP 1
PT	ES	AY 0
ES	PT	AY 1
MA	ES	N
ES	MA	N
Andorra	ES	N
ES	Andorra	N

FR

Disturbances

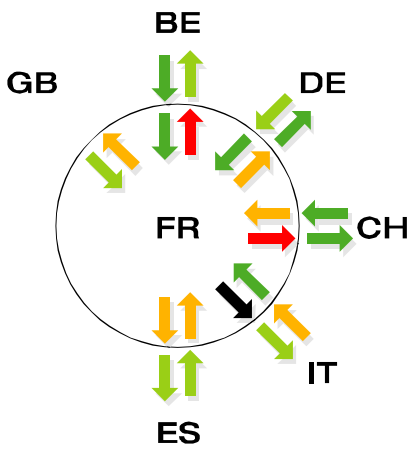
Along the year 2004, the French system has been operated without specific difficulties except at the end of June when some substations were occupied by strikers and unidentified demonstrators which led to some line triggering.

Developments

The previous ARGOEUVES CHEVALET line was modified to a dual circuit in order to cover quality and security of supply requirements for the Somme and Pas-de-Calais departments.

Congestion

The main congestion are seen in the Alps, on the French Belgium interconnection and on the Riviera area.

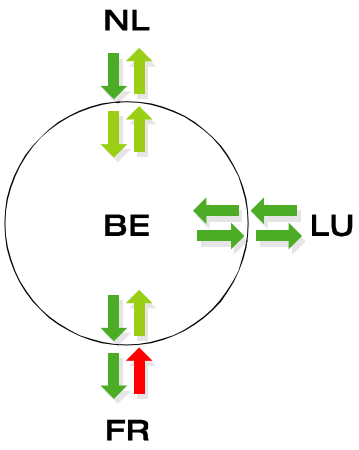


Border From	Border To	Severity of congestion	Remarks
FR	GB		Auction process
FR	BE	4/AY/A	
BE	FR	0	
FR	DE	3/AY/A	
DE	FR	0	
FR	CH	4/AY/A	
CH	FR	2 – spring summer	
FR	IT	5/AY/A	
IT	FR	0	
FR	ES	3/AY/A	
ES	FR	3/AY/A	

BE

Disturbances

During the most part of 2004, and especially during the winter, high unscheduled flows are observed through the Elia System Operator grid from the north to the south, up to 80% from the previous year. These seem to originate from the growing wind farms in the North of Europe, particularly in Germany and Denmark. The maximum unscheduled flow was 3329 MW on March 21.



Border		Severity of congestion
From	**To**	(0 to 5 – Season - Hours)
FR	BE	1/AY/A
BE	FR	0/AY/A
NL	BE	1/AY/D
BE	NL	1/AY/D
LU	BE	0/AY/A
BE	LU	0/AY/A

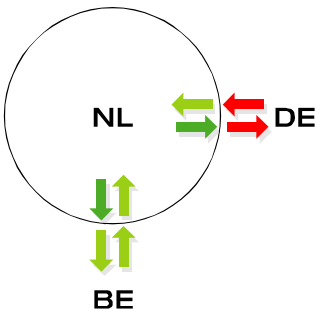
NL

Congestion

There are no notorious bottlenecks on the Dutch/Belgium cross-border lines themselves, but sometimes imports from Belgium/France or transports from France towards Germany must be restricted because of high loads on the France/Belgium cross-border lines. So it can be said that bottlenecks on other borders lower our import/export capacity.

Throughout the year on several moments appeared relatively huge transits from Germany towards Belgium and France through the Netherlands. These transports, mostly caused by high wind-generation in Germany, had such magnitude that transports on the Dutch-German border where stressing the security limits.

These transports, opposite to the normal observed flows could only be foreseen in operational planning by being alerted on very high nominations on the German-French border.
Several days and hours we reached operational limits on the German-Dutch cross-frontier-interconnections and an eventual contingency might have caused an emergency situation in the Netherlands as well in Belgium and Germany.



Border		Severity of congestion	Remarks
From	**To**		
NL	BE	0/N/N	
BE	NL	1/AY/V	In relation to France-Belgium border
NL	DE	0/N/N	
DE	NL	1/AY/V	Due to high transits from wind-generation sometimes NTC-values were exceeded

Developments

The capacitor-banks and shunt-reactors are part of a reactive re-adjustment scheme to better manage the voltage profile over the network in low and heavy load flow situations and to become more independent of reactive power from production units. This will have also some impact on the NTC-values.

DE

Disturbances

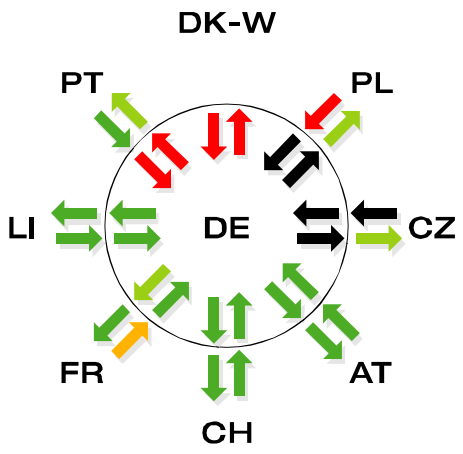
a) EnBW: In case of extreme high load flows from North to South (Northern Germany/Eastern Europe- France/Switzerland) it is possible, that the n-1-security within EnBW Grid cannot be maintained. Then topology and redispatching measures are necessary to restore the n-1-security. At the worst the exchange programs to France and Switzerland must be curtailed.
In 2004 topology measures had been necessary in a few cases.

b) RWE: At 30.12.2004 due to extreme high power flows from North to South (Northern Germany / Eastern Europe -> France / Switzerland), caused by large wind generation, the n-1 criterion at the interconnection RWE - TenneT shortly could not be maintained. Therefore topology and redispatching measures as well as pro - rata curtailment of the exchange schedules were necessary to restore the n-1 security. Here EnBW took part in the pro-rata-curtailment of the exchange schedules between DE and FR.

c) On 02.09.2004 an interruption of the power supply in the western part of the transmission grid of RWE occurred that affected the region around the city of Trier and greater parts of Luxemburg. The interruption was caused by an outage of a 220-kV line and the following malfunction of the protection system of the second 220-kV line that switched off the second line. The total loss of load amount to approx. 850 MW. After a stepwise restoration of the power customer supply was re-established between 30 minutes up to four hours.

Congestion

There is a high demand for transmission capacity from Poland to Germany which results in an equivalent price level.



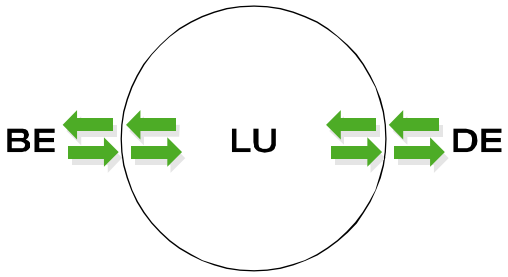
Border From	Border To	Severity of congestion	Remarks
DE	FR	1 /W/A	Joint management between EnBW and RWE as the congestion affects the D-F-Interface as a whole
DE	PL	5/AY/A	
PL	DE	5/AY/A	
DE	CZ	5/AY/A	
CZ	DE	5/AY/A	
DE	NL	4/AY/A	
DE	DK-W	4/AY/A	
DK-W	DE	4/AY/A	
CZ	DE	4/AY/A	
DE	NL	5/AY/A	
NL	DE	5/AY/A	

LU

Disturbances

On September 2nd we noted a national black-out in the public grid of CEGEDEL during 32 minutes and 30 seconds. The origin of this event was located in the German grid of RWE Transportnetz Strom. The Cegedel grid had no line-fault at this moment.
At 16:51hour, Tripping of the 220 kV Uchtelfangen-Diefflen-Trier (Saar Nord line), the 220 kV Uchtelfangen-Quint (Osburg line) and the 220 kV Niederstedem-Weissenturm (Kondelwald line) in Germany.
It resulted an interruption of the supply of the substations of Trier, Quint and Bauler in the german grid, where the four 220 kV supplying lines to the Luxembourg substations Heidorf Flebour and Roost are connected to.

During the black-out, a part (125MW) of the Cegedel grid could be connected via SOTEL to the Belgium grid.



PL Disturbances

On 19.11.2004 at 12:33 CET, due to extremely bad weather conditions (strong winds and snow storms), Poland lost its connection with Czech Republic - three lines tripped off (one 380 kV (Wielopole – Nosovice) and two 220 kV (Kopanina – Liskovec, Bujakow – Liskovec)), the fourth line (380 kV Dobrzen – Albrechtice) was switched off 3 days before because of fire in Albrechtice substation. Czech Republic was disconnected for about one hour, and on 13:26 CET the connection was restored (two 220 kV lines). After further 33 minutes tower of Kopania – Liskovec line was damaged, and PL-CZ profile operated only with one 220 kV line — Bujakow – Liskovec.
These extreme weather conditions caused also further trips of several transmission and hundreds of distribution lines in the south of Poland. The outages in the distribution systems led to power cuts which lasted from 19.11 till 21.11.
Damaged common tower for double-circuit 380 kV tie-line (Dobrzen – Albrechtice and Wielopole – Nosovice) on CZ-PL profile was rebuilt on 3rd December 2004 and both circuits became operational.
Further analysis of the event proved the classification of failure as n-2 case.

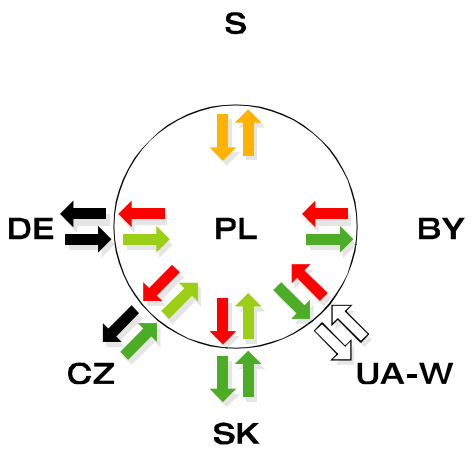
Congestion

National network:
Although many network constraints occur in Polish transmission system it is difficult to determine any structural bottlenecks. Most of network constraints result from limitations related to voltage stability in a given area rather than from permissible loading of transmission lines themselves. To manage congestion coming from these network constraints Polish TSO has to redispatch the generation.

Interconnection congestion:
In 2004 as in the previous years PSE-Operator managed congestion on all synchronous international tie lines (to D, CZ, and SK) together and thus the description of congestion situation is given for this whole profile.
The congestion on the PL-D/CZ/SK profile is caused by loop-flows resulted by high wind generation in North part of Germany.
In case of HVDC connection S-PL growing number of hour fluctuations could be observed

Management of congestion
In the year 2003 cross border power exchange was monopolised.
Starting from 1 may 2004 cross border power exchange is liberalised and PSE-Operator allocates capacities to market participants via explicit auction process. PSE-Operator as TSO determines NTC and ATC values on the UCTE profile which are a subject of the allocation process.
Auctions started on 1st of May 2004. At the beginning prices were respectively low (in both directions: export and import). During the year a rising trend could be observed, with a peak value on October (for import) and November (for export). Right after the peak period, prices suddenly fell and stayed low.

After negotiations conducted during 2004 with neighbouring TSOs, Polish cross-border transmission capacities are allocated on co-ordinated auctions from 2005 on yearly and monthly basis.



Border From	Border To	Severity of congestion	Remarks
PL	DE/CZ/SK	4 AY_D	
DE/CZ/SK	PL	1 AY_V	
PL	S	2 AY_V	commercial DC link
S	PL	2 AY_V	commercial DC link
PL	UA-W	-	NTC = 0
UA-W	PL	4 AY_A	radial operation
PL	BY	-	NTC = 0
BY	PL	4 AY_A	island operation

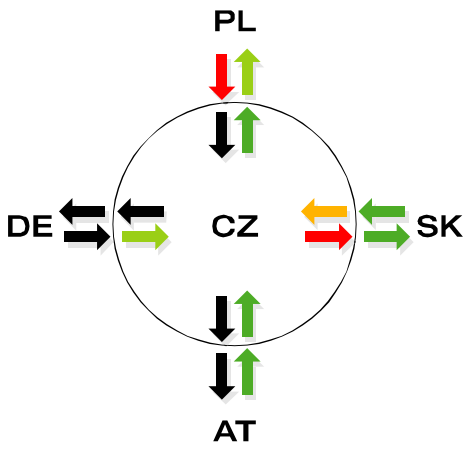
CZ

Disturbances

The last three units (90 MW) of storage plant Orlík were put back into operation after heavy flooding in 2002.
On 19.11.2004 tower of double line 380 kV between Czech Republic and Poland was destroyed by windstorm. The line was given to operation after repairing on 3rd December.

Congestion

The trade is liberalised on the interconnection. Explicit auctions are used on the cross-border with Germany (E.ON), Austria and Slovakia. There is a common co-ordinated auction on the cross-border with Germany (VE-T) and Poland.



Border From	Border To	Severity of congestion	Remarks
CZ	DE	5/AY/A	100 % real using – all days
DE	CZ	0/AY/A	---
CZ	AT	5/AY/A	100 % real using – all days
AT	CZ	0/AY/A	---
CZ	PL	0/AY/A	---
PL	CZ	5/AY/D	100 % real using – day hours only
CZ	SK	4/AY/V	60 % real using of allocated capacity
SK	CZ	3/AY/V	50 % real using of allocated capacity

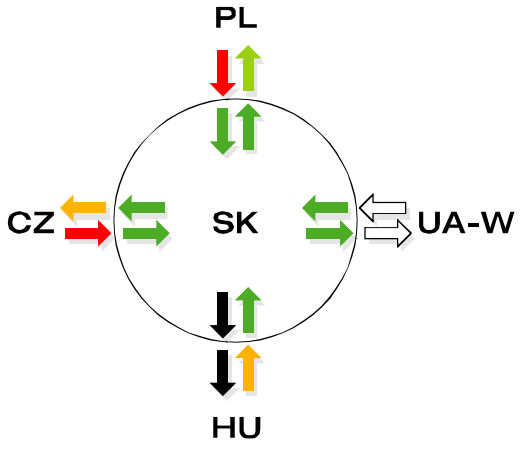
SK

Congestion

Due to its geographic location the Slovak Republic is significantly involved in electricity transits, especially in the north-south direction (from Poland to Hungary), as well as in east- west direction.

A main congestion exists on the Hungarian border. Its importance is increasing during working days. In case of particular operational conditions (mainly during disconnection of lines between CEPS and APG) some bottlenecks on the SK - H border can occur.

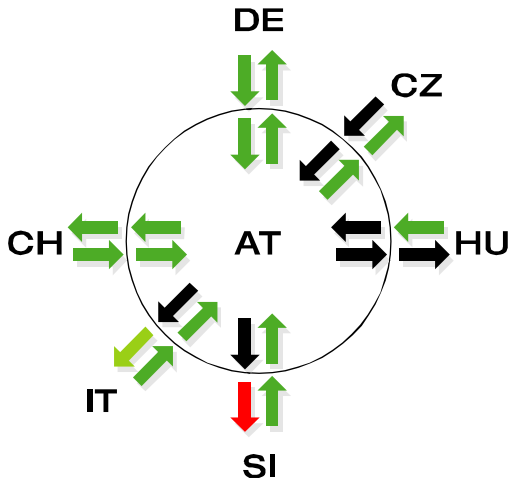
Existing 400 and 220kV connections with the Czech Republic, Hungary, Poland and Ukraine are fully loaded with electricity exchanges among the above states and have a significant share in electricity marketing in the Central and South -European region.
On all cross-border profiles the auction mechanism is used for cross-border capacities allocation. In 2004 yearly auctions and periodical monthly auctions were realised. Daily auctions are already realised for the CEPS/SEPS profile and will be implemented for other profiles later in 2005.



Border From	Border To	Severity of congestion (0 to 5 – Season - Hours)
SK	CZ	0/AY/A
CZ	SK	0/AY/A
SK	HU	5/AY/D
Hu	SK	0/AY/A
SK	UA	0/AY/A
UA	SK	0/AY/A
SK	PL	0/AY/A
PL	SK	0/AY/A

AT

Congestion



Border From	Border To	Severity of congestion	Remarks
AT	CZ	0	
CZ	AT	5 – AY	
AT	IT	5 - AY	
IT	AT	0	NTC 220MW
A	SI	5 – AY	
SI	AT	1 - V	depends on the generation in SLO
AT	HU	5 – AY	
HU	AT	5 – AY	

Auction: The allocation of the 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 the national laws.
Splitting of direction: Each country is responsible for a single direction.

National network:
Serious congestion in the Austrian network occurred on the three 220kV lines from the north to the south of Austria. The N-1 criterion was repeatedly violated especially in the winter season during the night, although strong congestion management measures were taken.

As in the last years, also 2004 was characterised by a high utilisation of the Austrian transmission grid. The surplus of electricity in the north and the deficit of electricity in the south of Austria combined with insufficient north-south-transmission capacity resulted in congestion in the transmission grid of Verbund-APG. Verbund-APG had to take counter measures in order to reduce these congestion. At present this is done by redispatching (including restrictions for

pumping) and changes of the network configuration. Due to the decommissioning of thermal power plants in the south the above mentioned bottlenecks will become even more critical.

For permanent improvement of these structural congestion, new 380 kV lines (Südburgenland - Kainachtal, St. Peter – Tauern) are planned to be put into operation. As the commissioning of these lines is delayed, additional congestion management measures will have to be taken. In this context the installation of three phase shifting transformers is envisaged. This measure in combination with redispatching will help to handle the north-south-bottlenecks until the commissioning of the above mentioned 380 kV lines. At the high-level meeting of 8 TSO's in Vienna (28.02.2005) this concept was already presented.

Another key development in 2004 was the increase of installed wind power plants to 600MW. The injected wind energy also contributes to further tightening of the already critical situation.

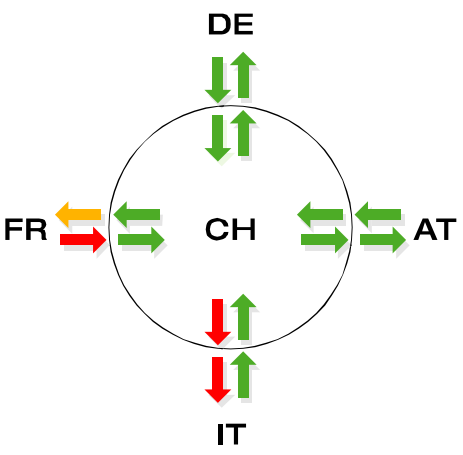
CH

Disturbances

The Swiss transmission system was operated in a secure and reliable manner in the year 2004. In order to maintain n-1 security ETRANS has ordered at several occasions limitations of cross border transactions of the market actors (import from Germany and France and export towards Italy).
Additionally rotating generation reserve was ordered by ETRANS to guarantee network security and an adequate voltage level in high import situation in the winter nights and weekends. Limitations of generation of hydro power plants had to be ordered in summer time because of internal congestion in the transmission system.

Congestion

The 380 kV transmission lines and the 220 kV transmission lines between North Switzerland and North Italy are often heavily loaded especially in the night and on the week-end or holidays. The main reason for this situation is the continuous increase of the imports of Italy in the last years and the low generation pattern in Switzerland in these time periods. Limitations or reductions of imports from Germany and France or from exports to Italy were necessary in many occasions during the year 2004 in order to maintain the n-1 security of the Swiss transmission grid. The construction of the 400 kV tie lines Filisur - an Fiorano and La Punt –Gorlago were practically finished by the end of the year 2004 and they was put into operation in January 2005. These lines significantly increase the transport capacity from Switzerland to Italy and the level of security of the Swiss transmission network.



Border		Severity of
From	To	congestion
DE	CH	2
FR	CH	2
CH	IT	4

IT

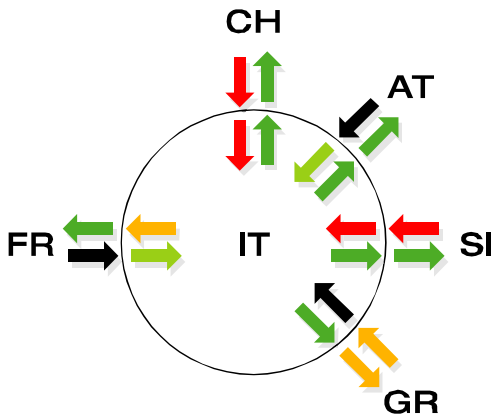
Disturbances

An attack against a tower of the 380 kV tie-line Bulciago-Soazza on April, 12th involved an important way to import electricity in Italy. As a consequence of unavailability of the interconnector, the power import was reduced.
On some days in August, in presence of unbalanced physical power flows on the Italian northern interconnection, in particular on the common border with France and Switzerland, endangering the security of the border networks, GRTN reduced the import.
On 1.10.2004, the Swiss TSO delayed the change of seasonal thermal capacities of the common interconnection lines and of the internal lines close to the border to winter season, as foreseen, but remained in summer season due to high temperatures and unusual weather conditions in Switzerland. This led to real-time commercial schedule reductions. This situation went on for several days.

Congestion

FR Border - Line Camporosso-Broc Carros : N-1 criterion not satisfied when the limit of the export goes over. In this case the 220 kV line of Campochiesa-Camporosso is switched-off to avoid the overload of the 130kV internal lines in that area.

CH/SI/GR Border - An automatic switching-off of the one of internal line involved in these exchange areas reduce automatically the internal production and prevents the overload with consequent risk of failure.



Border		Severity of congestion
From	To	(0 to 5 – Season - Hours)
FR	IT	1/AY/A
IT	FR	3/AY/Ni
CH	IT	4/AY/A
IT	CH	0/AY/A
AT	IT	1/AY/A
IT	AT	0/AY/A
SI	IT	4/AY/D
IT	SI	0/AY/A
GR	IT	5/AY/A
IT	GR	0/AY/A

Development

The 220 kV Italian-Swiss tie-line Sondrio-Robbia was put out of operation. This line will be replaced by the new 380 kV tie-lines S.Fiorano – Gorlago-Sils/Pradella , at the beginning of the year 2005 with an increase of the NTC.

New interconnection lines (2x400 kV) between Hungary and Slovenia and 2x400 kV line between Slovenia and Italy are planned to solve the congestion on the Italian border and on Austrian border.

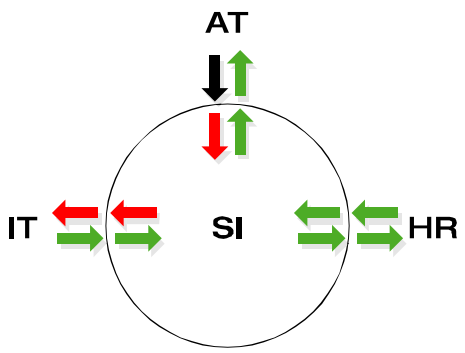
SI

Congestion

No internal congestion is observed on the Slovenian internal network. Bottlenecks are mostly on the interconnection lines from Austria, and to Italy.

At the moment there are no auctioning process (by the decision of the European Parliament about the postponement for Slovenia of the date for the performing the provisions from 1228/03 decree), pro – rata mechanism (50% / 50%) is used for the capacity allocation.

The new interconnection lines between Hungary and Slovenia and between Italy and Slovenia are planned. These capacities must solve congestion on Italian and Austrian borders.



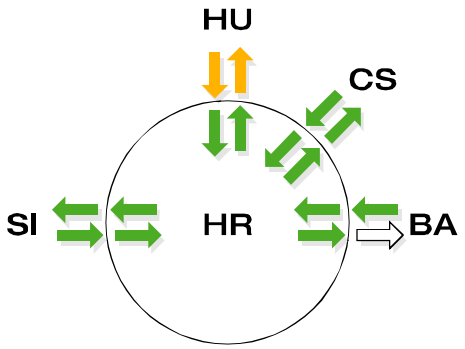
Border From	Border To	Severity of congestion	Remarks
SI	IT	4 – AY - A	Pro rata allocation mechanism, redispatching
IT	SI	0 – N - N	
AT	SI	4 – AY - A	Pro rata allocation mechanism
SI	AT	0 - N - N	
HR	SI	0 – N – N	
SI	HR	0 –N –N	

HR

Disturbances

A few disturbances occurred in Croatian power system during the year 2004, which were mostly caused by exceptionally bad weather conditions.
On 29 February 2004 in region of Split (energy not supplied to customers was approximately 150 MWh).

On November 14th .2004 due to the very strong wind (over 200 km/h) and exceptionally bad weather conditions a large disturbance and partial blackout happened in south-western part (region of Istra and Primorje) and southern part (region of Dalmatia) of Croatian power system. Energy not supplied to customers was approximately 324 MWh).



Border From	Border To	Severity of congestion
HR	HU	0/N/N
HU	HR	0/N/N
HR	CS	0/N/N
CS	HR	0/N/N
HR	BA	0/N/N
BA	HR	0/N/N
HR	SI	0/N/N
SI	HR	0/N/N

Development

Reliability and security of Croatian power system have been improved by upgrades of transmission system and commissioning of new elements – especially substation Zerjavinec and substation Ernestinovo. New substations improved security of supply of Zagreb (the biggest

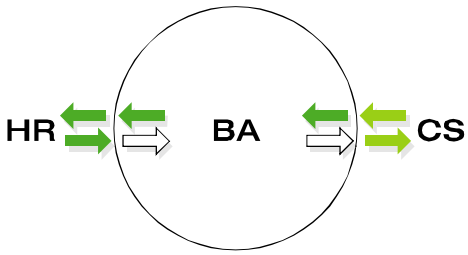
consumption centre in Croatia) and region of Slavonija (eastern part of Croatia). Substation Ernestinovo had significant role in reconnection of UCTE 1st and 2nd synchronous zones.

Reconnection of UCTE 1st and 2nd synchronous zones additionally improved security of Croatian power system, and changed its position within UCTE system from the power system on the edge of 1st UCTE zone to the system in-between with noticeable role regarding transits of electrical energy. Prior to reconnection of UCTE synchronous zones 1 and 2, on 25.09.2004 Croatia adjusted the phase sequence of its power system to the rest of UCTE system on the interface toward Slovenia and Hungary. This was an important condition for successful resynchronization.

Transformer with the possibility of active power control under load conditions, which is installed in substation Zerjavinec, enables rerouting of power from more loaded 400 kV network to less loaded 220 kV network.
Closing of 400 kV ring through Croatia and Bosnia and Herzegovina improved security and flexibility of power system operation.
New lines and upgrades of Croatian transmission system also reduced the losses.

BA

Congestion



Border		Severity of congestion
From	**To**	(0 to 5 – Season - Hours)
BA	HR	0 - N - N
BA	CS	0 - N - N

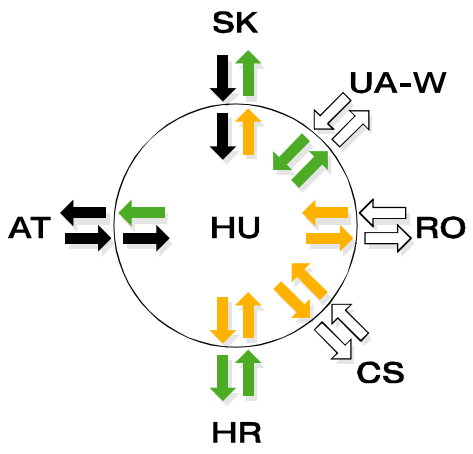
HU

Disturbances

On 18.07.2004 simultaneous but independent outage of two close 380 kV transmission lines occurred in West Hungary. In order to avoid the overloading of the 120 kV distribution network and maintain the reliable power supply, Hungarian–Croatian 380 kV interconnection (Hévíz–Žerjavinec TL) was disconnected for about 3 and a half hours.

Congestion

Main congestion are with Slovakia and Austria. Some congestion also exist on the national grid.



Border From	Border To	Severity of congestion
SK	HU	5/AY/A
HU	SK	3/A,W/V
AT	HU	5/AY/A
HU	AT	0
HR	HU	3/A,W/V
HU	HR	3/A,W/V
UA	HU	0
HU	UA	-
RO	HU	3/A,W/V
HU	RO	3/A,W/V
CS	HU	3/A,W/V
HU	CS	3/A,W/V

Development

The second circuit of Héviz-Zerjavinec has been posed (70km) and a new double-circuit line was created between Paks and Pécs (82km)

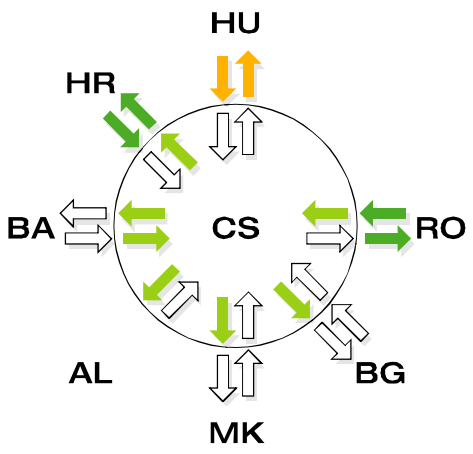
CS

Disturbances

On 25.09.2004 at 01:42 CET due to flashover in 380 kV network of EPCG, partial blackout in the system of Montenegro (~350 MW). Supply normalised in ~ 50 min.

Congestion

Congestion occur at the SCG borders towards MK, AL and with BA in both directions, but there are still no allocation mechanisms at these borders. Congestion Management is performed operationally in co-operation with neighbouring TSO. The establishment of capacity allocation and market-based congestion management mechanisms are under elaboration.



RO

Disturbances

Romanian power system has operated without major disturbances or difficulties.
On 28.03.2004, at 19:21 CET, Unit 1 of nuclear power plant Cernavoda has tripped due to the tripping of the main process controller and unavailability of the redundant controller. The NPP was return under operation in 01.04., at 03:31 CET.
On 27.10.2004, at 23:34 CET, due to earth quake in Vrancea area, 3 units tripped due to technological protection (

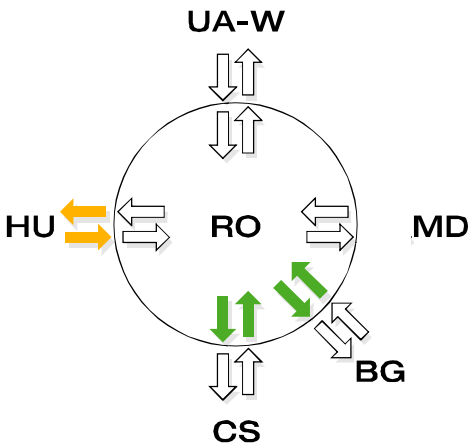
- TA4 Iasi I (48 MW);
- TA3 Bucuresti Sud (40 MW);
- TH1 Racova (9 MW).

Developments

Some conversion on lines and auto-transformers have been done to upgrade the grid.

Congestion

Occasionally congestion may appear in the north-eastern area of the system, at peak load hours, from December to February. They are solved by generation dispatch and extra meshing of 110kV network.

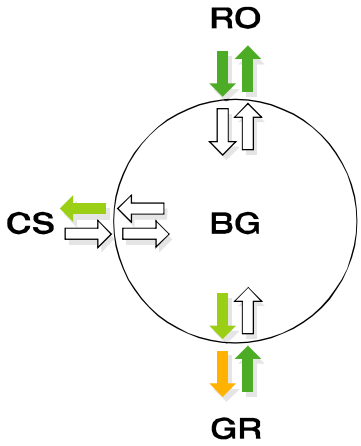


Border From	Border To	Severity of congestion
RO	BG	0
BG	RO	0
RO	CS	0
CS	RO	0

BG

Congestion

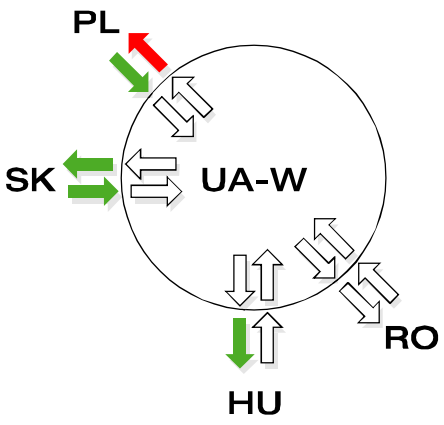
During 2004 congestion with Greece appears due to the maintenance program on 400kV lines between Bulgaria, Serbia and FYROM. This congestion is observed in summer for peak hours.



Border From	Border To	Severity of congestion	Remarks
BG	GR	1	During maintenance program of some 400 kV lines in Bulgaria, Serbia or Mk

UA-W

The trade on the interconnection is monopolistic. Pro-rata is used for capacity allocation and congestion management.



GR

Disturbances

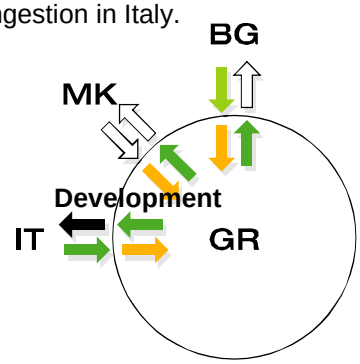
A series of disturbances mark the operation of the Hellenic system during 2004:

- 03.03.2004 08:46 CET interruption of supply of about 200MW in Athens area after a distribution fault for 10 minutes.
- 41 29.05.2004 17: CET during a heavy storm, a fault at a double line Kardia – Amyntaio provoked the trip of the interconnection line Kardia - Zemlak and the trip of three units with a total capacity ~900MW. The recorded frequency was about 49.6Hz.
- 12.07.2004 11:39 CET voltage collapse at the Athens area has resulted a black out at south Greece (Attica, Peloponnesus, Ionian Islands, Evoia). The total load interruption was about 4500MW. The restoration was started at ~12:30 CET and was completed at ~15:30 CET.
- *14.11.2004 14:39 CET a trouble at the insulation of the substation Agios Dimitrios at Thessaloniki area resulted in the interruption of supply of the customers with a total load of 30MW for 9 hours 21 minutes.*

Congestion

Once a year, there is an auction for the allocation of the total capacity of the northern interconnections in the import direction. In 2004 the capacity has been allocated to the participants of the market at the price of 1000 EURO/MW per year.

It is to be noticed that the exportable capacity to Italy is lower than the calculated NTC, due to a congestion in Italy.



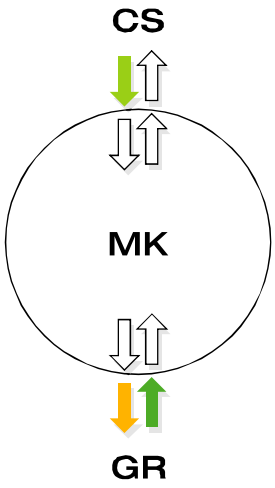
Border From	To	Severity of congestion
AL+MK+BG	GR	2/SU/P 2/W/P

The new power plant of IRON (150mw installed capacity), the gas turbines in Lavrion during the summer and the installation of capacitors of a total capacity 500Mvar in transmission system in Athens area, aim at solving the problem of low level of voltage.

MK

Disturbances

On 12.07.2004 at 11.38 CET due to partial blackout in Greece, the frequency in the Second UCTE synchronous zone raised up to 50.7 Hz.



5 COMMENTS ON MARKET DEREGULATION AND ELECTRICITY MARKET

5 Comments on Market deregulation and Electricity Market Developments

This chapter gives some general information on the opening up of the internal market in terms of implementation of the EU Electricity Directive and market developments occurred in the UCTE countries.

AT Opening process of the market

Since the legal base is the Austrian Electricity Act (ElWOG) the opening process of the electricity market is achieved.
The liberalised market is now stabilised.
Austrian network tariffs are fixed. This ensures a non-discriminatory charging for 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.
The balance group mechanism is in place to manage balancing and settlement between market operators.

DE Electricity Market Prices

Amounting to an average value of 28.52 EURO/MWh, base load in 2004 remained almost one EURO below the level of 2003 (29.49 EURO/MWh). This shows that surprises like in the previous year did not occur to a large extent. There was no heat wave like in 2003, and extreme price fluctuations kept within reasonable limits. In day-to-day trading, values of more than 40 EURO/MWh or of less than 15 EURO/MWh occurred seldom.

Energy policy:

The law concerning the primacy of renewable energies and the Co-generation Act, decided three years ago, entail an increased development of wind power and secure the operation of existing co-generation plants.

Till 30.08.2004 each German TSO had the balancing responsibility for the power production of wind power plants within its own control area. According to the new German Electricity Law for Renewable Energy since 01.09.2004 this balancing responsibility has changed to a fixed percentage of the wind power production within Germany. This percentage is calculated according to the yearly energy consumed within each control area respectively.

FR Electricity Market Developments:

RTE has opened up access to the French Balancing Mechanism through France - England interconnection (IFA) since November and then through France – Spain interconnection since December.
It provides the option of making offers on the French Balancing Mechanism through both interconnections at the day-ahead stage.

Energy policy

A law about public service in electricity and gas companies was issued on August the 9th . This text gives the limit between French transmission system operator and French distribution system operator. This law exposes the new countable rules of assets transfer between the different actors. It will lead RTE to become in 2005 a subsidiary company of EDF with an independent management guaranteed by the law.

Opening process of the market:

Since July 2004 the 1st all professional consumers can choose their electricity supplier. New suppliers are appearing on French market and foreign companies are presents on this market sectors.

BE Opening process of the market

Timetable for the opening up of the Belgian electricity market - situation as at 31 December 2004

	Federal level [2]	**Flemish Region** [3]	**Walloon Region** [4]	**Brussels-Capital Region**[5]
All high-voltage customers >10GWh (≥ in Walloon Region)	Eligible	Eligible	Eligible	Eligible
All high-voltage customers ≤10GWh (< in Walloon Region)	July 2004	Eligible	July 2004	July 2004
All professional, low-voltage customers		Eligible	July 2004[6]	July 2004[7]
All household low-voltage customers		Eligible	January 2007[8]	Captive[9]

Source: CREG

[2] Article 16 of the Electricity Law and Article 1er of the Royal Decree of 11 October 2000 declaring eligible other categories of final customer, as amended by the Royal Decree of 10 August 2004 (Belgian Gazette of 30 August 2004).

[3] Article 12 of the Decree of the Flemish Council of 17 July 2000 relating to the organisation of the electricity market and Article 2 of the Decree of the Flemish Government of 13 July 2001 establishing the conditions of eligibility as a customer within the meaning of Article 12 of the Electricity Decree.

[4] Article 27 of the Decree of the Walloon Region of 12 April 2001 relating to the organisation of the regional electricity market; Article 2 of the Decree of the Walloon Government of 22 April 2004 relating to the eligibility of final customers in the electricity and gas markets (Belgian Gazette of 10 May 2004); and Decision of the Walloon Government of 23 December 2004.

[5] Article 13 of the Order of 19 July 2001 on the organisation of the electricity market in the Brussels-Capital Region, as amended by Article 33 of the Order of 1 April 2004 on the organisation of the gas market in the Brussels-Capital Region, concerning the public domain fee as regards gas and electricity and amending the order of 19 July 2001 on the organisation relating to the electricity market in the Brussels-Capital Region (Belgian Gazette of 26 April 2004).

[6] Article 2 of the Decree of 22 April 2004 defines a professional customer as "any final customer purchasing electricity not intended for domestic use". Low-voltage professional customers who do not benefit from high-voltage tariffs must request this.

[7] Article 30 of the Order of 1 April 2004 defines a professional customer as "any final customer providing proof that they use the electricity supplied to their consumption site for exclusively professional purposes".

[8] Final household customers who obtain their supplies exclusively from green suppliers are already eligible.

[9] Article 33 of the Order of 1 April 2004 stipulates that household customers will become eligible in Brussels between 1 January and 1 July 2007.

GR Electricity Market Developments:

The first power plant IRON (gas turbines 150MW) owned by an independent producer was put into commercial operation on 6/12/2004. It is a power plant in the south of Greece near the consumption and it is capable of providing reserve to the system under contract. It is an expensive power plant and it raises the market prices in heavy load periods.

Apart from the purchasers who import electrical energy through the interconnections to supply final customers in Greece and those who import electrical energy for their own use, the new power plant of IRON fulfils the requirements to supply customers in Greece under the current legislation.

On 1.7.2004 all of the customers connected to the mainland interconnected system other than householders became eligible customers.
Changes in the existing legal framework concerning the market liberalisation are still in operation aiming at the facilitation of the opening of the market to actual competition.

IT Opening process of the market

The most significant event characterising the electrical scenario in Italy, in the year 2004, has been the passage, on 01.04, to a competition framework on the generation side. This is the first phase of the liberalisation process of the electricity market in Italy, which will be completed on the year 2005 with the introduction on the consumption side as well.
Currently the electrical market, with the reference to the day D, is articulated as follows:
DAY AHEAD MARKET (MGP): trade of energy from the day D-9 until 9 a.m. of the day D-1;
ADJUSTMENT MARKET (MA): in which producers and consumers can adjust the generation and consumption schedules, resulting from MGP. This session lasts from 10.30 a.m. to 2 p.m. of the day D-1.
DISPATCHING SERVICES MARKET (MSD): from 2.30 p.m. until 4 p.m. of the day D-1 in which GRTN:

- solve possible congestion modifying, if necessary, generation and consumption schedules;
- buys secondary and tertiary power reserve;
- buys resources for real time balancing.

All generation units participating to MPG are obliged to present bids on MSD.

SI Opening process of the market

Till the end of June 2007, the postponement for Slovenia of the date for the performing the provisions from Decree 1228/03 was accepted.

HR Opening process of the market:

At the end of the year 2004 Croatian parliament passed new energy law package which entered into force in December 2004. In accordance with new laws, transmission system operator and electricity market operator shall be founded as two separate companies.
According to new Law on Electricity Market eligible customers are customers with annual consumption larger than 20 GWh and all customers directly connected to transmission network. This law also sets the time schedule for further opening of electricity market in Croatia:

- from 1 July 2006 eligible customers will also become customers with annual consumption larger than 9 GWh,
- from 1 July 2007 eligible customers will also become small enterprises,
- from 1 July 2008 all customers will be eligible (full opening of electricity market).

It is expected that enforcement of new energy laws and establishing of transmission system operator and electricity market operator as two new companies will speed up deregulation of electricity market in Croatia.

LU Opening process of the market:

The opening of the market is foreseen by the law of 25th July 2000. To be in coherence with the new EU directive, a new law is in preparation. The new directive is not yet transposed in national law due to the elections in Luxembourg in 2004. The TSO Cegedel however will fulfil all the requests of the directive.

Cegedel had achieved the legal unbundling up from 1.1.2005. The new grid company is named Cegedel Net.

Since 1st July 2004 all non domestic clients are eligible.
By 1st January 2007, 100% opening will be reached. The new law may even specify en earlier date for this opening.

NL Energy policy:

In July 2003 started the implementation of MEP (Electricity Generation Environmental Quality), a government guided subsidising program, to realise a vigorous and cost-effective promotion of environmentally safely generated electricity in the Netherlands. This program showed last year a progressive growth of generation based on renewable energy sources.

Opening process of the market:

The last stage of the liberalisation of the market for the group of small consumers came into effect on July 1st 2004. This means that the deregulation of the market in the Netherlands is completed for all customers. About 8% of the small consumers changed of provider since then.

CH Electricity Market Developments

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 Euro/MWh in 2004, which means that they were much more stable than during the previous years.

Energy policy

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.

The latest energy scenarios indicate that if current energy policies are continued, energy consumption will increase heavily, particularly in the sectors of motor fuels, industrial processes and electrical energy. This would mean that the CO2 objectives specified under Swiss Energy, and also those laid down in the CO2 Law and in international climate conventions, cannot be achieved. To fulfil these goals, efforts must be redoubled in all areas of consumption.

Opening process of the market

The DETEC (Federal Department of Energy, Transport, Environment and Communication) has appointed an expert commission in order to lay down the basic form the new electricity industry structure should take. This commission finished its work in June 2004. On 30 June 2004 the Federal Council started a Consultation on the draft of the new Electricity Supply Low that lasted to the end of September 2004. Finally, on 3 December 2004 the Federal Council sent to the Parliament its proposals for this law and for a revision of the Power Installations Law. The latter treats questions of relevance to the present situation concerning the cross-border trade and should be passed urgent. On the contrary, the Electricity Supply Law intends to open the Swiss electricity market gradually.

ES Market development

In relation with the electricity market development in 2004 it was approved that:

- National CO2 emissions plan that assign each power station the amount of allowances that they receive free for the period 2005-2007
- RD 436/2004: new legislation related with renewable generation that introduce the obligation for the wind farms to forecast the production
- New developments for the new Iberian Market

CZ Opening process of the market

The electricity market has been opened for all consumers other than householders since January 1st 2005.

HU Opening process of the market

In the first stage of market opening, from 1 January 2003, the customers of yearly consumption higher than 6.5 GWh can – depending on their own decision – become eligible ones. By the end of December 2003, 222 customers (about 33% of the power market) made registration at the Hungarian Energy Office, of which actually 88 customers (about 18% of the power market) entered into the open market.

Pursuant to the Directive 2003/54/EC, from 1 July 2004 all customers except household customers will be eligible, from 1 July 2007 also the household customers will be eligible, i.e. 100% of the market will be open.

PL Energy Policy

With the aim of the full implementation of the new IEM Directive, the legislation process of adopting the Polish Energy Law Act and its secondary legislation to the requirements of the Directive 2003/54/EC is under way.

Opening process of the market

Poland, after its accession to EU on 1 May 2004, has become the full member participant in the Internal Electricity Market.
According to the Polish Energy Law, at the day of Poland's accession to the EU, the opening of the electricity market was extended to electricity generated in the EU Member States. The process of gradual opening continued according to the Ordinance of the Ministry of Economy.

Electricity Market Developments

The Polish Energy Law Act was changed in April 2004 with amendments adapting it to the Directive 2001/77/EC. According to that amendments the President of the Energy Regulatory Authority will issue guarantee of origin of electricity produced from RES.
On 4January 2005 the document "Energy Policy till 2025 in Poland" was adopted by the Polish government.

On 1 July 2004 a company PSE-Operator S.A. commenced its activities as a Polish Transmission System Operator on the basis of its transmission licence. PSE-Operator S.A. has been established within the structures of the PSE holding as a legally unbundled company, according to requirements of the Directive 2003/54/EC.
From 1 July 2004 Poland is fully participating in the CBT mechanism.

With the aim of the full implementation of the new IEM Directive, the new amendments to the Polish Energy Law Act are in the final stage of the Parliamentary approval. The main legal changes will include: introduction of supplier of last resort and universal service, increase in the regulator's tasks, unbundling provisions for the system operators. The aim of these amendments is to make further convergence and harmonisation of the Polish market rules with the EU model.

SK Electricity Market Developments

In the Slovak Republic there is not any Power Exchange.

The Slovenska elektrizacna prenosova sustava, a.s. - SEPS, a.s. mission is to ensure electricity transmission from the main producer, as well as electricity imports, exports, and transits via the Slovak territory.

With regard to the present legislation adopted, SEPS, a.s. issued and updated following documents which were approved by the Regulatory Authority:

- Grid Code
- Dispatch Order for Control of the Power system of the Slovak Republic
- Trading Code,
- Commercial conditions of SEPS, a.s.

In October 2004 the new energy legislation package (The Energy Act, the Heat Act and the Regulation Act) was adopted by the Parliament. These acts are coming into force on 1st of January 2005.

According to the new Energy Act since 1st of January 2005 electricity market is opened for all customers except households. Households become eligible customers since 1st July 2007 (in compliance with Directive 2003/54/EC).
In 2004 the Regulatory Authority regulated prices for non-eligible final customers. Prices of basic electricity of dominant producers and ancillary services were regulated too.
Since 1st January 2005 price of basic electricity will be deregulated however ancillary services will be further regulated.

In 2004 SEPS, a.s. become full member of ETSO and has regular shared to CBT mechanism.

BA Opening process of the market

Laws are currently under preparation.

RO Opening process of the market

The Energy policy continued to focus towards restructuring energy sector. Decisions, adopted by the Government create a new organisation of the market by the de-integration of National companies.

By the deregulation process (law of July 2003) Romanian market will be open in May 2006 by 80% and by 100% in 2007.

Due to the significant changes in energy sector during 2004, Romanian Electricity Market was under continuous development: ongoing restructuring process (successive reorganisations of the thermal generation industry), continuous increase of the market opening degree (up to 55% starting with November 2004) and related decrease of the eligibility threshold (at least 1GWh/year) provided a strong competitive environment. In respect of these principles and to be fully consistent with the *acquis communautaire*, the structure and model of the electricity market were orientated towards a full competitive market, the secondary legislation issued by the Romanian Electricity and Heat Regulatory Authority being in line with these requirements.

OPCOM, the Romanian Electricity Market Operator, played the role of electricity market administrator, as stated in primary and secondary legislation in force, providing the organised framework to trade within the wholesale electricity market and being fully consistent with objectivity, transparency and equidistance principles.

The constant development of the Romanian power market, integrated in the adaptation process to the European evolution, resulted in the enhancement of the electricity market operator activity as

administrator of the wholesale power market of Romania. As for example, the number of contracts administrated by OPCOM grew every year, reaching at the end of 2004 the impressive amount of 336.

Based on ongoing contracts, not only for electricity but also for ancillary services, payment obligations and collection rights were monthly established. Spot market transactions were also cleared and settled.

Eligible consumers and power suppliers had the opportunity to trade electricity on the competitive market, where the prices are negotiated based on bilateral contracts or cleared on the spot market. The real share of the competitive market in 2004 was about 33%, less than the market opening degree stipulated in regulation in force.

During August 2000-December 2004, OPCOM administrated electricity trades and services totalling 262 TWh and related amounts totalling about 224,296 billion ROL, i.e. 3.5% out of Gross Domestic Product of Romania.

BG Opening process of the market

The new Energy Law in force since December 2003 is in full compliance with the principles of EU legislation providing for an open and transparent energy market, based of fair competition, security of supply and sustainable development of the sector. The Law introduces a regulated Third Party Access to the Grid, new market relations and a new Market Model, established in all countries in EU – a model of ”bilateral contracts and a balancing market”. The first schedule for supply of electricity at freely negotiated prices was registered on September 16, 2004. Eight Market Players were active on the open market in 2004, among them three Independent Producers and five Eligible Customers. The total energy supplied under bilateral contracts in 2004 is 232383 MWh. Since July 2004 the eligibility threshold is 40 GWh. The share of the Open Market is 21,6 % of the total consumption of electricity.
Step by step the model shall be developed further and a complex market incorporating a spot “day-ahead market” for short-term deals with electricity and ancillary services will be put in place.

MK Opening process of the market

In accordance to the decision for the separation of the state owned joint stock company for Production, Transmission and Distribution of electricity “Elektrostopanstvo na Makedonija” AD and the decisions confirming the Separation Plan of the state owned joint stock company “Elektrostopanstvo na Makedonija” AD, adopted by the Government of the Republic of Macedonia, a new status occurred, by which the Company was divided into two entities, by setting up, starting from January 01, 2005, the following:

- “Elektrostopanstvo na Makedonija” AD vo drzavna sopstvenost-Skopje, (Electric Power Company for Production, Distribution and Supply of electricity, state owned joint stock company), hereinafter referred to as AD ESM;

- “Operator na elektroprenosniot sistem na Makedonija” AD vo drzavna sopstvenost-Skopje (Macedonian Transmission System Operator, state owned joint stock company), hereinafter referred to as AD MEPSO;

SI Energy Policy

In the National Energy Plan , the wind energy is foreseen in the next 10 years of total capacity around 200MW.

APPENDIX

APPENDIX 1: UCTE 2004 power data table

Table A/1	**UCTE – Power balance retrospect 2004, power data**											**GW**
	Net values at the reference time 11:00 of each 3rd Wednesday of each month											
	Jan.	**Feb.**	**March**	**April**	**May**	**June**	**July**	**Aug.**	**Sept.**	**Oct.**	**Nov.**	**Dec.**
National generating capacity												
hydro power stations	132.2	132.2	132.3	132.1	132.1	132.3	132.5	132.4	132.4	132.5	132.6	132.6
nuclear power stations	113.3	113.3	113.3	113.3	113.3	113.3	113.3	113.3	113.3	113.3	113.3	113.3
conventional thermal power stations	303.4	303.6	304.4	305.9	306.6	307.1	309.0	311.0	311.4	311.8	312.3	312.6
renewable energy sources	27.7	28.2	28.6	29.0	29.4	29.6	30.1	30.6	30.8	31.5	32.1	32.9
not clearly identifiable energy sources	1.7	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
National generating capacity (6=1+2+3+4+5)	**578.4**	**579.0**	**580.3**	**582.1**	**583.1**	**584.1**	**586.7**	**589.1**	**589.7**	**591.0**	**592.0**	**593.2**
non-usable capacity	100.7	101.4	106.6	108.6	109.0	112.8	117.0	119.8	114.4	106.4	107.6	109.7
overhauls (thermal power stations)	11.6	18.5	31.9	45.8	56.5	52.8	47.6	51.7	41.5	36.6	25.2	7.9
outages (thermal power stations)	15.2	17.2	19.2	15.7	16.8	13.1	15.2	16.9	20.2	17.1	12.4	15.8
system services reserve	31.5	28.3	29.1	28.2	27.0	27.0	26.6	29.3	26.2	29.3	31.0	28.7
Reliable Available Capacity (11 = 6 - (7 + 8 + 9 + 10))	**419.4**	**413.6**	**393.4**	**383.7**	**373.8**	**378.4**	**380.3**	**371.3**	**387.4**	**401.5**	**416.0**	**431.2**
Load	**348.1**	**343.1**	**314.6**	**309.1**	**299.4**	**304.6**	**312.7**	**279.7**	**310.2**	**320.5**	**342.0**	**360.6**
margin against the monthly peak load	31.5	30.4	45.9	34.7	29.0	24.1	21.1	45.3	25.4	24.4	35.2	31.0
Remaining capacity (14=11-12) without exchanges	**71.2**	**70.5**	**78.9**	**74.6**	**74.4**	**73.8**	**67.6**	**91.6**	**77.2**	**80.9**	**74.0**	**70.6**
Physical exchanges												
Import	38.2	39.1	37.1	33.6	33.2	30.0	33.1	28.8	34.3	37.3	39.8	38.2
Export	37.0	35.6	33.4	31.8	32.9	30.4	33.9	29.9	34.9	38.8	36.2	34.7
Physical exchanges balance (17 = 15 - 16)	**1.2**	**3.4**	**3.7**	**1.8**	**0.3**	**-0.4**	**-0.8**	**-1.2**	**-0.5**	**-1.5**	**3.6**	**3.4**
Remaining capacity with exchanges (18 = 14 + 17)	**72.4**	**73.9**	**82.6**	**76.4**	**74.7**	**73.3**	**66.8**	**90.5**	**76.6**	**79.4**	**77.6**	**74.0**

APPENDIX 2: UCTE 2004 energy data table

Table A/2	**UCTE – Power balance retrospect 2004, energy data**																							**TWh**
	BE	**DE**	**ES**	**FR**	**GR**	**IT**	**SI**	**HR**	**MK**	**CS**	**LU**	**NL**	**AT**	**PT**	**CH**	**CZ**	**HU**	**PL**	**SK**	**BA**	**RO**	**BG**	**UA-W**	**UCTE**
Generation																								
Hydro power stations	1.6	26.7	33.9	64.5	4.9	47.9	3.6	7.0	1.5	13.4	0.8	0.1	34.4	9.9	35.1	2.6	0.2	3.5	4.0	6.0	16.3	3.3	0.1	321.3
Nuclear power stations	44.9	158.4	60.9	426.8	0.0	0.0	5.2	0.0	0.0	0.0	0.0	3.6	0.0	0.0	25.4	24.8	11.2	0.0	15.7	0.0	5.1	15.4	0.0	797.5
Conventional thermal power stations	34.8	352.2	129.4	51.8	43.2	231.8	4.6	5.4	4.7	25.3	3.1	86.4	17.2	27.8	2.9	50.5	16.6	138.3	6.0	6.6	30.5	16.7	7.5	1293.4
Renewable energy sources	0.1	32.8	18.7	3.5	1.0	6.9	0.0	0.0	0.0	0.0	0.1	4.0	1.4	1.7	0.9	0.0	0.8	0.4	0.0	0.0	0.0	0.0	0.0	72.3
Not clearly identified sources	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.8	0.0	0.0	0.0	2.0	0.0	2.6	0.0	0.0	0.0	0.0	9.4
TOTAL	**81.4**	**570.1**	**242.9**	**546.6**	**49.1**	**286.6**	**13.4**	**12.4**	**6.2**	**38.7**	**4.0**	**94.1**	**57.8**	**39.4**	**64.4**	**77.9**	**30.8**	**142.2**	**28.3**	**12.6**	**51.9**	**35.4**	**7.7**	**2493.9**
Exchanges	7.8	-7.3	-3.0	-62.1	2.8	45.7	-0.8	3.7	1.2	2.0	3.4	16.2	3.2	6.5	0.8	-15.7	7.5	-9.3	-1.9	-1.9	-1.1	-5.9	-3.3	-11.5
Import	14.6	44.2	8.1	6.6	4.9	46.5	4.3	10.1	2.0	6.0	6.5	21.4	16.5	8.6	26.1	9.8	13.8	5.3	8.7	1.7	1.7	0.7	1.6	269.6
Export	6.8	51.5	11.1	68.7	2.0	0.8	5.0	6.4	0.8	4.0	3.1	5.2	13.3	2.1	25.3	25.5	6.3	14.6	10.6	3.6	3.0	6.6	4.9	281.2
Pumped storage	1.7	7.9	4.6	7.3	0.8	10.3	0.0	0.1	0.0	0.8	1.1	0.0	3.0	0.4	2.4	0.7	0.0	2.2	0.1	0.0	0.0	0.3	0.0	43.8
Consumption	**87.5**	**554.0**	**235.1**	**477.2**	**51.2**	**322.0**	**12.6**	**16.0**	**7.4**	**39.9**	**6.3**	**111.1**	**56.6**	**45.5**	**60.0**	**61.5**	**38.3**	**130.6**	**26.3**	**10.7**	**50.7**	**29.5**	**4.4**	**2434.5**

APPENDIX 3: Transmission System Adequacy, main grid developments

The following tables shows the main grid developments in the different UCTE countries.

BE

Line or Equipment name	Voltage Level	Commissioning Date	Main Characteristics (single or double circuit line, length, AC lines or DC lines, …)
Champion-Cognelée	380kV	17/3/2004	Second circuit AC line 3.6 km
Champion	380/70 kV	31/3/2004	transformator
Tihange Bis	380/150 /70 kV	7/11/2003	transformator

DE

Line or Equipment name	Voltage Level	Commissioning Date	Main Characteristics (single or double circuit line, length, AC lines or DC lines, …)
Eschen-Feldkirch	110 kV	01.10.2004	Single circuit, Cable
Diele - Hanekenfähr Emsland West / Rhede	380 KV	30.4.04	Single circuit; 86km
Kriftel (Rhein/Main-Area)	380/110 kV	19.10.2004	Substation 380/110 KV
Connection Wustermark	380 kV	19.02.2004	Double circuit, AC
Wustermark	380/110 kV	February 2004	Substation 380/110 KV

On 18.12.2004 the reinforcement of the grid connection from the DC-link Baltic Cable for max. power of 600 MW was finished.

ES

Line or equipment name		Voltage level	Commissioning date	Main characteristics (single or double circuit line, lenght, AC lines or DC lines,…)
Nueva Escombreras	*Rocamora*	*400*	*03/09/04*	*1 circuit, 65 km*
Nueva Escombreras	*Escombreras*	*400*	*03/09/04*	*1 circuit, 2 km*
Fuendetodos	*Escatron*	*400*	*05/11/04*	*1 circuit, 56 km*
Fuendetodos	*Almazan*	*400*	*05/11/04*	*1 circuit 136 km*
Santa Engracia	*Serna*	*400*	*23/06/04*	*1 circuit 59 km*
Santa Engracia	*Garoña-Barcina*	*400*	*23/06/04*	*1 circuit 92 km*
Amorebieta	*Ichaso*	*400*	*23/11/04*	*1 circuit 43 km*
Amorebieta	*Gatica*	*400*	*23/11/04*	*1 circuit 22 km*
Arrubal	*Santa Engracia*	*400*	*23/06/04*	*1 circuit 5 km*
Arrubal	*Santa Engracia*	*400*	*23/06/04*	*2 circuits 5 km*
C. Gibraltar	*Pinar*	*400*	*12/02/04*	*2 circuits*
C. Gibraltar	*Pinar*	*400*	*12/02/04*	*1 circuit*
Balboa	Alqueva	400	23/12/04	1 circuit 73 km
Alto Lindoso – (Portugal – Spain)	Cartelle 2	400	26/03/04	AC Interconnection circuit (second circuit of a double pole). Included in Retrospective 2003 due to operational connections in October 2003 but in service in 2004
Transformers				
Fuencarral	*AT1*	*400*	*02/04/04*	

Escombreras	*AT2*	*400*	*01/02/04*	
Fuendetodos	*AT1*	*400*	*15/12/04*	
Begues	*AT2*	*400*	*12/08/04*	
Can barba	*TR7*	*400*	*30/05/04*	
Palos	*AT1*	*400*	*05/11/04*	

FR

Line or Equipment name	Voltage Level	Commissioning Date	Main Characteristics (single or double circuit line, length, AC lines or DC lines, …)
ARGOEUVES CHEVALET	400 kV	August	Length of the line: 45 km
LA BOISSE-CAILLOUX SUR FONTAINE	225 kV	December	Length of the line: 10.6 km

GR

Line or Equipment name	Voltage Level	Commissioning Date	Main Characteristics (single or double circuit line, length, AC lines or DC lines, …)
HT s/s OLYMPIC VILLAGE	150	7/5/2004	SUBSTATION
HT s/s IRON pp	150	18/7/2004	SUBSTATION
EHT s/s ARGYROUPOLIS	400	21/7/2004	SUBSTATION
EHT s/s ACHARNES	400	12/7/2004	AUTOTRANSFORMER 280MVA
EHT s/s PALLINI	400	21/7/2004	AUTOTRANSFORMER 280MVA
EHT s/s AGIOS STEFANOS	400	13/7/2004	AUTOTRANSFORMER 280MVA
EHT s/s LARISA	400	15/4/2004	AUTOTRANSFORMER 280MVA
EHT s/s LARYMNA	400	7/4/2004	AUTOTRANSFORMER 280MVA
EHT s/s DISTOMO	400	2/8/2004	AUTOTRANSFORMER 280MVA
TRANSMISSION SYSTEM – ATHENS AREA			CAPACITORS OF 500mvAR

IT

Line or Equipment name	Voltage Level	Commissioning Date	Main Characteristics (single or double circuit line, length, AC lines or DC lines, …)
Teramo - Rosara	380 kV		Single line
Teramo - Villanova	380 kV		Single line
La Spezia - Acciaiolo	380 kV		Single line
Flero –Mantova	380 kV		Single line
Laino - Altomonte	380 kV		Single line
Candela -Foggia	380 kV		Single line
Other 380 kV lines	380 kV		Lines for a total length of 42 Km
# 49 lines	150/132 kV		Lines
Bussolengo - Colunga	220 kV		Single line
Tavarnuzze – Arezzo	220 kV		Single line
Villasor – Busachi	220 kV		Single line
Sulcis - Villasor	220 kV		Single line
Other 220 kV lines	220 kV		Lines for a total length of 75 Km
Transformer	380/132 kV		Total of 1110 MVA
Transformer	220/132 kV		Total of 450 MVA
Substation	380 kV		# 4
Substation	220 kV		# 2
Substation	150 kV		# 4

NL

Line or Equipment name	Voltage Level	Commissioning Date	Main Characteristics (single or double circuit line, length, AC lines or DC lines, …)
Several capacitor banks and	380 kV	In the course	

shunt-reactors		of 2004	

PT

Line or Equipment name	Voltage Level	Commissioning Date	Main Characteristics (single or double circuit line, length, AC lines or DC lines, …)
TR at SE of Tunes	150/60 kV	30-April	126 MVA transformer
TR at SE of Falagueira	150/60 kV	30-July	63 MVA transformer
TR at SE of Sete-Rios	220/60 kV	30-December	170 MVA transformer
Alto Lindoso – Cartelle 2 (Spain) (Portuguese portion)	400 kV	26-March	AC interconnection circuit of 1.1 km (second circuit of a double pole)
Rio Maior – Ribatejo	400 kV	30-October	AC circuits (single pole) of 40.5 and 57.6 km from reconstruction of old Rio Maior – Palmela line to the new Gas Central of Ribatejo.
Ribatejo – Palmela			
Derivation from F-Alentejo – Alqueva to Balboa (Spain) (Portuguese portion)	400 kV	23-December	AC interconnection circuit of 40.0 km (one circuit in double pole)
Santarém – Zêzere	220 kV	29-August	AC circuit of 52.3 km (double pole)
Pereiros – Zêzere 3	220 kV	20-September	AC circuit of 70.9 km (double pole)
Alto de Mira – Sete-Rios	220 kV	30-December	AC circuit of 8.6 km (aerial double pole and underground cable)
Derivation from Vila Nova – Riba d'Ave to Oleiros	150 kV	4-June	AC circuit of 30.8 km (double pole)
Derivation from Caniçada – Riba d'Ave to Venda Nova 2	150 kV	27-November	AC circuit of 4.9 km (single pole)

CH

Line or Equipment name	Voltage Level	Commissioning Date	Main Characteristics (single or double circuit line, length, AC lines or DC lines, …)
Substation Chamoson	220 kV	June 2004	Modernisation
Filisur - Italian border	380 kV	January 2005	AC circuit of 2400 A
La Punt – Italian border	380 kV	January 2005	AC circuit of 2400 A

CZ

Line or Equipment name	Voltage Level	Commissioning Date	Main Characteristics (single or double circuit line, length, AC lines or DC lines, …)
none			

HU

Line or Equipment name	Voltage Level	Commissioning Date	Main Characteristics (single or double circuit line, length, AC lines or DC lines, …)
Hévíz–Žerjavinec (second circuit)	400 kV	04.06.2004	double circuit, (in Hungary) 70 km
Paks-Pécs	400 kV	15.11.2004	double circuit, 82 km

PL

Line or Equipment name	Voltage Level	Commissioning Date	Main Characteristics (single or double circuit line, length, AC lines or DC lines, …)
Mory substation	220/110 kV	4.10.2004	complete modernization
Wielopole substation	400/220/110 kV	within 2004	modernization

RO

Line or Equipment name	Voltage Level	Commissioning Date	Main Characteristics (single or double circuit line, length, AC lines or DC lines, …)
L 400kV Rosiori – Oradea Sud	400kV	20.10.2004	Was converted from 220 kV to 400 kV
Autotransformer from substation Portile de Fier	400 / 231 kV	5.02.2004	500MVA replace the old 400MVA autotransformer
Station Oradea Sud	400 / 110 kV	1.09.2004	Upgraded and converted from 220/110 kV to 400/110kV
Station Constanta Nord	400 / 110 kV	20.10.2004	upgraded

MK

Line or Equipment name	Voltage Level	Commissioning Date	Main Characteristics (single or double circuit line, length, AC lines or DC lines, …)
S/S Skopje 5	400/110	23.11.2003	

BA

Line or Equipment name	Voltage Level	Commissioning Date	Main Characteristics (single or double circuit line, length, AC lines or DC lines, …)
Ugljevik - Ernestinovo	400 kV	31.08.2004.	between Bosnia and Herzegovina and Croatia, which had been out of operation due to war damages, reconstructed and put into operation, single.
Gradacac - Djakovo	220 kV	05.11.2004.	between Bosnia and Herzegovina and Croatia, which had been out of operation due to war damages, was reconstructed and put into operation, single.
Mostar 4 – Sarajevo 10	400 kV	in July 2004.	which had been out of operation due to war damages, was reconstructed and put into operation, single.
Mostar 4 - Gacko,	400 kV	in July 2004.	which had been out of operation due to war damages, was reconstructed and put into operation, single.
400 kV Visegrad – TS Tuzla		06.08.2004.	which had been out of operation due to war damages, was reconstructed and put into operation, single.
Mostar 2 - Nevesinje	110 kV	in July 2004.	which had been out of operation due to war damages, was reconstructed and put into operation, single.

HR

Line or Equipment name	Voltage Level	Commissioning Date	Main Characteristics (single or double circuit line, length, AC lines or DC lines, …)
Substation Ernestinovo	400/110 kV	June 2004	Installed capacity 600 MVA. This is newly built substation on the location of former substation Ernestinovo which was completely destroyed during the war.
Reactor in substation Ernestinovo	110 kV	June 2004	100 MVAr
Substation Zerjavinec	400/220/110 kV	June 2004	Installed capacity 1000 MVA. Substation is in vicinity of Zagreb, which is the largest consumption centre in the country.
Transformer in substation Zerjavinec with the possibility of active power control under load conditions	400/220 kV	June 2004	400/220 kV, 400 MVA
Zerjavinec - Ernestinovo	400 kV	June 2004	Single circuit line. This national line was damaged during the war. Part of the line, between Mraclin and Djakovo, was temporarily operated on 220 kV level.
Zerjavinec – Heviz 1&2	400 kV	June 2004	Double circuit tie line between Croatia and Hungary. Only one circuit of this line (Zerjavinec – Heviz 1) was commissioned in June 2004. The other circuit (Zerjavinec – Heviz 2) is larger part of former tie line Tumbri – Heviz which was successfully operating from the year 1999 to June 2004.
Zerjavinec – Tumbri	400 kV	June 2004	Single circuit line. This national line is smaller part of former

			tie line Tumbri – Heviz.
Zerjavinec – Cirkovce	220 kV	June 2004	Single circuit line. This tie line between Croatia and Slovenia is larger part of former tie line Mraclin – Cirkovce.
Zerjavinec - Mraclin	220 kV	June 2004	Single circuit line. This national line is smaller part of former tie line 220 kV Mraclin – Cirkovce.
Konjsko - Mostar	400 kV	25 August 2004	This tie line between Croatia and Bosnia and Herzegovina was included in 400 kV network once again after 12 years of operation on 220 kV voltage level due to the war damages.
Ernestinovo – Ugljevik	400 kV	31 August 2004	Single circuit tie line between Croatia and Bosnia and Herzegovina (reconstruction of line which was damaged during the war)
Ernestinovo – Mladost	400 kV	10 October 2004	Single circuit tie line between Croatia and Serbia and Montenegro (reconstruction of line which was damaged during the war).
Djakovo – Gradacac	220 kV	5 November 2004	Single circuit tie line between Croatia and Bosnia and Herzegovina (reconstruction of line which was damaged during the war).

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