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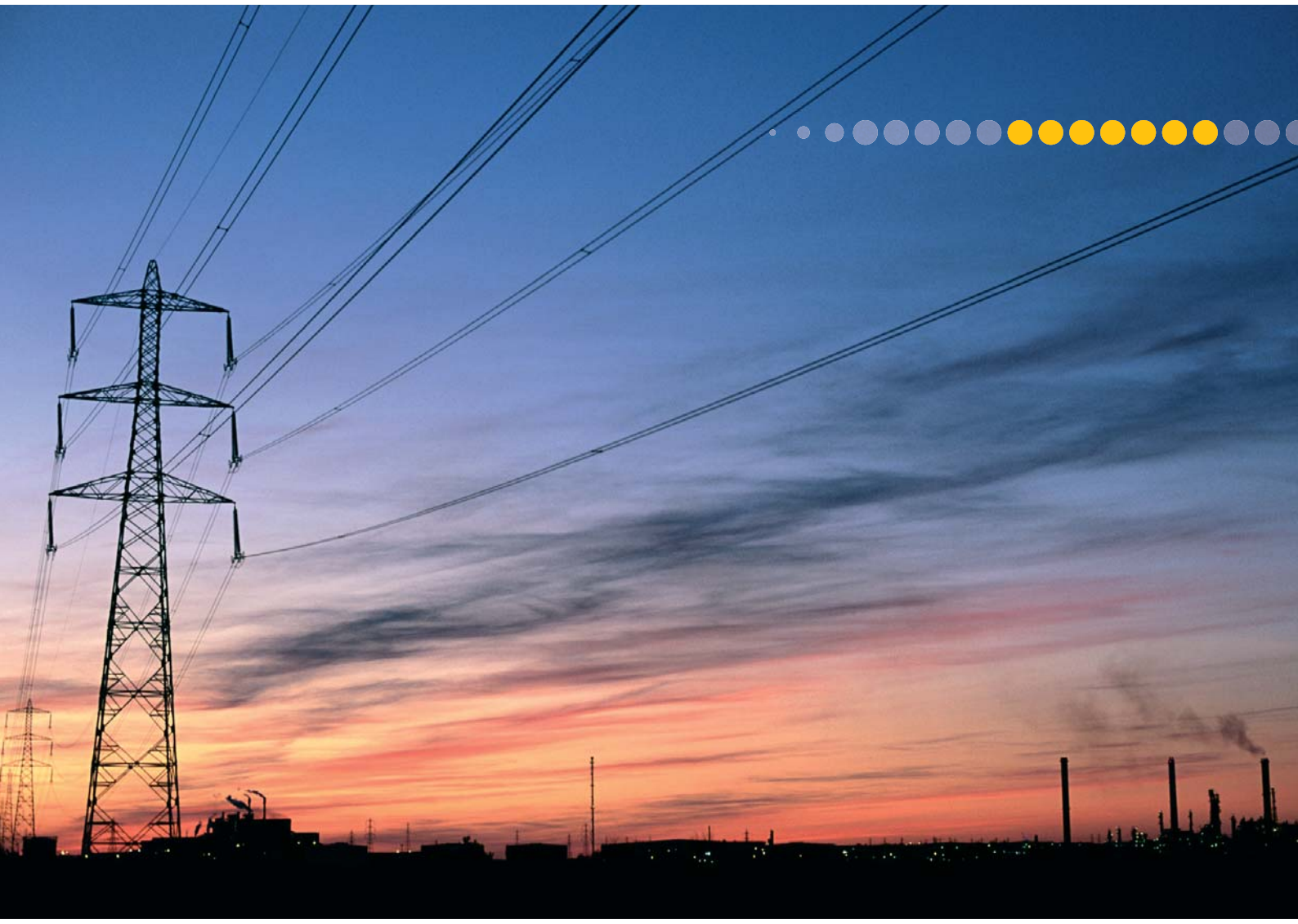

System Adequacy Retrospect 2008

union for the co-ordination of transmission of electricity

UCTE

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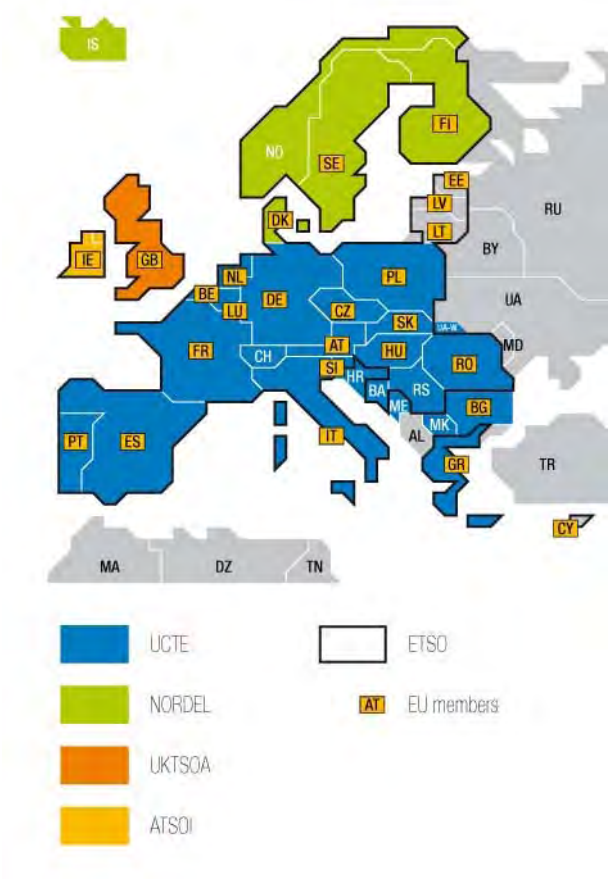
INTRODUCTION TO UCTE

The "Union for the Co-ordination of Transmission of Electricity" (UCTE) has been the association of transmission system operators in continental Europe, providing a reliable market base by efficient and secure electric "power highways". 50 years of joint activities laid the basis for a leading position in the world, which the UCTE holds with respect to the quality of synchronous operation of interconnected power systems. Through the networks of the UCTE, about 450 million people are supplied with electric energy; annual electricity consumption totals approx. 2600 TWh.



Map 1 European TSO Cooperative Bodies up to 2008

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 liberalization 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 liberalization 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.

UCTE WINDS-UP, ENTSO-E STARTS-UP

This report is the last System Adequacy Retrospect report to be published by UCTE. More analyses on system adequacy by Transmission system Operators to come from the new established European Network of Transmission System Operator of Electricity (ENTSO-E). More information on http://www.entsoe.eu

ENTSO-E was founded on 19th December 2008 as a proactive step of the TSO community to contribute to reliable and efficient pan-European and regional markets, ahead of the European Union Third Legislative Package of the Internal Electricity Market. The General Assembly also approved a budget for 2009 and a work plan for transferring the work of existing European TSO associations into ENTSO-E.

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

INTRODUCTION

This UCTE System Adequacy Retrospect 2008 report aims at providing stakeholders in the European electrical Market with an overview of:

- Generation, demand and their adequacy in the UCTE Power System in the year 2008 with a focus on the power balance and margins, and the generation mix;
- The state and the evolution of the UCTE Transmission Grid with a focus on the interconnection tie-lines and their possible influence on system security.

This retrospect analysis is part of the monitoring process performed by UCTE members as an input to the forecast analysis of system adequacy. UCTE published its latest forecast report in January 2009. *UCTE System Adequacy Forecast 2009-2020* is available on the UCTE website[1] All the data used in this report are downloadable on the UCTE website on the same page.

ENERGY BALANCE

Annual Energy	2003 TWh	2004 TWh	2005 TWh	2006 TWh	2007 TWh	2008 TWh	2007 to 2008 TWh	2007 to 2008 %
Hydro Power Generation	312.5	321.3	294.8	311.7	298.4	307.8	9.4	3.1
Nuclear Power Generation	788.1	797.4	791.4	801.1	759.3	774.6	15.3	2.0
Fossil Fuel Power Generation	1271.1	1296.4	1349.6	1363.5	1407.6	1377.6	-30.0	-2.1
Renewable Energy Sources Generation (exclud. hydro power)	54.8	76.5	94.2	114.3	139.7	154.7	14.9	10.7
Not Clearly Identified Sources Generation	27.0	9.4	8.5	3.7	3.5	11.3	7.8	224.7
Total Generation	**2453.5**	**2501.0**	**2538.5**	**2594.2**	**2608.6**	**2626.0**	**17.4**	**0.7**
Physical Exchanges Balance (I-E)	-13.5	-11.5	-1.8	-13.6	-2.0	0.4	2.4	-122.4
Pumped Storage	44.7	43.8	46.8	44.9	41.6	39.8	-1.7	-4.2
Consumption	**2395.3**	**2445.7**	**2489.9**	**2535.8**	**2565.0**	**2586.6**	**21.5**	**0.8**

DEMAND

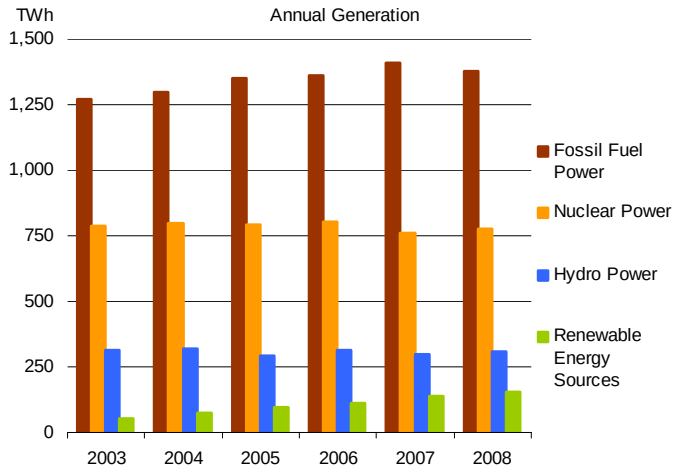
The UCTE annual consumption in 2008 was 0.8% higher than in 2007 and just below 2587 TWh. Behind this annual figure, if the summer[2] growth rate was positive with 2.4%, the winter growth rate was unusually flat with -0.3%, despite 2008 being a bissextile year unlike 2007. This negative value reveals the **strong impact on electricity consumption of the economic crisis**, in Q4 mostly. As the winter growth rate is an average value over both Q1 and Q4 merged together, the Q4 consumption alone is likely to have decreased.

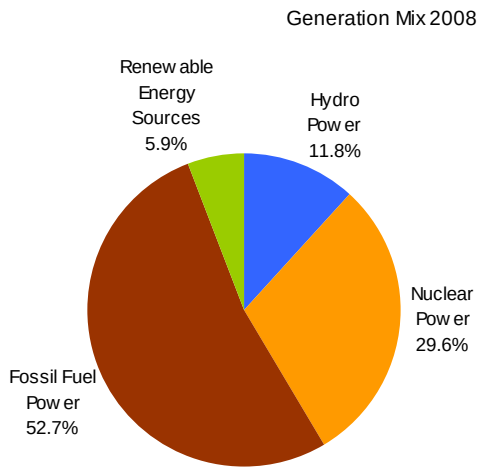
[1] http://www.ucte.org/resources/publications/systemadequacy/

[2] Winter and summer respectively refer to the winter quarters (Q1+Q4) and summer quarters (Q2+Q3) of the same calendar year 2008.

GENERATION

In 2008, the total generation on the UCTE grid was just below 2633 TWh. Its annual growth rate of 1.2%, above 0.6% in 2007, is lower than in the 5 earlier years as values were between 1.5% and 2%. This is in line with the slower consumption growth rate mentioned above while external exchanges were almost balanced as usual (see further).





In 2008, the highest increase was for nuclear generation with 15.3. TWh, thanks to a higher availability in Germany mostly. Second and very close increase was for renewable energy sources with additional 14.6 TWh due to its ever-increasing installed capacity. Consequently, fossil fuel generation decreased by 30 TWh.

EXCHANGES

The volume of internal exchanges within the UCTE grid decreased for the third year in a row down to 611 TWh in 2008, representing about 24% of the UCTE consumption compared to 26% in 2007 and 27% in 2006. The UCTE grid is almost balanced with an external Exchange Balance of 3.5 TWh (net export) in 2008 compared to 2 TWh in 2007 (net import) and 13.6 TWh in 2006 (net export). The external energy balance has been below 0.6% of the internal consumption during the last 6 years.

POWER BALANCE

All power data have been collected on a national basis for each monthly reference point, namely third Wednesday at 11:00 C.E.T.

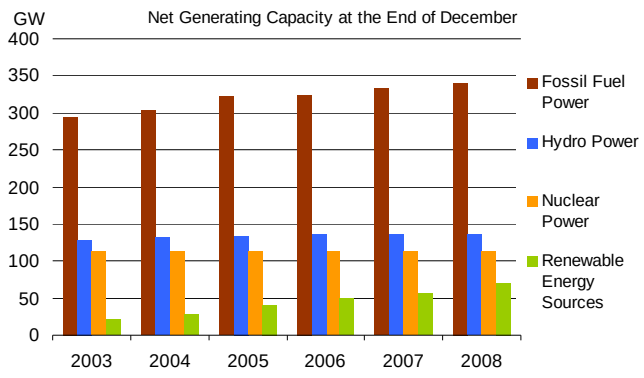
Power values in December	2003 GW	2004 GW	2005 GW	2006 GW	2007 GW	2008 GW	2007 to 2008 GW	2007 to 2008 %
Net Generating Capacity	569.1	593.2	611.3	625.1	639.7	660.5	20.7	3.2
Reliably Available Capacity	414.2	431.6	440.3	455.2	470.0	466.3	-3.7	-0.8
Load at Reference Time	348.2	360.6	369.5	368.1	384.0	361.4	-22.6	-5.9
Remaining Capacity w/o Exchanges	**66.0**	**70.6**	**70.8**	**87.0**	**86.0**	**104.8**	**18.8**	**21.9**
Physical Exchanges Balance (I-E)	1.6	3.4	8.2	2.4	3.0	2.8	-0.2	-6.1

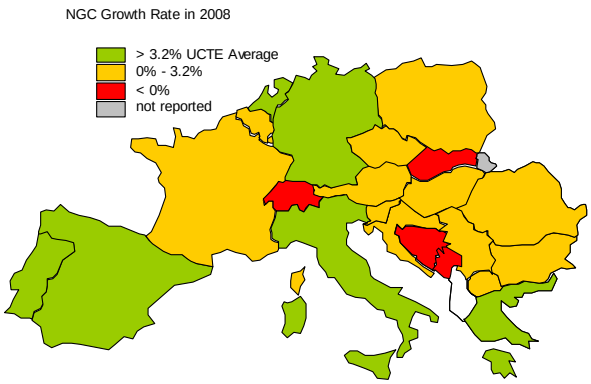
LOAD

Load in 2008 was almost stable compared to the previous 4 years. The continuous increase previously monitored stopped in 2008 from June onward, which can be connected to a mild summer temperatures and to the impact of the economic crisis. The highest value was in January due to more severe temperature in some particularly sensitive countries, than in other winter months.

GENERATING CAPACITY

The total generating capacity on the UCTE grid kept on increasing in 2008, even with the second largest increase over the 6 last years after 2005.





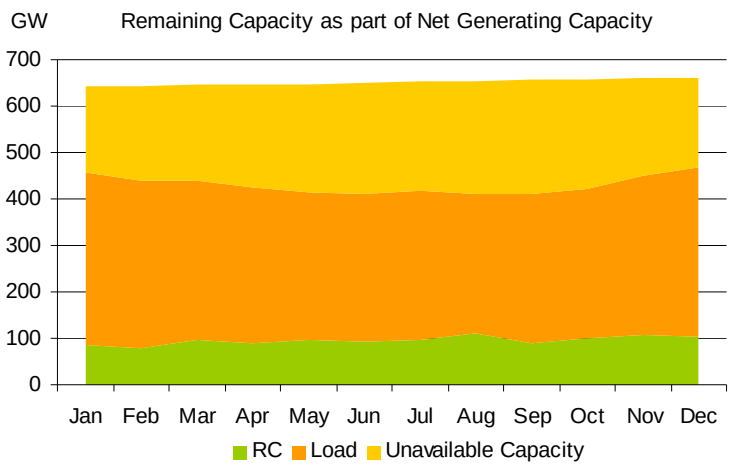
The most increasing type of generating capacity on the UCTE grid is made of renewable energy sources (RES) power plants with a growth rate of almost 25% in 2008. RES generating capacity is mainly made up of wind power, which accounts for more than 70% of the total 71 GW. Solar energy is booming, with significant capacities in Germany and Spain mostly, with a total installed power of 5 GW.

The fossil fuel generating capacity increased by the second highest growth rate in years, namely 2.0% in 2008. After one year of stagnation, namely 2006, the fossil fuel generating capacity goes on increasing since.

The generating capacity mix at the end of 2008 remains similar to the mix observed in previous years. Although decreasing, the fossil fuel generating capacity still accounts for approximately 52% of the total generating capacity.

GENERATION ADEQUACY

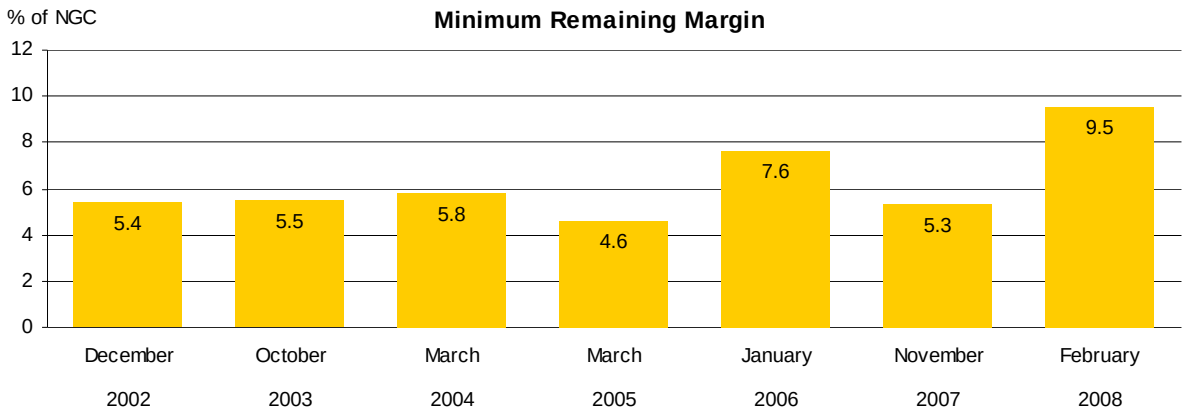
Remaining Capacity (RC) is the part of Net Generating Capacity left on the system to cover any unexpected load variation and unplanned outages at reference point. Remaining Capacity (RC) on a power system is the difference between Reliably Available Capacity and Load.



UCTE Remaining Capacity was positive at all Reference Points. It means that the UCTE power system had enough internal generating capacity available to cover its load at all reference times.

Besides, Remaining Capacity reached its 2008 minimum value in February with 80.3 GW or 12.5% of Net Generating Capacity. This minimum value was about 9 GW higher than in the previous years.

Remaining Margin (RM) on a power system is the difference between Remaining Capacity and Margin Against monthly Peak Load. Remaining Margin is the part of Net Generating Capacity left on the system to cover any unexpected load variation and unplanned outage over the month.



UCTE Remaining Margin was definitely positive for all months in 2008, it means that the UCTE power system had enough internal generating capacity left to cover its load at any time of the month.

UCTE Remaining Margin in 2008 was also above the indicative level of 5% of the Net Generating Capacity used within UCTE to forecast generation adequacy like in the latest System Adequacy Forecast 2009-2020 report[3].

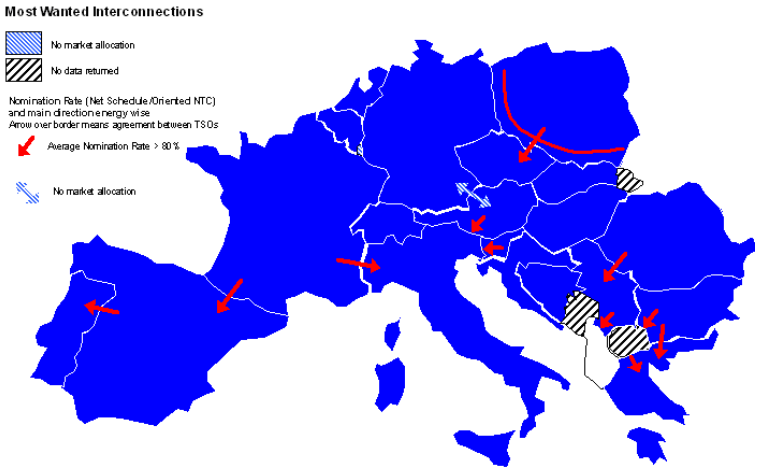
The lowest value of the Remaining Margin in 2008 was in February. It is the results of the aggregation of the national values. No UCTE wide explanation can be found as minimum Remaining Margin occurred in different months in the various countries. The level of the minimum UCTE Remaining Margin in 2008 was much higher than the usual level with 9.5 % of the Net Generating Capacity compared to 5.7% in average from 2002.

[3] http://www.ucte.org/_library/systemadequacy/saf/UCTE_SAF_2008-2020.pdf

TRANSMISSION ADEQUACY

Methodology for transmission adequacy analysis has been updated to get more synthetic and reliable results compared to the previous reports. It does not report about physical constraints on transmission lines anymore but on commercial bottlenecks based on the average usage of the cross-border transmission capacities.

This document gives a retrospective view on the past year. Power flow patterns are however everything but static: their evolution reflects indeed directly long term drivers (different load growth rates, generation assets evolving at different pace in the various countries), and short-term ones (climatic conditions and primary fuel prices fluctuations). Therefore, the information provided in this report cannot be extrapolated in any sense, especially to perform a forecast. As a matter of fact, any decision to enhance the transmission adequacy of the UCTE system in the future will require specific adequacy, market and network forecast analyses, jointly performed by TSOs on a regional basis, which are out of the scope of this report.



Bottlenecks occur especially at the Northern border of Italy, as Italy relies on relatively high and constant level of imports.

In the South East region, power tends to flow from North to South, Romania and Bulgaria being net exporters and Greece, FYROM and Montenegro usually importing, with five constrained borders reported.

Exchanges between France to Spain (mostly from France to Spain, sometime also in reverse direction), Spain to Portugal and from Poland to its South-Western neighbours also looked constrained in 2008.

1 METHODOLOGY SUMMARY

1 METHODOLOGY SUMMARY

1.1 INTRODUCTION

The data and the methodology for system adequacy analysis used by UCTE in its System Adequacy Retrospect (SAR) reports are described in details in the UCTE System Adequacy Methodology document downloadable on the UCTE web site[4].

System adequacy of a power system is the ability of a power system to supply the load in all the steady states in which the power system may exist considering standards conditions. System adequacy is analysed through generation adequacy and transmission adequacy.

Abbreviation	Flag	Country	National Correspondent Company
AT		Austria	VERBUND APG
BA		Bosnia-Herzegovina	ISO BiH
BE		Belgium	Elia
BG		Bulgaria	ESO EAD
CH		Switzerland	swissgrid
CZ		Czech Republic	CEPS
DE		Germany	BDEW
ES		Spain	REE
FR		France	RTE
GR		Greece	HTSO/DESMIE
HR		Croatia	HEP-OPS
HU		Hungary	MAVIR ZRt.
IT		Italy	Terna S.p.A.
LU		Luxembourg	CEGEDEL Net S.A.
ME		Montenegro	EPCG
MK		Former Yugoslav Republic of Macedonia	MEPSO
NL		Netherlands	TENNET
PL		Poland	PSE Operator S.A.
PT		Portugal	REN
RO		Romania	Transelectrica
RS		Serbia	JP EMS
SI		Slovenia	ELES
SK		Slovak Republic	SEPS
UA_W		Ukraine West	Ukrenergo[5]

Tab. 1 System Adequacy Geographical Perimeter

[4] http://www.ucte.org/_library/systemadequacy/saf/UCTE_System_Adequacy_Methodology.pdf

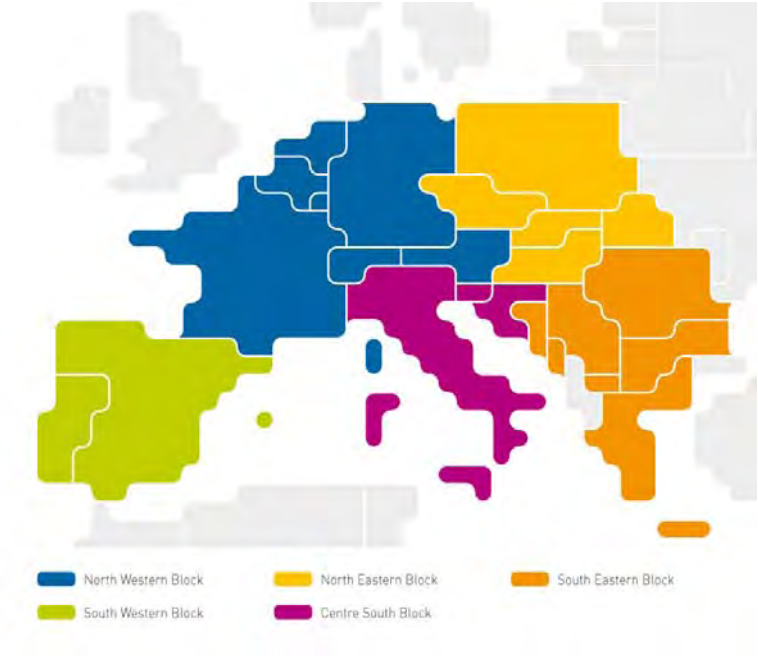
[5] No data has been returned by Ukrenergo this year.

Every national correspondent is in charge of collecting data aggregated for the whole country and not only on the EHV grid or the one managed by TSOs.

The perimeter of the system adequacy analysis performed by UCTE is made of all the countries of the UCTE members minus the Denmark West associated member Energynet.dk and plus the Ukraine West TSO Ukrenergo[6]. The differences between the UCTE perimeter and the actual geographical perimeter of the System Adequacy analysis are small enough to extend its results to the actual UCTE perimeter.

National power data are collected for a single monthly reference point, namely third Wednesday of each month at 11:00.

Regional blocks are specified to match with the most interconnected systems, as shown in Map 2.



- South Western block is made of Portugal and Spain.
- North Western block is made of Austria, Belgium, France, Germany, Luxembourg, the Netherlands and Switzerland.
- North Eastern block is made of Czech Republic, Hungary, Poland, Slovak Republic and Ukraine-West.
- South Eastern block is made of Bosnia-Herzegovina, Bulgaria, FYROM, Greece, Montenegro[7], Romania and Republic of Serbia.
- Centre South block is made of Croatia, Italy and Slovenia.

Map 2 Regional Blocks for Adequacy Analysis

1.2 DEFINITIONS

Generation adequacy of a power system is an assessment of the ability of the generation on the power system to match the consumption on the power system.

Generation adequacy is made at three levels: individual countries, 5 regional blocks and the whole UCTE. The analysis at regional level completes the overall UCTE-wide picture by taking account of major limitations in power flows within the whole synchronous area.

A UCTE SAR report is published by the middle of every year (Y) with a retrospect of the year before the publishing date (Y-1).

[6] Ukrenergo did not provide any data for this report.

[7] Following its independency on June 3rd 2006, data regarding Montenegro and Republic of Serbia are not aggregated anymore. Distinct historical data are available form 2006 only.

Power data collected for each country are synchronous at each reference point (date and time power data are collected for) and can thus be aggregated. In order to compare the evolutions of the results, similar reference points are specified for each month and from one report to another.

Load on a power system is the net (excluding consumption of power plants' auxiliaries, but including network losses) consumption corresponding to the hourly average active power absorbed by all installations connected to the transmission or distribution grid, excluding the pumps of the pumped-storage stations.

Net Generating Capacity (NGC) of a power station is the maximum electrical net active power it can produce continuously throughout a long period of operation in normal conditions. NGC of a country is the sum of the individual NGC of all power stations connected to either the transmission grid or to the distribution grid.

Unavailable Capacity is the part of NGC that is not reliably available to power plant operators due to limitations of the output power of power plants. It consists of the Non-Usable Capacity, Maintenance and Overhauls, Outages and System Services Reserve.

Reliably Available Capacity (RAC) on a power system is the difference between NGC and Unavailable Capacity.

Remaining Capacity (RC) on a power system is the difference between RAC and Load.

Margin Against Peak Load (MaPL) is the difference between Load at the reference point and the peak load over the period the reference point is representative of. SAR MaPL is monthly and is called Margin Against Monthly Peak Load (MaMPL).

Remaining Margin (RM) on a power system is the difference between RC and MaPL. In SAR reports, RM is calculated with MaMPL and with or without Exchanges.

All the above definitions are illustrated in Fig. 1.

Fig. 1 Generation Adequacy Analysis

1.3 ADEQUACY ASSESSMENT

1.3.1 GENERATION ADEQUACY

Generation adequacy retrospect on power system is assessed at the reference points through the Remaining Capacity value.

When Remaining Capacity without Exchanges is positive, it means that the power system had enough internal generating capacity left to cover its Load; when negative, it means that the power system had to cover its Load with the help of imports.

As long as all individual Remaining Capacities with Exchanges are positive, it means that the power balance was achieved throughout UCTE.

The comparison of the Remaining Capacity to an indicative level of 5% of the Net Generating Capacity is a good indicator of the evolution of generation adequacy.

Considering Remaining Margin definition introduced in Chapter 1.2, the generation adequacy retrospect assessment is then monthly extended.

When Remaining Margin without Exchanges is positive, it means that the power system had enough internal generating capacity left to cover its load at any time of the month.

When Remaining Margin without Exchanges is negative, it means that the power system might have to rely on imports to cover its monthly peak load.

The evolution of the annual minimum Remaining Margin throughout the years is a good indicator of the true evolution of the generation adequacy.

Generation adequacy retrospect analysis on year 2008 is in Section 3.

1.3.2 TRANSMISSION ADEQUACY

Transmission adequacy is the ability of the electric system to deal with exchanges resulting from market behaviour. Transmission adequacy retrospect analysis looks back at the potential relieves and constraints on cross-border capacities and commercial exchanges during the previous year considering two aspects:

- The main grid developments with an emphasis on commissioned transmission devices, which had a significant impact on cross-border capacities;
- Cross-border bottlenecks retrospect analysis based on average usage of interconnection transmission capacities[8], considering whether access to the cross-border transmission capacities has been granted or not to market players who requested it.

This document reports about the transmission adequacy in the previous year but not about transmission adequacy in the future. Therefore, any decision to enhance the transmission adequacy of the UCTE system

[8] This part of the methodology for transmission adequacy analysis has been updated and made more explicit to make sure that all TSOs use the same rules to get more transparent and reliable results compared to the previous reports. It is not reporting about physical congestions on transmission lines anymore. Potential sources of cross-border bottlenecks could be either actual limited transmission capacities or the allocation mechanisms of these transmission capacities.

in the future will require specific adequacy, market and network forecast analyses jointly performed by TSOs on a regional basis, which are out of the scope of this report.

Transmission adequacy retrospect analysis on year 2008 is in Section 4.

2 ENERGY BALANCE

2 ENERGY BALANCE

The present Section analyses the consumption and generation mix in the UCTE system in 2008 backward.

In addition to the figures reported in this Section, extra figures are in Appendix 2 and on the UCTE website along with the present document.

2.1 UCTE ENERGY BALANCE SUMMARY

Annual Energy	2003 TWh	2004 TWh	2005 TWh	2006 TWh	2007 TWh	2008 TWh	2007 to 2008 TWh	2007 to 2008 %
Hydro Power Generation	312.5	321.3	294.8	311.7	298.4	307.8	9.4	3.1
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Total Generation	**2453.5**	**2501.0**	**2538.5**	**2594.2**	**2608.6**	**2626.0**	**17.4**	**0.7**
Physical Exchanges Balance (I-E)	-13.5	-11.5	-1.8	-13.6	-2.0	0.4	2.4	-122.4
Pumped Storage	44.7	43.8	46.8	44.9	41.6	39.8	-1.7	-4.2
Consumption	**2395.3**	**2445.7**	**2489.9**	**2535.8**	**2565.0**	**2586.6**	**21.5**	**0.8**

Tab. 2 UCTE Energy Balance Retrospect

Tab. 2 is the 2008 summary of the energy figures on the UCTE grid, detailed in the following Chapters.

2.2 DEMAND

2.2.1 ENERGY CONSUMPTION

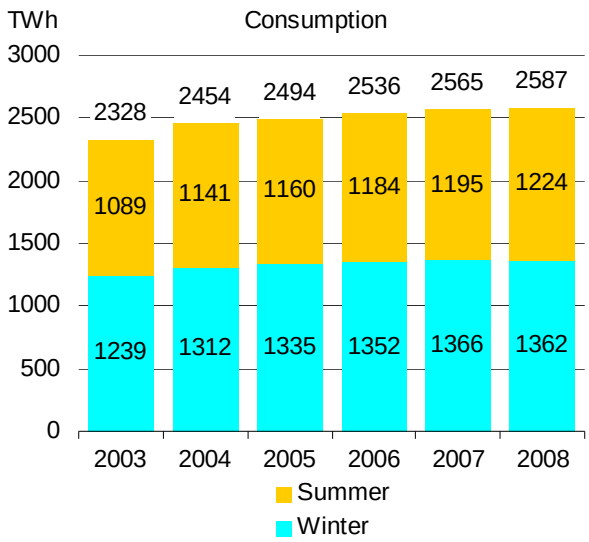


Fig. 2 UCTE Consumption Retrospect[9]

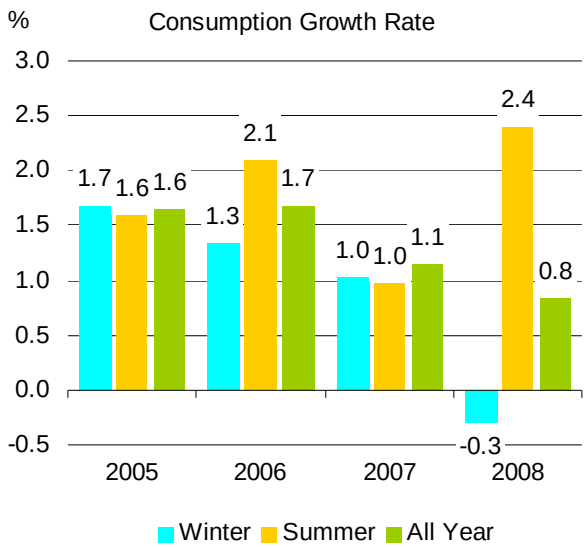
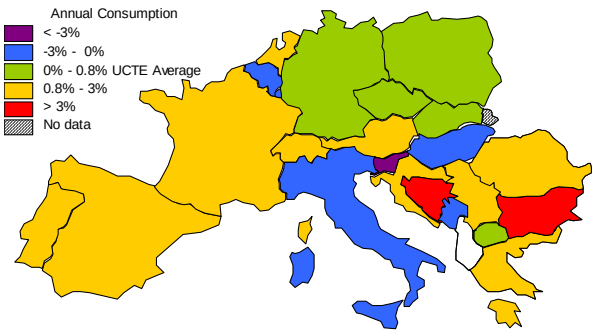


Fig. 3 UCTE Consumption Growth Rate Retrospect

The UCTE annual consumption in 2008 was 0.8% higher than in 2007 and just below 2587 TWh. Behind this annual figure, if the summer[10] growth rate was highly positive with 2.4%, the winter growth rate was unusually negative (-0.3%), despite 2008 being a bissextile year. This almost nil value reveals the strong impact on electricity consumption of the economic crisis, in Q4 mostly. Bearing in mind that Q1 and Q4 consumptions are merged together, the Q4 consumption is likely to have decreased.



Map 3 Electricity Consumption Growth Rate in 2008

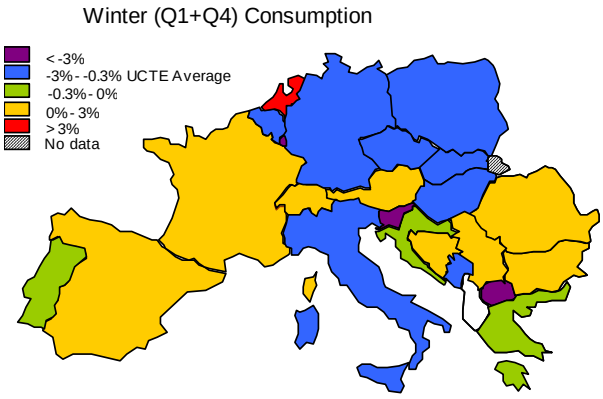
Map 3 shows that annual consumption massively decreased in Slovenia (-4.8%), Montenegro (-2.4%), Hungary (-1.6%), Luxembourg (-1.5), Belgium (-0.8%) and Italy (-0.7%). Unlike 2007[11], these negative rates were due to the economic slow down. Yet most countries experienced positive yearly growth rates with highest values in Bulgaria (3.9%) and Bosnia-Herzegovina (3.3%). Unlike in the previous years, high value growth rates have been metered in Western Europe too like in the Netherlands (2.9%) and France (2.6%).

[9] Deviations in total and seasonal figures come from separated data collection processes.

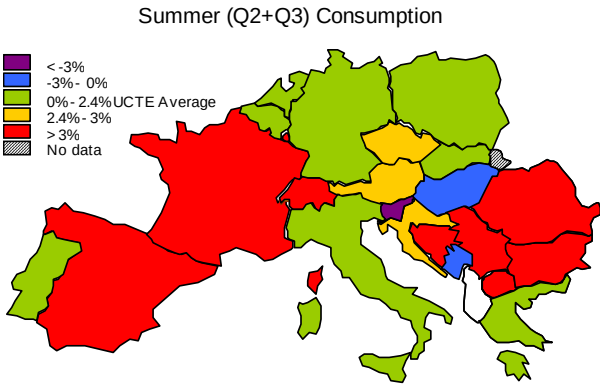
[10] Winter and summer respectively refer to the winter quarters (Q1+Q4) and summer quarters (Q2+Q3) of the same calendar year 2008.

[11] Belgium, Montenegro, the Netherlands and Switzerland experienced negative growth rates in 2007 due to mild temperatures.

As shown in Map 4, winter consumption dramatically decreased in FYROM (-8.5%), Luxembourg (-6%) and Slovenia (-5.6%). More negative growth rates have been metered in some countries and among them Italy (-2.7%), Montenegro (-2.4%), Hungary (-2.0%), and Germany (-1.9%). Yet some countries still experienced significant positive winter growth rates in 2008 like the Netherlands (+3.1%), Bosnia-Herzegovina (2.7%), Switzerland (+2.6%) and Bulgaria (+2.3%).



Map 4 Winter Consumption Growth Rate in 2008



Map 5 Summer Consumption Growth Rate in 2008

Regarding summer consumption and in complement to Map 5 most significant positive growth rates have been metered in FYROM (+11.8%), Bulgaria (+6%) and Switzerland (+5.8%) followed by Republic of Serbia (+4.7), France (+4.4%), Bosnia-Herzegovina (+4%), Luxembourg and Romania (both +3.4%). Negative growth rates have been observed in Slovenia (-5.6%), Hungary (-1.1%) and Montenegro (-0.6%), which have been affected earlier than others by the economic crisis.

More details on consumption in 2008 on a national basis are in Chapter 2.2.2.

2.2.2 National Comments on Demand

National data regarding demand are in Appendix 2.

BE Belgium

The average monthly temperature in 2008 was lower than the corresponding decennial monthly average temperature (1999-2008) for all the months with exception of January, February and May. The highest deviation from the decennial monthly average temperature was measured in September 2008, namely 3.2°C lower than the decennial average temperature for that month. The lower average monthly temperatures in summer resulted in an increase of the Belgian consumption during this period by 0.7%. A combination of higher monthly temperatures in January and February 2008 combined with the impact of the financial and economic crisis on the load in the fourth quarter of 2008 led to a decrease in the consumption during the winter by 2.1%.

The 2008 Belgian consumption figure is a provisional one. It is possible that not all energy generated at embedded generation level is accounted for. Definitive consumption values are only available approximately two years after the ending of the year.

CZ Czech Republic

The consumption increased in total of about 0.7% in 2008. On one hand the increasing of about 4.0% was observed in the first half of previous year. On the other hand significant decreasing of consumption has been recorded since October 2008.

DE Germany

Despite the slightly cooler weather as compared to the previous year, the effects of the financial crisis on real economy during the last months of 2008 most likely contributed to the stagnation of electricity consumption

FR France

Most of the increase of the consumption is due to climatic contingencies and the presence of the 29th of February. Altogether they resulted in consumption 8 TWh higher than would normally have been expected.

GR Greece

There was an unusual moderate increase of less than 0.8% of the energy consumption, due to the mild weather conditions compared to the extreme temperatures appeared in 2007.

IT Italy

The consumption in 2008 decrease of 0,7% compared to 2007. This result represents the first drop in the electricity demand since 1981.

NL The Netherlands

We believe there is a correlation between growth of consumption and growth of production.

The Consumption figures for 2008 are provisional.

PL Poland

Forecasted level of the consumption growth (c.a. 2,7%) is confirmed for the first half of 2008, especially for winter months. In November and December Polish TSO noticed the big decrease (c.a. 5,7%) of the consumption as a result of world crises. Average yearly consumption in Poland rose of 0,5% in comparison with year 2007.

PT Portugal

The consumption increase rate was 1 %, the lowest since 1993 (1.1% corrected from temperature and working days effects).

SI Slovenia

Lower consumption in 2008 due to shut down of one electrolyze in aluminium factory Talum at the end of 2007. Financial crises in the last quarter of 2008 additionally reduced annual energy consumption.

SK Slovak Republic

The yearly netto consumption was on the level of 2007, index 2008/2007 was 0,2 %. Increase of consumption was recorded in first three quarters of the year (average +2,5 %). The significant decline of consumption was in November (-5,8%) and December (-8,7%).

2.3 GENERATION

The generation is the net electrical energy injected in the grid. The consumption of the auxiliaries of the power plants is deducted from the gross generation.

2.3.1 UCTE OVERVIEW

Annual Generation	2003 TWh	2004 TWh	2005 TWh	2006 TWh	2007 TWh	2008 TWh	2007 to 2008 TWh	2007 to 2008 %
Hydro Power	311.3	321.8	294.8	*311.7*	298.4	307.8	9.4	3.1
Nuclear Power	788.1	797.4	791.4	*801.1*	759.3	774.6	15.3	2.0
Fossil Fuel Power	1271.1	1296.4	1349.6	*1363.5*	1407.6	1377.6	-30.0	-2.1
Renewable Energy Sources	54.8	76.5	94.2	*114.3*	139.7	154.7	14.9	10.7
Not Clearly Identified Sources	27.0	9.4	8.5	*3.7*	3.5	11.3	7.8	224.7
Total Generation	**2452.3**	**2501.0**	**2538.5**	**2594.2**	**2608.6**	**2626.0**	**17.4**	**0.7**

Tab. 3 UCTE Annual Generation Retrospect

In 2008, the total generation on the UCTE grid was 2626 TWh. Its annual growth rate of 0.7%, similar to 0.6% in 2007, is lower than in the 5 earlier years when value was between 1.5% and 2%.

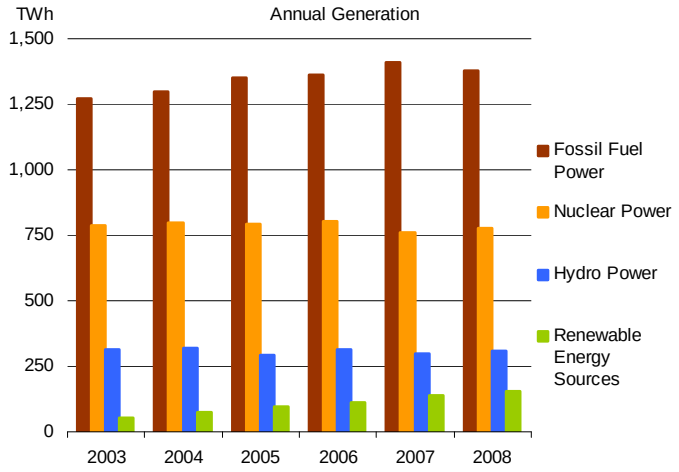


Fig. 4 UCTE Annual Generation Retrospect per Primary Energy

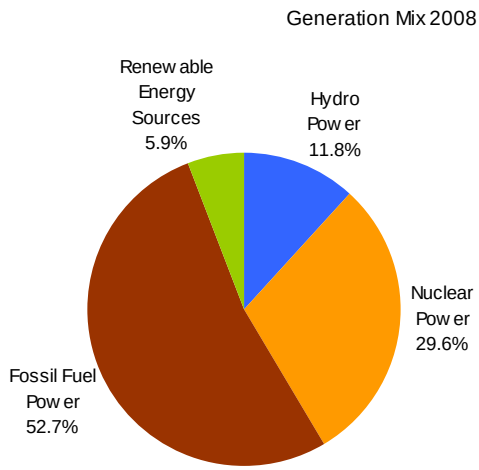


Fig. 5 UCTE Generation Mix in 2008

In 2008, the highest increase was for nuclear generation with 15.3. TWh, thanks to a higher availability in Germany mostly. Second and very close increase was for renewable energy sources with additional 14.9 TWh due to its ever-increasing installed capacity as shown in Section 3. Consequently, fossil fuel generation decreased of 30 TWh.

More details on generation per primary energy are in Chapters 2.3.1.1 to 2.3.1.4. National Comments are in Chapter 2.3.2.

2.3.1.1 FOSSIL FUELS

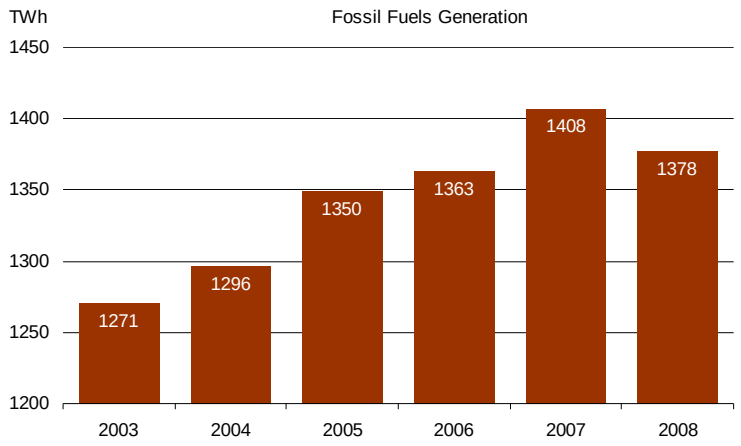


Fig. 6 UCTE Fossil Fuel Generation Retrospect

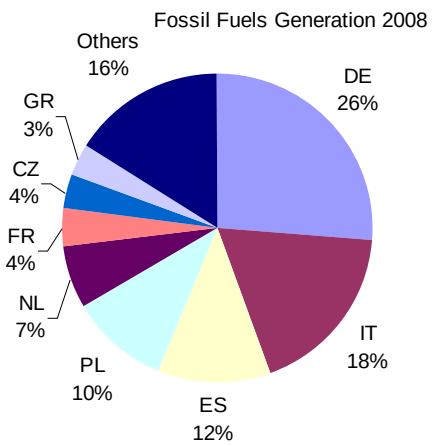


Fig. 7 National Shares in UCTE Fossil Fuel Generation in 2008

Fig. 6 shows that fossil fuel generation experienced in 2008 its first decrease in years, returning just above its 2006 level with 1378 TWh. This may partially be connected to the higher generation out of nuclear units as seen in Chapter 2.3.1.3. Almost 70% of the UCTE fossil fuel generation was generated in Germany, Italy, Spain and Poland, as shown in Fig. 7.

Annual Generation	2006 TWh	2007 TWh	2008 TWh	2007 to 2008 TWh	2007 to 2008 %
Gas	382.2	466.2	495.7	29.5	6.0
Hard Coal	367.5	400.5	366.2	-34.3	-9.4
Lignite	358.4	353.7	342.1	-11.7	-3.4
Oil	63.9	56.0	54.8	-1.2	-2.2
Mixed Fuels	43.6	38.5	43.2	4.8	11.0
Not Indentified Fossil Fuels	147.8	92.8	75.6	-17.2	-22.8
Fossil Fuel Power	**1,363.5**	**1,407.6**	**1,377.6**	**-30.0**	**-2.18**

Tab. 4 UCTE Fossil Fuel Generation Mix Retrospect

Tab. 4 shows that, among the fossil fuel generation on the UCTE grid, gas generation[12] had the highest increase in 2008 with about additional 30 TWh and Fig. 8 shows that gas power made up more than 36% of the total fossil fuel generation (compared to 33% in 2007) and almost 20% of the total generation.

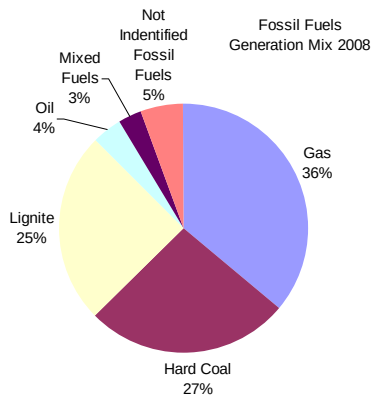


Fig. 8 UCTE Fossil Fuel Generation Mix in 2008

Then, hard coal counted for almost 27% of the fossil fuel generation (respectively 14% of the total generation) and lignite counted for 25% of the fossil fuel generation (respectively 13% of the total

[12] Fossil fuel generation mix has been reported since 2006 only.

generation). Oil generation kept on decreasing from year to year, making about 4% of the fossil fuel generation in 2008 like in 2007.

Note that the mix of fuels burnt by the plants in the "Mixed Fuels" category are unknown to TSOs, may differ from one plant to another and may differ from the UCTE fossil fuel generation mix in Fig. 8. The allocation of a unit to the listed fossil fuels sub-categories may also deviate from one year to another depending on the fuels they actually burnt that year and on the information available to the TSOs.

Indicative CO2 emissions can be roughly estimated applying standard emission factors on the energy generation as reported in Tab. 4. Emission factors for coal power (1 CO2Mt/TWh), oil power (0.8 CO2Mt/TWh) and gas power (0.4 CO2Mt/TWh) are extracted from the World Energy Outlook 2008 published by the International Energy Agency[13]. The coal power emission factor applies for both "hard coal" and "lignite" generation. For practical purposes, as the fuel information is basically missing to TSOs, the global emission factor for fossil fuels generation (0.8 CO2Mt/TWh) applies to "mixed fuels" and "non identified fossil fuels" generation. With these simplifications in mind, indicative CO2 emissions of the UCTE power system can be roughly estimated to 1045 CO2Mt in 2008, 1090 CO2Mt in 2007 and 1083 CO2Mt in 2006.

2.3.1.2 Renewable Energy Sources

The renewable energy sources (RES) in this report do not include generation from hydro power units. The generation from hydro power units are given separately but can only be considered as renewable energy sources if it involves natural inflows only.

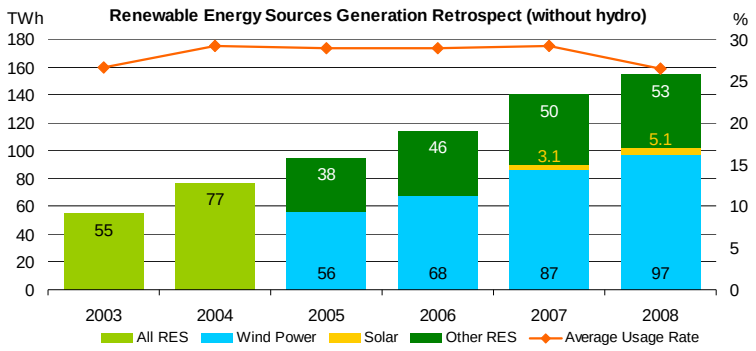


Fig. 9 UCTE RES Generation and Average Usage Rate

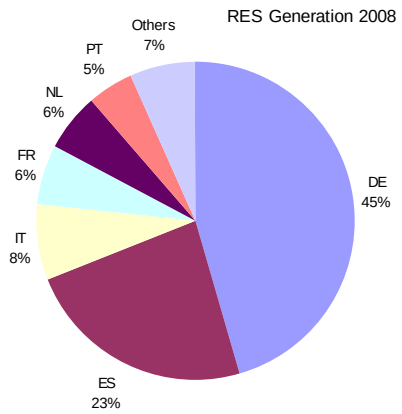


Fig. 10 National Shares in UCTE RES Generation in 2008

Solar generation has been collected for the first time for this report in 2007 and 2008 while wind power generation has been collected since 2005.

Fig. 9 shows that in 2008, about 155 TWh were produced with renewable energy sources, excluding hydro. Fig. 10 shows that almost 70% of the UCTE RES generation (excluding hydro) was generated in Germany and Spain. These countries counted respectively for 46% of the total RES generation and 23% of the UCTE RES generation. Similar figures have been metered in 2006 and 2007.

[13] Generic emission factors are based on the electricity generation and the related CO2 emissions in 2006 in the European Union, page 521.

As shown in Fig. 9, the average usage rate[14] of the RES generating capacity on the UCTE grid has been estimated to around 29% for the last 4 years but is down to its 2003 level 26.5 %. This figure is not only connected to a slightly lower average usage rate of wind power, which counted for 63% of the RES generation on the UCTE grid in 2008, but also to the discrepancies in the collected data from one year to another and the development of solar power, which usually have a lower usage rate than wind. The national average usage rates of wind power capacity are in Fig. 11.

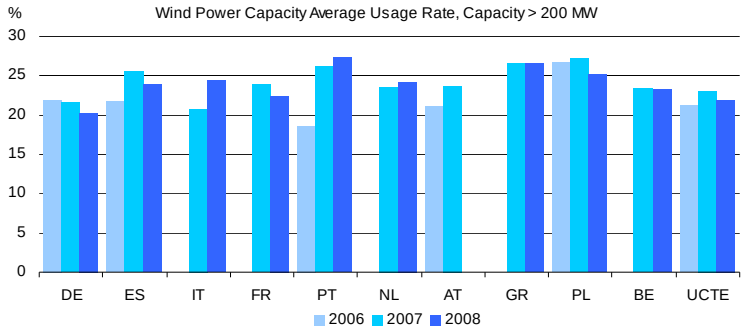


Fig. 11 Wind Capacity Average Usage Rate

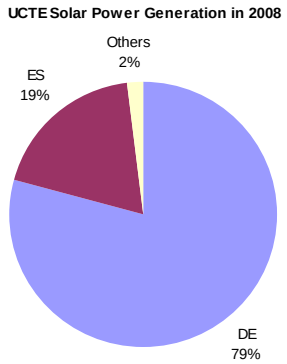


Fig. 12 Solar Generation in 2008

The national usage rates of wind are only considered relevant for countries with a significant wind capacity (>200 MW). Fig. 11 only provides information for countries that meet this criterion. In 2008, the UCTE average usage rate of wind power capacity was 22% compared to 23% in 2007. Average usage rates of wind power in 2008 were 20.3% in Germany (21.6% in 2007) and 23.9% in Spain (25.5% in 2007) the most important generating countries. The highest average usage rate was 27.3% in Portugal. These trends could be connected to specific wind conditions and the location of additional wind farms, which might have less wind potential than the first ones.

As shown in Fig. 9, if solar generation counted for 2.2% of the total RES generation in 2007, this figure jumped to 3.3% in 2008. Yet, Fig. 12 shows that Germany (4 TWh) and Spain (almost 1 TWh) are the only two countries in the UCTE where solar generation is noteworthy so far.

[14] The average usage rate of a generating capacity is estimated as the ratio of the actual annual generation by the theoretical annual maximum generation. The theoretical annual maximum generation is obtained by multiplying the annual average generation capacity with the number of hours in a year. This average usage rate should not be confused with the available power at a particular moment used for generation adequacy assessment which is lower due to the volatility of the power out of RES generating capacity.

2.3.1.3 NUCLEAR POWER

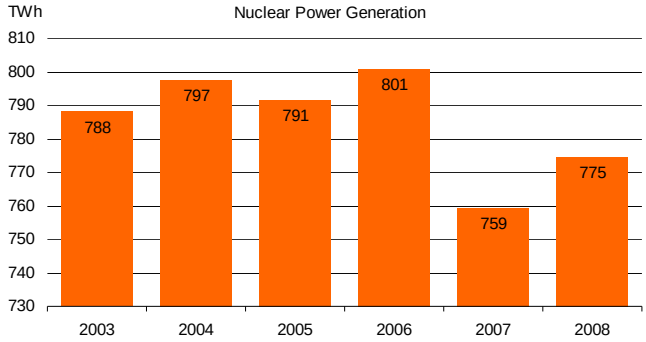
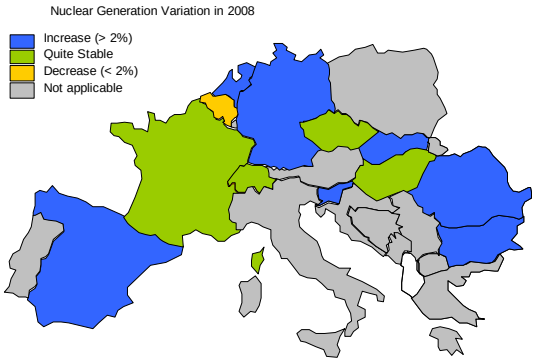


Fig. 13 UCTE Nuclear Power Generation Retrospect



Map 6 National Variation of Nuclear Power Generation in 2008

As shown in Fig. 13, the total nuclear power generation in 2008 was about 775 TWh. The UCTE nuclear power generation was higher in 2008 (2%) than in 2007, yet still lower than in the previous 4 years. In complement to Map 6, the main contributors to this increase at the UCTE level are in Germany (+7.9 TWh), Spain (+3.6 TWh) and Romania (+3.3 TWh). Meanwhile, nuclear generation in France has been remarkably similar in 2008 and 2007 but still 10 TWh below its values from 2004 to 2006 (due to a durable low availability in 2007 and 2008). More, Belgium units generated -2.6 TWh less in 2008 than 2007.

More national comments are in Chapter 2.3.2.

2.3.1.4 HYDRO POWER

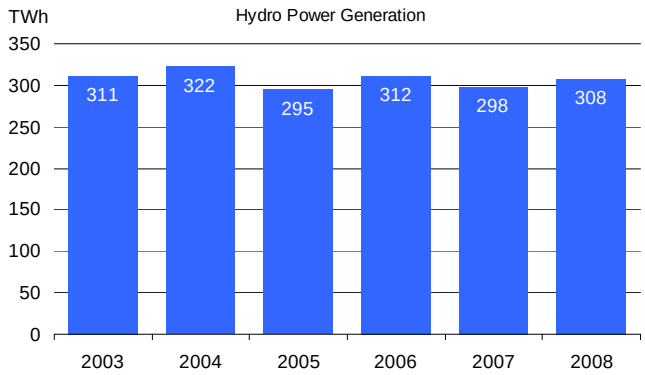
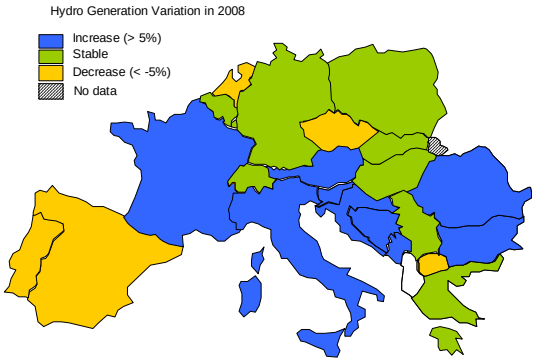


Fig. 14 UCTE Hydro Power Generation Retrospect



Map 7 Hydro Generation Variation in 2008

As displayed in Fig. 14, the overall UCTE hydro generation slightly increased in 2008 up to 308 TWh close to its level before 2007. In addition to Map 7, the main contributors to this UCTE increase are France (+6.4 TWh) and Italy (+4.8 TWh) while massive decreases took place in Spain (-4.2 TWh) and Portugal (-3.1 TWh). Globally, Alpine countries benefited from more rainfalls than in 2007 and so were Balkan countries. On the contrary, the Iberian Peninsula lacked more than 18% of its hydro generation in 2007.

2.3.2 National Comments on Generation

More data regarding national generation are in Appendix 2.

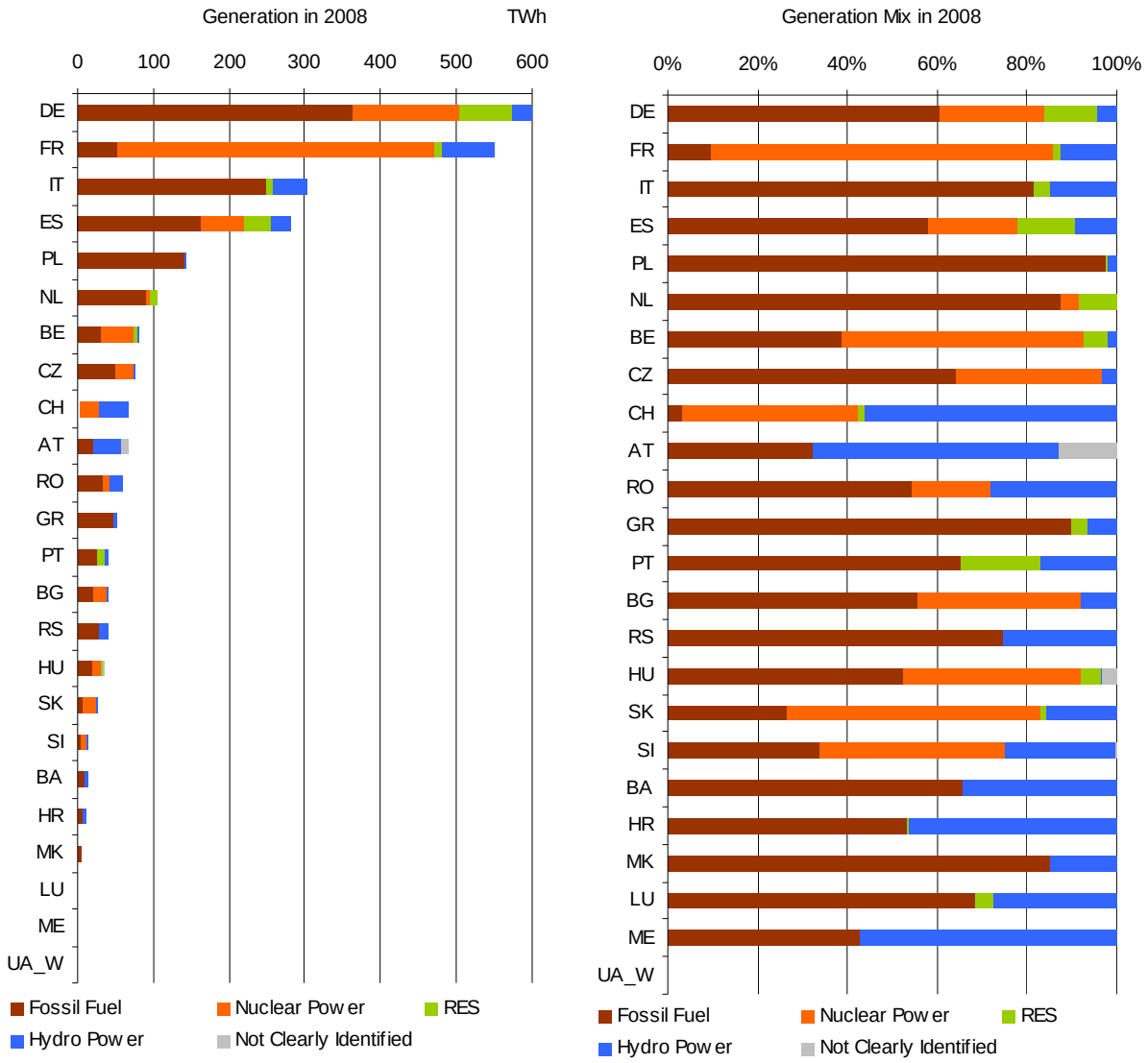


Fig. 15 Generation Mix in 2008

BE Belgium

The national net generation was 5.2% lower in 2008 as compared to 2007. This decrease in net generation resulted from a reduction in nuclear generation (-5.4% compared to 2007) and fossil fuel generation (-7.4% compared to 2007). These two fuel types count for almost 93 % of the Belgian generation in 2008. However, the renewable energy sources generation and hydro generation increased in 2008 compared to 2007. The renewable energy source generation grew with the highest growth rate namely 12.7%.

CZ Czech Republic

The total production decreased of about 5.3% (4.3 TWh). This was caused mainly by the decrease of exports.

DE Germany

In conventional thermal power stations of general supply in Germany, generation from lignite as primary energy decreased by 3% to 137.6 TWh as compared to 2007 (share in generation: 23%). Hard-coal based electricity generation decreased by 10% to 118.3 TWh (share in generation: 20%).

Concerning nuclear power stations which produced 141.1 TWh in 2008 (or 6% more than in 2007), a higher availability was recorded as compared to the preceding year. The share of nuclear energy in total generation in Germany amounted to 24%.

The share of renewable energy sources in Germany's electricity generation is continuously increasing. Since 2004, renewables-based electricity generation from water, wind, biomass (including the renewable share of waste) and photovoltaics increased from 56.5 TWh (gross value) by almost two thirds to 93 TWh in 2008. This corresponds to an increase of almost 6% as compared to the previous year and to a share of approximately 15% in total gross electricity production and gross consumption in Germany. Thus, the target value of 12.5% determined by the EU, which is to be achieved by 2010, has already been reached or even exceeded in Germany (just like already in 2007). With somewhat more than 43%, wind power has the largest share in renewables-based electricity generation.

FR France

Generation rose by 0.8% compared with 2007. Nuclear generation is nearly stable compared with 2007. Hydro-electric generation rose by 7.4% and reaches its highest amount since 2001. Fossil fuel power stations generation fell by 3.3 %. Generation from renewable sources (but hydro) rose by 22.5 % in 2008, it accounted for 9.6 TWh. The volume of wind generation rose by nearly 40% compared with 2007, and reached 5.6 TWh.

GR Greece

There is a reduction of up to 1% in the generated energy compared to 2007.

IT Italy

The installed generating capacity increased by nearly 6%. Wind farms gave a significant contribution to this increase with over 500 MW of new capacity.

PL Poland

Comment on fossil fuel: Energy from co-firing (biomass combustion in lignite/hard coal power stations) is classified as energy from fossil fuels installations. Comment on renewable: Only energy from 100% renewable installations (e.g. wind farms, biogas) is classified as energy from renewable (co-firing is not included). Comment on generation: In spite of a small consumption increase, production decreased as the result of big fall of exchanges.

PT Portugal

The hydro inflows were, for the fifth year consecutive, below the average (56% of the average values). However, the clean energy sources (hydro plus renewable generation) supplied about 28% of the electricity demand in 2008.

RO Romania

In 2008 generation was at 6% greater than 2007 generation. Considering that 2008 was a normal hidrological year, the hydro power plants generation represented 28.1% from total generation and was at 7.6% greater than 2007 hydro generation. The nuclear generation represented 17.3% from total generation and was at 45% greater than nuclear generation in 2007 due to commissioning of the second nuclear unit since August 2007. The generation in thermal power plants represented 54.6% from total generation.

SI Slovenia

High hydro production is a result of good hydrologic conditions. Non-identifiable energy sources represents CHP units on transmission network. The figures considers 100 % of generation in Nuclear power plant Krsko although its ownership is equally divided between Slovenia and Croatia, thus half of its generation is delivered to Croatia in accordance with the international agreement. With this fact taken into account, in 2008 Slovenian production units covered approx. 90% of national consumption, remaining was covered with imports.

SK Slovak Republic

Generation in the year 2008 was in total 5% higher than the year before. Increase was observed in nuclear (+9 %) and fossil fuel power plants (+3 %), decrease was observed in hydro power plants (-4,5 %).

2.4 EXCHANGES

Exchanges are the import and export physical flows on every interconnection lines[15] of a power system. Exchange Balance is the difference between import and export physical flows. Physical flows are metered at the exact border or at a virtual metering point estimated from the actual one.

[15] Figures may therefore differ with the ones reported by UCTE for statistic purposes, which exclude distribution lines.

2.4.1 Energy Flows

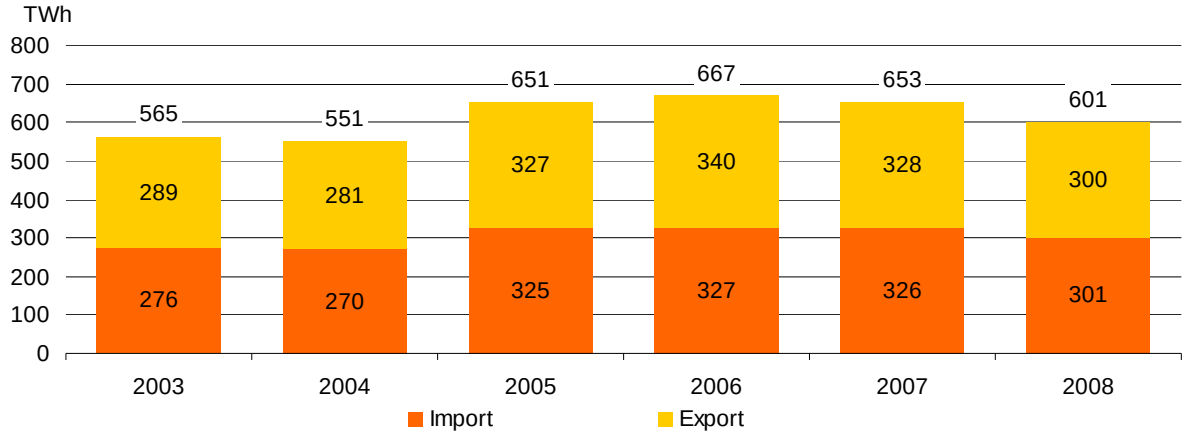
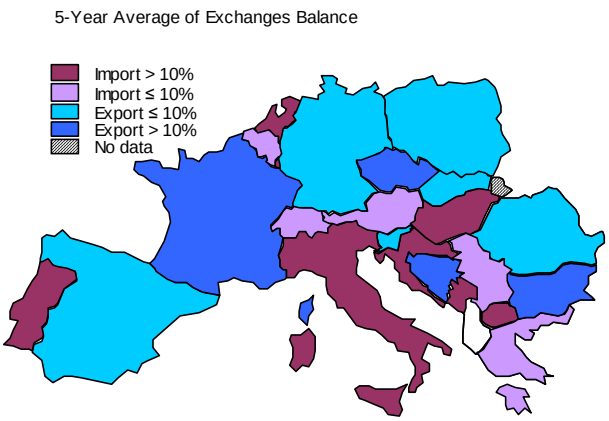


Fig. 16 UCTE Internal Exchanges Energy Retrospect

Fig. 16 shows that the volume of internal exchanges within the UCTE grid decreased for the third year in a row down to 601 TWh in 2008[16], representing about 24% of the UCTE consumption compared to 26% in 2007 and 27% in 2006. The UCTE grid is almost balanced with an external Exchange Balance of 0.4TWh (net import) in 2008 compared to 2 TWh in 2007 (net export) and 13.6 TWh in 2006 (net export). The external energy balance has been below 0.6% of the internal consumption during the last 6 years.



Map 8 5-Year Average Imports minus Exports Energy as part of Consumption

As shown in Map 8, the countries with an exporting 5-year average Exchanges balance are distributed over the UCTE grid. The countries relying the most on imports for their energy balance are Luxembourg (56%), Montenegro (45%), Croatia (33%) and FYROM (23%).

Note that one country might have a small balance of exchanges in Map 8 but a strong usage of its interconnection lines.

Fig. 17 gives a short overview of the national Exchange Balance throughout the last 5 years.

[16] All 2007 figures in this SAR 2008 report have been corrected compared to figures in last year SAR 2007 report. It reflects the latest corrections on metering values.

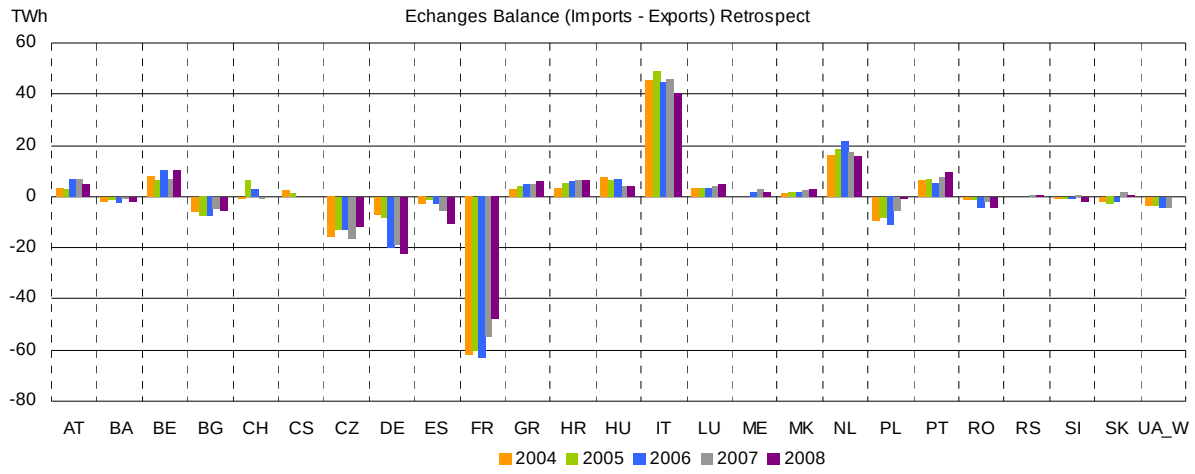


Fig. 17 Exchange Balance Retrospect

More analysis on the role of the interconnection lines is in Section 4.

2.4.2 National Comments on Exchanges

More national data on physical exchanges are in Appendix 2.

BE Belgium

The physical imports increased by 8.5% in 2008 compared to 2007 and the physical exports went significantly down by 27.4%. The exchange balance (physical imports & exports) significantly increased with 56.3% in 2008 compared to 2007. The national physical exchanges given in energy include the exchanges with France that do not transit on UCTE lines.

DE Germany

In 2008, electrical energy imports from other countries, amounting to 40.2 TWh, had a share of almost 6% in electricity output of total supply in Germany. As compared to the preceding year, imports decreased by 4 TWh or 9%. Reduced imports were recorded mainly from France (-36% or -5.8 TWh) and the Czech Republic (-16% or -1.5 TWh). A distinct increase was registered for imports from Sweden (+36% or +0.7 TWh), Austria (+24% or +1.1 TWh) and Denmark (+18% or +1.4 TWh). More favourable hydraulic conditions in Scandinavia might have contributed to this development. Compared with physical energy flows across national frontiers, France still has the largest share (26% or 10.6 TWh) in total German imports, in spite of the considerable decrease. But these physical energy flows probably comprised substantial quantities of transit flows from France via Germany to Switzerland and Italy. The shares of Denmark and the Czech Republic amount to 23% and 20%, respectively.

As compared to the previous year, physical exports of Germany to neighbouring countries have only insignificantly decreased by 1% to 62.7 TWh. The largest decreases in percent were recorded for exports to Sweden (-44% or 0.4 TWh) and Switzerland (-8% or -1.2 TWh). Higher increases occurred with regard to exports to the Czech Republic (+50% or 0.4 TWh) and Poland (+14% or 0.7 TWh). The Netherlands have the highest share (30 %) in Germany's total physical exports. Austria (24%) is ranking second and Switzerland (22%) third. Table 3, Figure 2.The export surplus of 22 TWh in 2008 amounts to somewhat

more than 3% of the German gross electricity generation. The exchange volume (i.e. the sum of imports and exports) corresponds to almost 16% of the overall electricity generation in Germany.

FR France

The balance of physical exchanges fell by 15.4 %, mainly due to a drop in the exports, and reached its lowest level since 1990 with 48.0 TWh.

The physical exchanges have resulted in an export balance for every day of the year except for 6 days, compared to 18 days in 2007. The physical exchanges have resulted in an export balance for every hourly values of the year except for about 240 hourly values spread over 39 days.

GR Greece

There is an increase of imports (15%) and exchange balance in the import direction (24%) compared to 2007.

IT Italy

The balance of physical exchanges was reduced, with a variation of -14,5% compared to the previous year. Relevant the increase of the export with a positive variation by 29,6% while the import significantly decreased (-12,1%).

PL Poland

Very significant fall of the exchanges took place in 2008 as a result of import increase with export decreasing simultaneously. The main reasons were:

1. Higher (than in previous years) prices of electricity in Poland.
2. Lower level of offered capacities in the export direction to market players due to:
    a. tight balance situation in Polish power system in the first half of 2008.
    b. Switching off two 400kV PL-CZ lines (main channel of energy exporting) in September, October, and November.

PT Portugal

The net imports were the highest ever verified, representing about 19% of the national demand.

SI Slovenia

In relation to 2007 imports increased by 2,1% and exports by 37,8%. The main reasons for high export are lower consumption, higher production of hydro units and overhaul of NPP Krško in 2007.

SK Slovak Republic

Physical exchanges in 2008 decreased significatly (-28%). Import (521 GWh) covered only 1,9 % of netto consumption. In 2007 it was 6,3% (import 1 725 GWh). Contracted import decreased (-13,6 %) and netto production increased (+5,0 %).

3 POWER BALANCE

3 POWER BALANCE

The present Section presents the collected power data on the UCTE grid and the subsequent generation adequacy analysis. All power data have been collected on a national basis for each monthly reference point, namely third Wednesday at 11:00 C.E.T.

In addition to the figures reported in this Section, extra figures are in Appendix 3 and on the UCTE website along with the present document.

3.1 UCTE POWER BALANCE SUMMARY

Power values in December	2003 GW	2004 GW	2005 GW	2006 GW	2007 GW	2008 GW	2007 to 2008 GW	2007 to 2008 %
Net Generating Capacity	569.1	593.2	611.3	625.1	639.7	660.5	20.7	3.2
Reliably Available Capacity	414.2	431.6	440.3	455.2	470.0	466.3	-3.7	-0.8
Load at Reference Time	348.2	360.6	369.5	368.1	384.0	361.4	-22.6	-5.9
Remaining Capacity w/o Exchanges	**66.0**	**70.6**	**70.8**	**87.0**	**86.0**	**104.8**	**18.8**	**21.9**
Physical Exchanges Balance (I-E)	1.6	3.4	8.2	2.4	3.0	2.8	-0.2	-6.1

Tab. 5 UCTE Power Balance Summary Retrospect

3.2 LOAD

Load on a power system is the net consumption corresponding to the hourly average active power absorbed by all installations connected to the transmission grid or to the distribution grid, excluding the pumps of the pumped-storage stations. “Net” means that the consumption of power plants‘ auxiliaries is cut from the gross Load, but network losses are included in it. Load is based on hourly average of the actual metering[17].

3.2.1 UCTE OVERVIEW

Load	Jan GW	Feb GW	Mar GW	Apr GW	May GW	Jun GW	Jul GW	Aug GW	Sep GW	Oct GW	Nov GW	Dec GW
2008	371.3	360.5	343.3	336.3	318.6	320.1	324.4	301.0	322.3	324.1	344.0	361.7
2007	359.6	349.4	351.4	317.7	318.2	329.5	332.6	269.0	321.4	329.6	358.8	384.0
2006	369.5	365.4	352.4	317.4	310.1	324.8	325.5	274.3	314.4	325.2	334.8	368.1
2005	361.6	359.9	328.8	322.6	310.1	313.8	315.5	276.6	309.4	324.1	342.6	369.5
2004	348.1	343.1	314.6	309.1	299.4	304.6	312.7	279.7	310.2	320.5	342.0	360.6

Tab. 6 UCTE Load at Reference Time Retrospect

[17] Activated Load Management is reflected in the actual Load metering. Load Management capacity is therefore not used in the generation adequacy retrospect assessment and no value is collected.

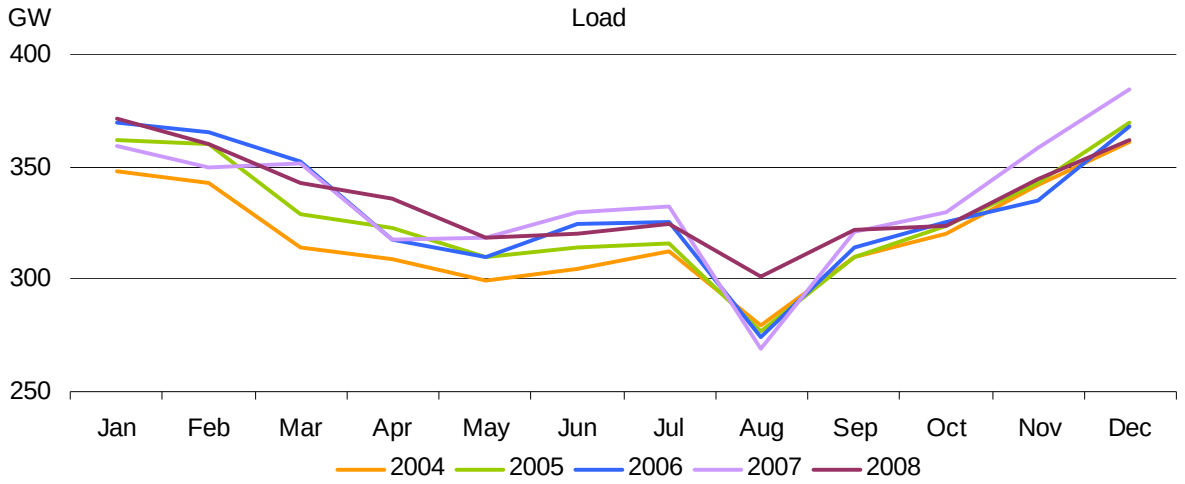


Fig. 18 UCTE Load at Reference Time Retrospect

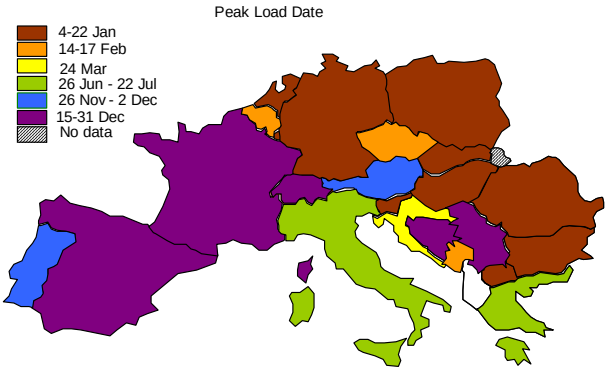
First thing to note in Fig. 18 is that Load in 2008 was almost stable compared to the previous 4 years. The continuous increase previously monitored stopped in 2008 from June onward, which can be connected to a mild summer temperatures and to the impact of the economic crisis. The highest value was in January due to more severe temperature than in other winter months. Load at the reference point August 2008 is the highest value in the last 5 years. This can be explained by the fact that the 3rd Wednesday of August 2008 was the August 20th, which was not part of the same week than August 15th (massive week holiday in most countries). Thus 3rd Wednesday in August 2008 is more a regular working day with higher demand.

Second point is the higher level of load in reference point April 2008 compared to the previous 5 years, due to a cold 3rd Wednesday (April 16th) especially in France where load is highly connected to temperature.

3.2.2 National Peak Loads

Although not used in the power balance, this Chapter reports about the national peak loads, which are significant driver to power systems, as part of a broad retrospect report.

Unlike all other power metering in this report, peak load is not an hourly average value but the actual maximum metered value.



Map 9 Peak Load Period in 2008

With the exception of Italy, Greece and Croatia, all national peak loads in 2008 have been metered in winter early 2008 in most countries (13) and, despite the economic crisis, late 2008 in 7 countries:

- late November in Austria and early December in Portugal;
- mid December in France, Spain and Switzerland;
- at the beginning of new year's eve 2009 in Bosnia-Herzegovina and Republic of Serbia.

Here below are some details on the national yearly and historical peak loads in 2008.

	Peak Load 2008								Historical Peak Load			
	Weekday	Day	Month	Time	Daily Average °C	Deviation to Normal °C	MW	Compare to 2007 %	Day	Year	Deviation to Normal °C	MW
AT	Wednesday	26	11	17:30	-	-	9,397	-1.26	Mon 17 Dec	2007	-	9,517
BA	Wednesday	31	12	18:00	0.00	0.00	2,117	2.00	Wed 31 Dec	2008	0.00	2,117
BE	Thursday	14	2	18:30	0.64	-4.70	13,648	-4.10	Mon 17 Dec	2007	-5.69	14,234
BG	Sunday	13	1	18:00	-6.10	-5.20	7,034	2.10	Thu 21 Dec	1989	-7.30	8,332
CH	Wednesday	17	12	10:15	0.00	0.00	9,854	-1.00	Wed 15 Feb	2006	-6.50	10,218
CZ	Thursday	14	2	15:00	0.50	0.00	10,010	-1.60	Wed 25 Jan	2006	-9.10	10,485
DE	Tuesday	15	1	19:00	5.50	5.40	76,800	-2.20	Tue 10 Dec	2002	-8.10	79,700
ES	Monday	15	12	20:00	4.90	4.10	42,920	-4.40	Mon 17 Dec	2007	-2.70	44,876
FR	Monday	15	12	19:00	3.90	-1.40	84,426	-5.20	Mon 17 Dec	2007	-6.00	88,960
GR	Tuesday	22	7	14:00	32.00	0.00	10,217	-1.93	Mon 23 Jul	2007	5.00	10,414
HR	Tuesday	24	3	18:00	0.23	-1.50	3,009	-2.87	Mon 17 Dec	2007	-4.00	3,098
HU	Wednesday	9	1	17:00	-1.50	0.70	5,980	-3.24	Thu 29 Nov	2007	-5.70	6,180
IT	Thursday	26	6	12:00	32.00	1.50	55,292	-2.70	Thu 18 Dec	2007	1.00	56,822
LU	Thursday	17	1	19:00	5.20	1.60	1,054	-0.70	Mon 10 Dec	2007	3.20	1,061
ME	Sunday	17	2	20:00	-	-	770	-	-	-	-	-
MK	Sunday	6	1	18:00	4.00	-	1,618	-	Sun 23 Dec	2007	-	1,664
NL	Tuesday	15	1	18:00	8.50	5.70	18,465	0.60	Tue 15 Jan	2008	5.70	18,465
PL	Friday	4	1	18:00	-8.38	-10.04	23,115	1.91	Fri 4 Jan	2008	-10.04	23,115
PT	Tuesday	2	12	19:30	9.20	-3.00	8,964	-1.60	Tue 18 Dec	2007	-1.60	9,099
RO	Thursday	10	1	17:00	-4.20	0.30	8,589	-1.07	Thu 23 Nov	1989	-	10,248
RS	Wednesday	31	12	17:00	-5.90	6.00	7,504	2.70	Wed 31 Dec	2008	6.00	7,504
SI	Thursday	10	1	19:00	0.10	-1.20	1,990	-4.60	Thu 26 Jan	2006	1.00	2,110
SK	Wednesday	9	1	17:00	-1.20	1.30	4,342	-1.70	Tue 12 Dec	1989	-	4,471
UA_W	-	-	-	-	-	-	-	-	-	-	-	-

Tab. 7 Peak Load in 2008 and Historical Peak Load

The national peak load reported in 2008 exceeded that of 2007 in 5 countries only: Bosnia-Herzegovina, Poland and Republic of Serbia, where a new historical peak load have been metered too, and in Bulgaria. As a reminder, it was the case in 15 countries in 2007.

Note that unlike 2007, in 2008 the UCTE average annual growth rate of the national peak loads (1.6 %) has been lower than the UCTE average growth rate of the 2008 consumption (2.0%) as shown in Chapter 2.2.1. This is not the necessarily the case in all countries.

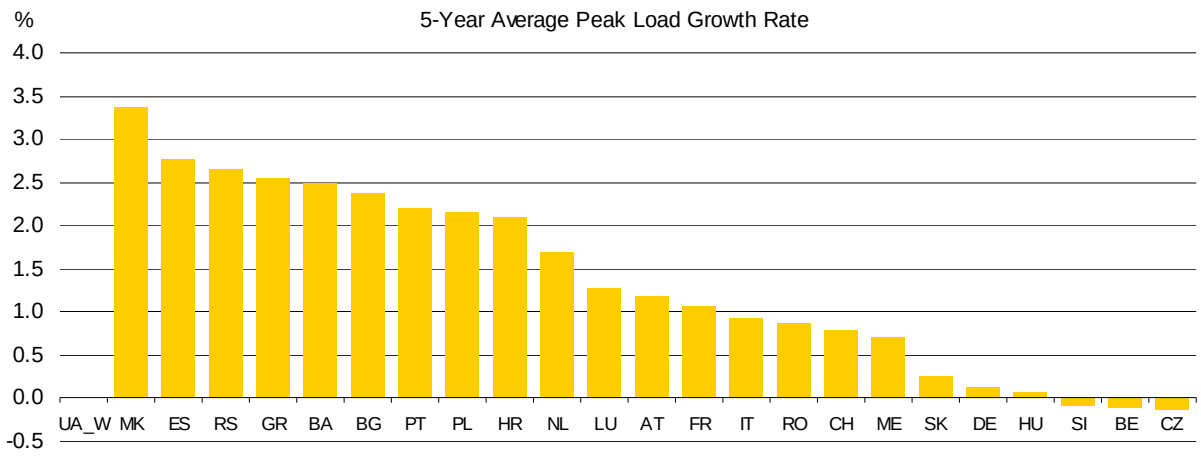


Fig. 19 5-Year Average Peak Load Growth Rate

Fig. 19 shows that the 5-year average growth rate of the national peak loads goes from 3.4% in the Former Yugoslavian Republic of Macedonia and 2.8 % in Spain, down to about –0.1% in the Slovenia, Belgium and the Czech Republic.

3.2.3 National Comments on Load

National data on Load at reference time are in Appendix 3.

BE Belgium

Although the mean temperature in November and December 2008 was below the decennial monthly average temperature (1999-2008) and the mean temperature in January and February 2008 was above the decennial monthly average temperature, the maximum Belgian peak load was measured in February due to the impact of the financial and economic crisis in the fourth quarter of 2008.

On the third Wednesday of May 2008 load-shedding contracts were activated between 3 pm and 6:30 pm. The reported load for the third Wednesday of May is due to the timing of the load-shedding not influenced by it, since the reference time for reported load is 11 am.

The monthly peak load used for the Belgian assessment is the maximum value of the real measurements and estimates of a particular month and not the maximum value of the hourly average values of real measurements and estimates that are entered on the UCTE webpage.

PL Poland

There was a small increase of monthly peak load observed at the average level of 0,9% with comparison to the year 2007. The biggest growth was registered in January and amounted 6,4%. The peak load, took place on Friday, 4th January and it was the highest historical value (23115 MW).

In December 2008 PSE Operator registered maximum monthly peak load at the level of 95,2% of peak load from December 2007.

SK Slovak Republic

Colder winter in first three months had impact on higher load (+3%), but the last quarter had opposite development. Especially in December the load fall down (-5%) due to warm weather and lower activity of industry (worldwide financial crisis).

3.3 Generating Capacity

Generating capacity reported in this document is Net Generating Capacity (NGC). Net Generating Capacity of a power station is the maximum electrical net active power it can produce continuously throughout a long period of operation in normal conditions. “Net” means that the load of the auxiliaries necessary to operate the power plant is deducted from the gross installed capacity.

3.3.1 UCTE Overview

Here in Tab. 8 is the evolution of the Net Generating Capacity in total and by primary energy.

End of December	2003 GW	2004 GW	2005 GW	2006 GW	2007 GW	2008 GW	2007 to 2008 GW	2007 to 2008 %
Hydro Power	129.4	132.2	134.7	135.5	135.4	135.6	0.2	0.1
Nuclear Power	112.8	113.3	112.7	112.6	112.1	111.7	-0.4	-0.4
Fossil Fuel Power	294.8	303.4	322.6	324.7	333.8	340.5	6.7	2.0
Renewable Energy Sources	21.8	27.7	39.9	50.0	57.2	71.3	14.1	24.7
Non Clearly Identifiable Energy Sources	1.9	1.7	1.4	1.9	1.2	1.1	-0.1	-8.8
Total Generating Capacity	**560.7**	**578.4**	**611.3**	**624.7**	**639.7**	**660.5**	**20.7**	**3.2**

Tab. 8 UCTE Net Generating Capacity Retrospect per Primary Energy

The total generating capacity on the UCTE grid kept on increasing in 2008, even with the second largest increase over the 6 last years after 2005.

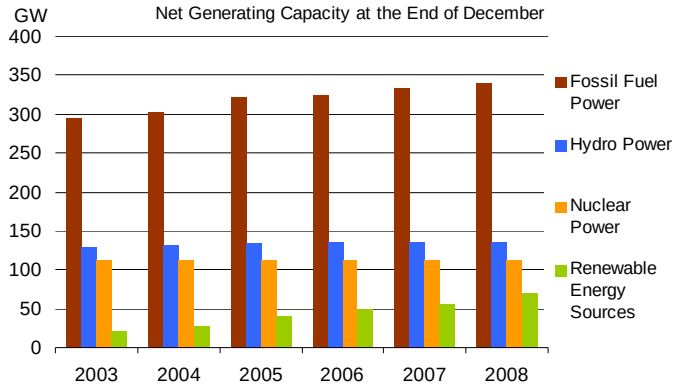
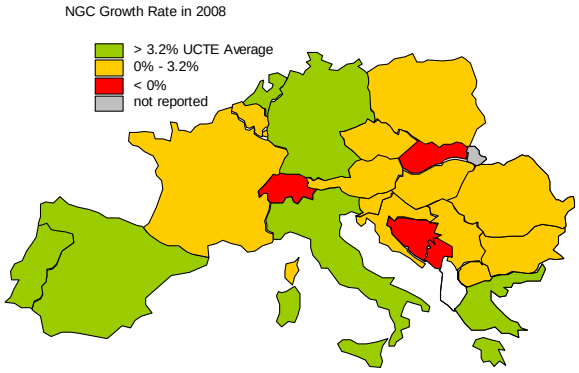


Fig. 20 UCTE Net Generating Capacity Retrospect per Primary Energy



Map 10 Net Generating Capacity Growth Rate in 2008

Tab. 8 shows that the most increasing type of generating capacity on the UCTE grid is made of renewable energy sources (RES) power plants with a growth rate of almost 25% in 2008. RES generating capacity is mainly made up of wind power, which accounts for more than 70% of the total 71 GW. Solar energy is booming, with significant capacities in Germany and Spain mostly, with a total installed power of 5 GW.

The fossil fuel generating capacity increased by the second highest growth rate in years, namely 2.0% in 2008. After one year of stagnation, namely 2006, the fossil fuel generating capacity started increasing again. However, the added capacity over years 2007 and 2008 (16 GW in 2 years) is a lot lower than the added capacity over years 2004 and 2005 (28 GW in 2 years).

The generating capacity mix at the end of 2008 remains similar to the mix observed in previous years. Although decreasing, the fossil fuel generating capacity still accounts for approximately 52% of the total generating capacity.

As shown in Map 10, Net Generating Capacity increased in 2008 all over the UCTE grid with the exceptions of Switzerland, Bosnia-Herzegovina, Slovakia and Montenegro where the net generating capacity decreased respectively by 0.6%, 6%, 1.1% and 3.3%. The highest growth rate has been reported in the Netherlands, with an increase of the Net Generating Capacity of 13.5%. Second comes Portugal, with 6.4%, followed by Germany and Spain, both with 5.4%.

3.3.1.1 FOSSIL FUELS

Here below in Tab. 9 is the evolution of the breakdown of the fossil fuel generating capacity per fossil fuel type, which has been collected since 2006.

End of December	2006 GW	2007 GW	2008 GW	2007 to 2008 GW	2007 to 2008 %
Lignite	61.5	61.5	60.6	-0.9	-1.4
Hard Coal	77.7	77.1	82.0	4.9	6.4
Gas	84.2	92.7	117.2	24.5	26.4
Oil	35.4	35.8	33.2	-2.6	-7.3
Mixed Fuels	32.2	32.5	37.4	4.9	15.1
Non Identified Fossil Fuels	33.6	34.3	10.2	-24.1	-70.4
Fossil Fuel Power	**324.7**	**333.8**	**340.5**	**6.7**	**2.0**

Tab. 9 UCTE Fossil Fuel Generating Capacity per Fuel Type

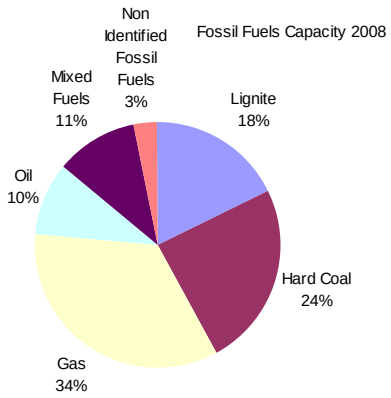


Fig. 21 UCTE Fossil Fuel Generating Capacity Mix at the end of 2008

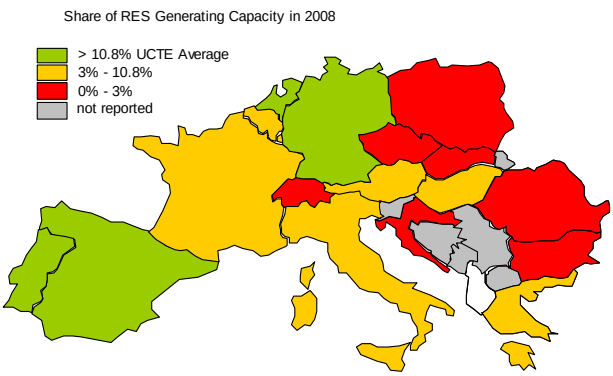
The increase of the fossil fuel generating capacity on the UCTE grid is mainly due to the commissioning of gas power plants, namely 25 GW increase in gas generating capacity in 2008 (see Tab. 9).

Fig. 21 shows that gas generating capacity kept on increasing its share in the UCTE Fossil Fuel Generating Capacity Mix, accounting for 34% (28% in 2007).

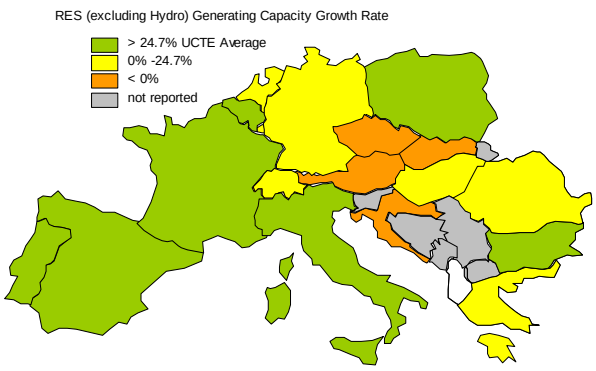
Non Identified Fossil Fuels[18] units massively dropped in 2008 compared to the previous 2 years. The allocation of a unit to the listed fossil fuels sub-categories may also deviate from one year to another depending on the fuels they actually burnt that year and on the information available to the TSOs.

3.3.1.2 RENEWABLE ENERGY SOURCES

Here below are details on the evolutions of renewable energy sources (RES) capacity on the UCTE grid excluding hydro capacity.



Map 11 Share of RES (other than Hydro) in Generating Capacity at the end of 2008



Map 12 RES (other than Hydro) Capacity Growth Rate in 2008

[18] Non Identified Fossil Fuels sub-category is no longer collected but calculated as the difference between the total Fossil Fuels categories and its 5 collected sub-categories.

Map 11 shows that the most important share of RES in the national generating capacity at the end of 2008 can be found in the same countries as in 2007, namely Germany (24%), Spain (22%), Portugal (21%) and the Netherlands (12%).

The RES generating capacity significantly increased in all UCTE countries except in Austria[19], Croatia, Slovakia and the Czech Republic where it remained stable, see Map 12.

3.3.1.3 NUCLEAR POWER

The only significant evolution regarding nuclear power capacity concerns Slovakia, where one nuclear unit (440 MW) in Jaslovske Bohunice has been decommissioned. This decommissioning was partly balanced by capacity increases in some other plants; however these increases only account for 38MW.

3.3.1.4 HYDRO POWER

UCTE hydro power generating capacity was stable in 2008 at about 135 GW.

3.3.2 NATIONAL COMMENTS ON GENERATING CAPACITY

National data on Net Generating Capacity are in Appendix 3.

[19] Austrian data are from 2007

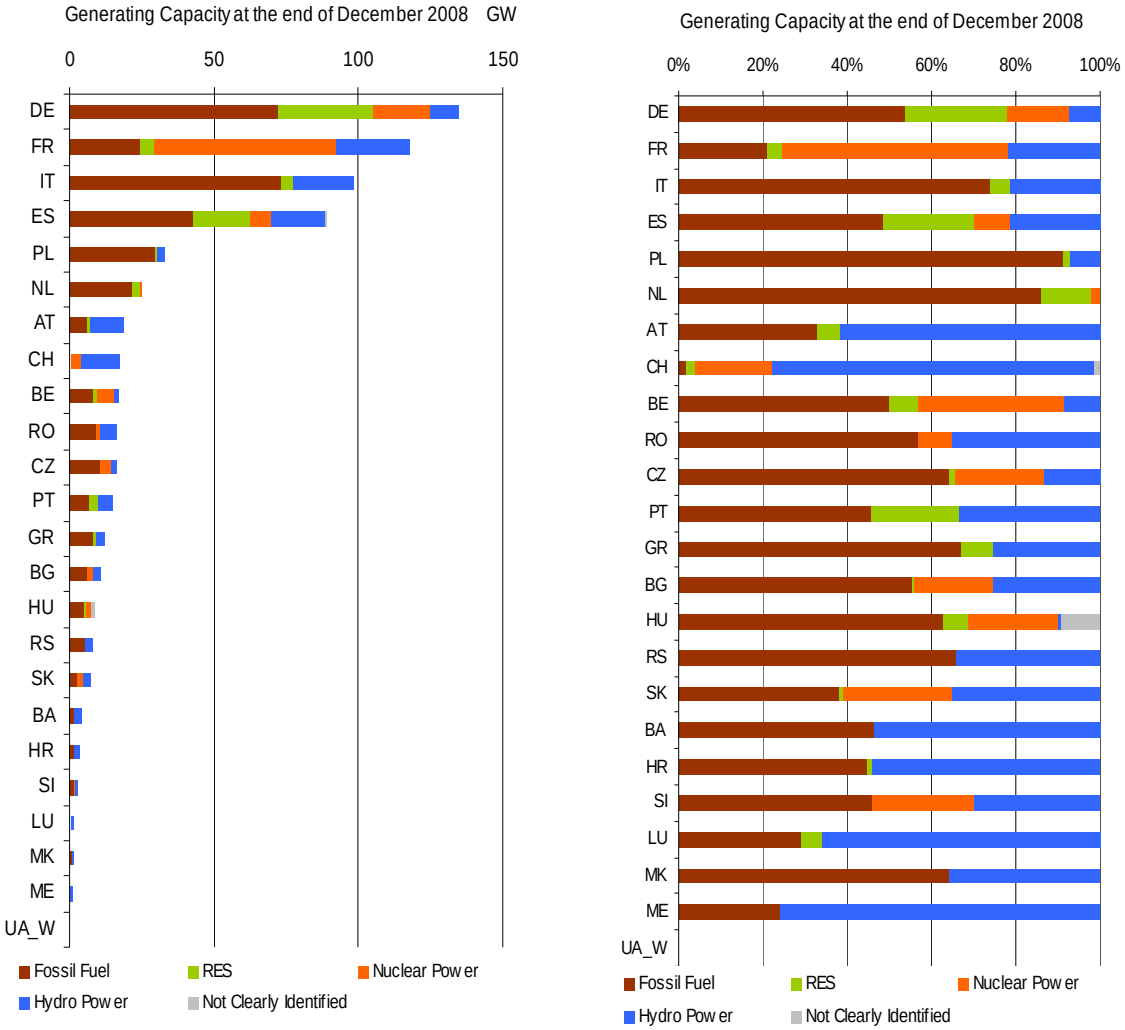


Fig. 22 Net Generating Capacity at the End of 2008

AT Austria

Data about "RES" are included in "Not Clearly Identified". RES data will be available after publishing of this report.

BE Belgium

In 2008 three major fossil fuel units were commissioned and two major fossil fuel units were decommissioned. In December 2008 C-Power the operator of the first offshore windmill farm near the Belgian coast started testing the first wind turbine (5MW) of the first construction stage of 6 turbines (30 MW).

For the values of 2008, 9 fossil units previously assigned as mixed fossil fuel units were reallocated to other fossil fuels. Three units were assigned to coal and 6 units to gas.

In some cases fossil fuel power stations burn a mixture of fossil fuels and renewable energy sources. The installed generation capacity of this type of units is allocated to the different fuels proportionally to the

importance of each energy source in the used fuel combination. In 2008, the installed generation capacity of this type of units totalled 1792 MW.

An application of the above explained allocation rule resulted in the following split-up: 1628 MW of fossil fuel power stations and 164 MW of installed generating capacity of renewable energy sources.

ES Spain

Mixed pumped storage is included in Storage hydro.

FR France

The increase of the production capacity connected to the RTE network was of 890 MW:

- connection of three wind farms (+190 MW in total),
- connection of two open cycle gas turbines and one combined cycle gas unit (+825 MW in total), partially offset by the decommissioning of other units;

On the distribution networks, further development of wind generation with an increase of about 840 MW of installed capacity and increase of photovoltaic generation, which reaches about 25 MW of installed capacity.

GR Greece

The commissioning of MEGALOPOLI H/Z 60 MW unit is intended to meet the consumption in summer.

New 326 MW ALOUMINIO Gas Power Station, has been set in testing operation since June 2008.

HR Croatia

Croatian half part of NE Krsko included in imports

29 MW non-attributable

37 MW Other RES

pumped storage included in storage

HU Hungary

Only smaller generating units were commissioned, including a gas turbine PP (Hungrana 27 MW), a wind farm (Nagylózs, 20 MW), gas engines (Salgótarján 9 MW). Due to the repowering of Paks NPP, there was also a minor increase in the nuclear generating capacity. One steam turbine unit (Szolnoki Cukorgyár 11 MW) was shut down.

PL Poland

New unit in Patnow power plant took into operation with the net generating capacity of 430 MW (Lignite). Three old units were decommissioned with the total capacity of 305 MW.

PT Portugal

There was no commissioning of new large generation units during 2008. The NGC increase results mainly from new wind power stations totalizing about 600 MW.

The renewable generating capacity mantained high increasing rates (Wind:28%, Solar: from 13 to 51 MW). In 2008 was commissioned the first Wave power station.

RO Romania

The NGC Hydraulic power break down differences between Dec2007 and Jan2008 are given by the new ´pre-dominantly´ specifications. In this respect there are 192MW that are moved from ´run-of-river´ to ´storage´.

SK Slovak Republic

The net generating capacity was 150 MW higher all the year except December than in 2007.

At the end of 2008, the nuclear unit (440 MW) in Jaslovske Bohunice was shutdown due to the obligation of fulfillment that Slovak Republic adopted in the process of access negotiations in EU. Therefore from the midlle of December the power of the unit was going down. The capacity has increased in J. Bohunice (2 x 4 MW) and in Mochovce (2 x 30 MW) during the year 2008.

About 30% of installed capacity of Fossil fuels is located in industry.

The wind power plants lost 2 MW in April.

3.4 UNAVAILABLE CAPACITY

3.4.1 UCTE OVERVIEW

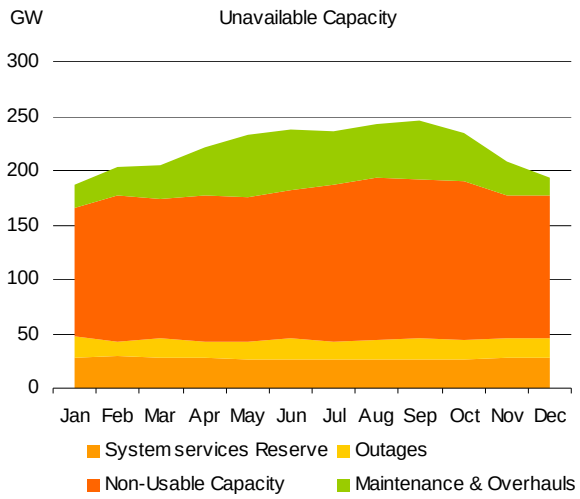


Fig. 23 UCTE Unavailable Capacity in 2008

Unavailable Capacity is the part of Net Generating Capacity that is not reliably available to power plant operators due to limitations of the output power of power plants. It consists of the Non-Usable Capacity, System Services Reserve, Maintenance and Overhauls and Outages.

The specifications of these subcategories are available in the system adequacy methodology description on the UCTE web site[20].

More details on these subcategories can be found in the next Chapters.

[20] http://www.ucte.org/_library/systemadequacy/saf/UCTE_System_Adequacy_Methodology.pdf

Unavailable Capacity	Jan GW	Feb GW	Mar GW	Apr GW	May GW	Jun GW	Jul GW	Aug GW	Sep GW	Oct GW	Nov GW	Dec GW
2008	186.9	203.7	205.6	220.8	233.4	237.1	235.5	241.9	245.8	233.9	208.7	194.2
2007	168.5	175.1	179.4	215.6	214.9	226.7	221.1	228.9	228.3	220.8	208.5	169.8
2006	161.2	168.9	181.6	200.5	212.8	209.7	222.7	223.8	217.8	204.0	186.3	169.9
2005	162.8	164.6	191.7	206.2	216.7	216.7	217.8	223.5	213.0	199.6	183.7	171.0
2004	159.0	165.5	186.9	198.3	209.3	205.6	206.4	217.7	202.3	189.5	176.1	162.0

Tab. 10 UCTE Unavailable Capacity Retrospect

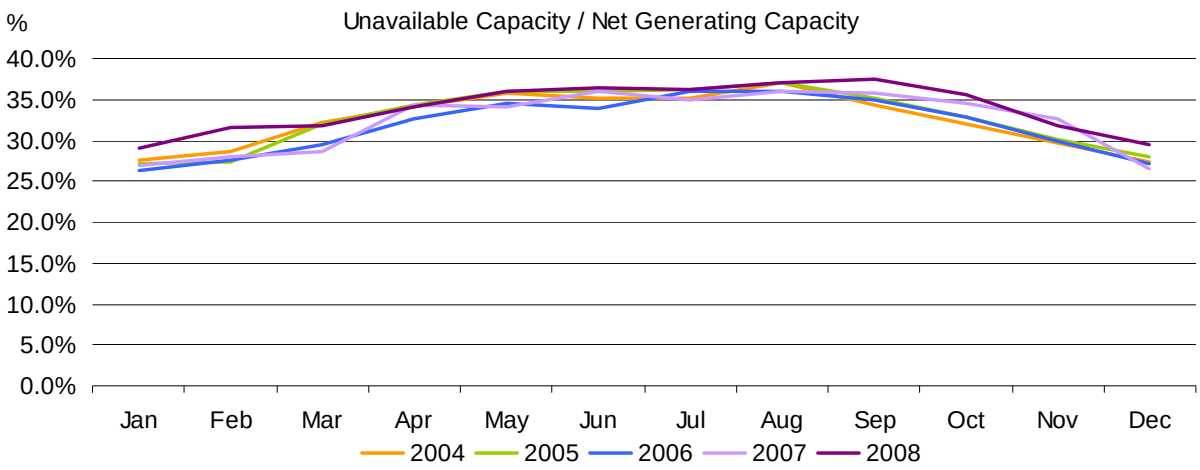


Fig. 24 UCTE Unavailable Capacity Retrospect as part of Net Generating Capacity

Although not much different to previous years, monthly figures in Fig. 24 are almost all the highest in years. It can be connected to the development of non demand driven or non totally dispatchable generation like wind power, solar power, CHPs, run-of-river, etc.

3.4.1.1 NON-USABLE CAPACITY

Non-Usable capacity is the part of the generating capacity which cannot be used due to temporary limitations including mothballed, environmental constraints, network constraints, etc.

Non Usable	Jan GW	Feb GW	Mar GW	Apr GW	May GW	Jun GW	Jul GW	Aug GW	Sep GW	Oct GW	Nov GW	Dec GW
2008	118.3	135.0	128.0	134.7	133.6	136.9	143.2	148.9	145.3	145.0	131.2	131.1
2007	103.4	108.4	104.5	120.7	114.1	124.5	128.6	131.6	129.6	130.0	121.9	107.0
2006	106.2	105.3	104.4	112.8	111.9	118.3	132.5	125.6	125.1	116.6	113.2	107.8
2005	106.7	100.7	114.3	113.6	112.4	120.8	120.9	126.0	119.1	118.9	112.3	110.0
2004	100.7	101.4	106.6	108.6	109.0	112.8	117.0	119.8	114.4	106.4	107.6	109.7

Tab. 11 UCTE Non Usable Capacity Retrospect

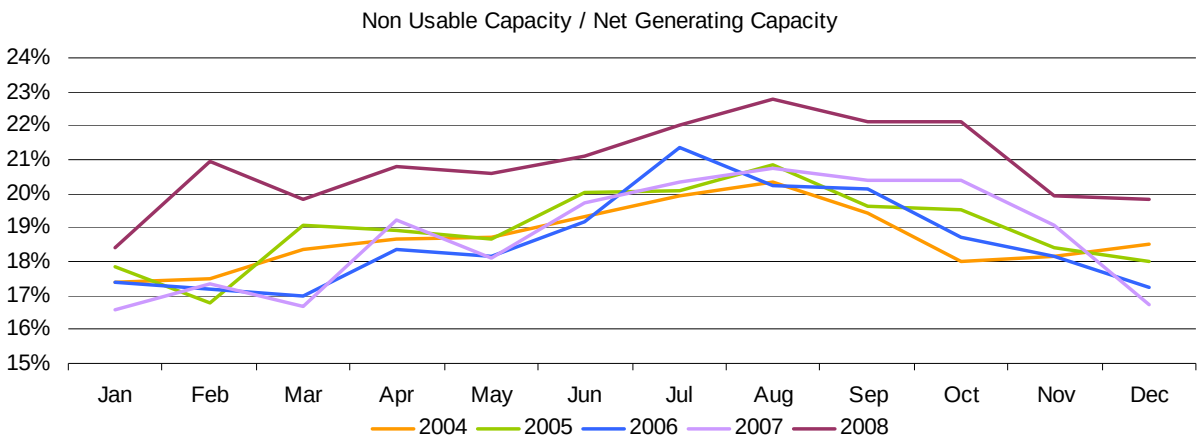


Fig. 25 UCTE Non Usable Capacity Retrospect as part of Net Generation Capacity

In 2008, monthly Non Usable capacities are the highest in 5 years. It has to be connected to the increasing generating capacity of course, but also to the increasing share of wind power in the generating capacity. Part of wind capacity is considered[21] as Non Usable capacity depending on the regular availability of wind power units in each country.

3.4.1.2 System Services Reserve

System Services Reserve is the part of the net generating capacity[22] required to compensate for real-time unbalances or to control the voltage, the frequency, etc. and which falls under the responsibility of TSOs to maintain system security.

Services System Reserve	Jan GW	Feb GW	Mar GW	Apr GW	May GW	Jun GW	Jul GW	Aug GW	Sep GW	Oct GW	Nov GW	Dec GW
2008	27.8	28.7	28.3	27.3	26.5	26.8	26.9	25.9	26.6	26.2	28.0	28.1
2007	29.5	29.3	28.6	29.1	29.6	27.4	27.5	27.3	28.3	28.3	29.2	29.2
2006	29.9	29.9	27.7	30.4	27.4	26.4	27.4	29.8	28.8	30.1	30.2	29.3
2005	32.0	29.9	32.6	30.0	28.8	25.7	29.5	29.4	27.7	28.3	27.6	27.0
2004	31.5	28.3	29.1	28.2	27.0	27.0	26.6	29.3	26.2	29.3	31.0	28.7

Tab. 12 UCTE System Services Reserve Capacity Retrospect

In 2008 monthly System Services Reserve capacity are among the lowest in 5 years.

[21] http://www.ucte.org/_library/systemadequacy/saf/UCTE_System_Adequacy_Methodology.pdf

[22] Load reduction measures contributing to system services are excluded of System Services Reserve

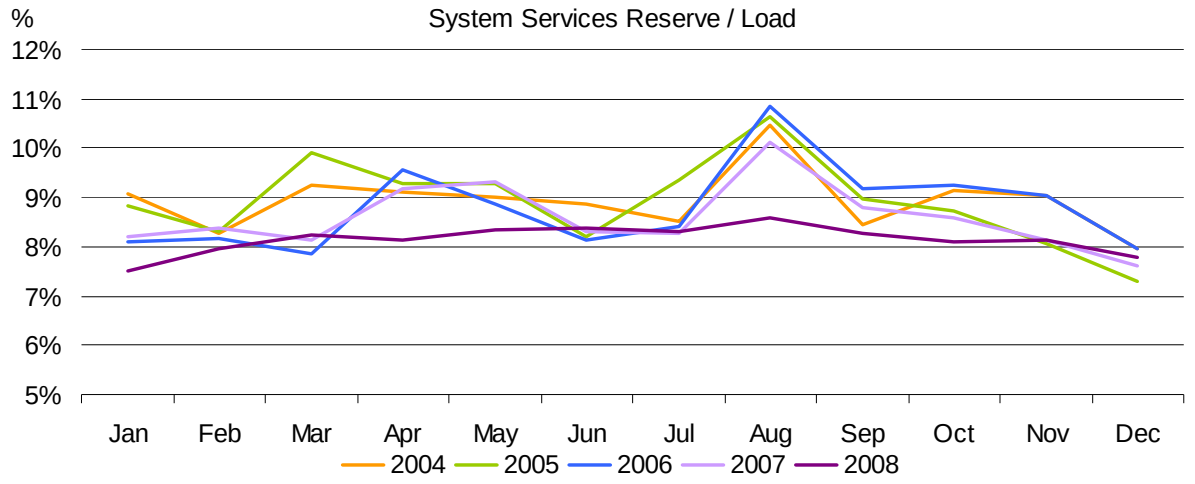


Fig. 26 UCTE System Services Reserve Retrospect as part of Load

System Services Reserve is defined by UCTE but sized according to national rules related to the specific volatilities of generation and demand. UCTE System Services Reserve is therefore not correlated to Load only.

The major difference in Fig. 26 for 2008 is the lower value for the August reference point. This can be explained by the fact that the 3rd Wednesday of August 2008 was the August 20th, which was not part of the same week than August 15th (holiday in most countries). Thus 3rd Wednesday in August 2008 is a regular working day with lower uncertainties (and thus reserve) and higher Load.

3.4.1.3 MAINTENANCE AND OVERHAULS

Maintenance and Overhauls aggregates scheduled and organised unavailability of generating capacity for regular inspection and maintenance, including recharging of fuel elements in nuclear power plants.

Overhauls	Jan GW	Feb GW	Mar GW	Apr GW	May GW	Jun GW	Jul GW	Aug GW	Sep GW	Oct GW	Nov GW	Dec GW
2008	21.7	25.9	31.9	43.9	57.7	55.0	49.3	48.2	54.5	44.5	31.2	16.8
2007	18.7	22.2	30.1	47.4	56.9	58.2	52.2	55.7	52.8	45.0	39.0	20.0
2006	10.4	15.7	30.3	39.0	56.6	47.8	45.8	50.8	48.4	40.3	28.5	13.7
2005	12.2	17.2	29.8	48.3	56.2	51.7	42.9	44.6	47.0	33.7	25.8	11.8
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

Tab. 13 UCTE Maintenance & Overhauls Capacity Retrospect

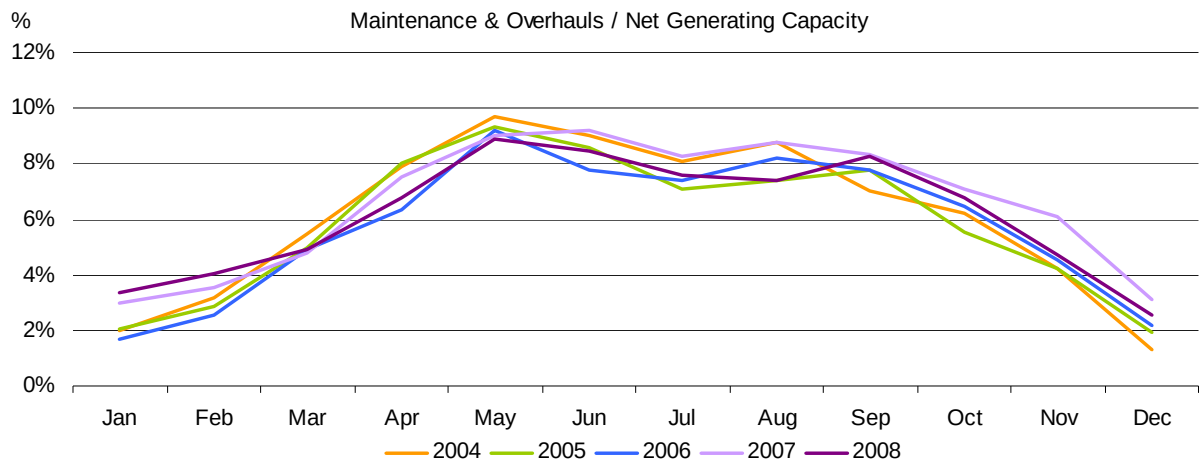


Fig. 27 UCTE Maintenance & Overhauls Retrospect as part of Net Generating Capacity

Unlike in 2007 (June), but like in all previous years, the maximum amount of maintenance & overhauls capacity was in May with about 58 GW or 9% of the Net Generating Capacity.

As in 2007, but unlike in the previous years, higher level of maintenance and overhauls have been experienced in January.

3.4.1.4 OUTAGES

Outages capacity aggregates the forced unavailability of generating capacity, i.e. not scheduled and not included in Maintenance and Overhauls.

Outages	Jan GW	Feb GW	Mar GW	Apr GW	May GW	Jun GW	Jul GW	Aug GW	Sep GW	Oct GW	Nov GW	Dec GW
2008	19.1	14.1	17.4	14.9	15.5	18.3	16.1	18.9	19.4	18.3	18.4	18.2
2007	16.9	15.2	16.3	18.4	14.3	16.6	12.8	14.4	17.6	17.5	18.4	13.5
2006	14.7	18.0	19.2	18.3	16.8	17.2	17.0	17.6	15.4	17.0	14.3	19.2
2005	11.9	16.9	15.1	14.3	19.3	18.6	24.5	23.4	19.3	18.7	18.0	22.3
2004	15.2	17.2	19.2	15.7	16.8	13.1	15.2	16.9	20.2	17.1	12.4	15.8

Tab. 14 UCTE Outages Capacity Retrospect

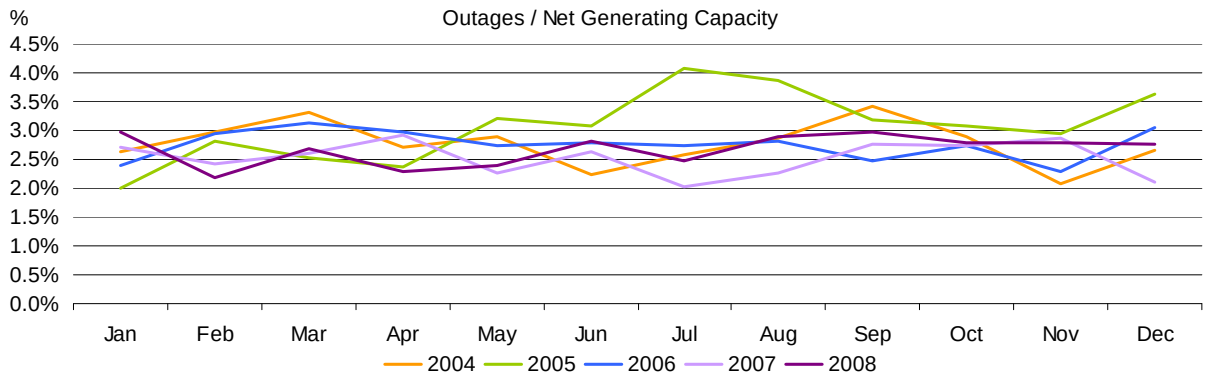


Fig. 28 UCTE Outages Retrospect as part of Net Generating Capacity

The level of Outages capacity for UCTE has been very similar to the previous years with the exception of summer 2005 and its dramatic warm temperatures. The average rate of outages is about 2.8% all year long.

3.4.2 National Comments on Unavailable Capacity

More national data on Unavailable Capacity are in Appendix 3.

BE Belgium

The system services reserve consists of 94 MW primary reserve, 754 MW minutes reserve and 363MW other reserves. Only 514 MW (137 MW secondary reserve and 377 MW tertiary reserve) of the minutes reserve is considered. The remaining 240 MW of the minutes reserve are load shedding contracts with industrial customers. This type of reserve in not included in the UCTE definition of system services reserve.

The 363 MW Other reserves are contractually imposed by Elia on the generator with the biggest unit, but does not come within the operational responsibility of Elia. The origin of the imposition, although it comes through the ARP contract, is the Grid Code: every ARP is responsible for his own balance. This reserve is included because it is a part of the system services reserve as determined by the UCTE rules.

Several load-shedding contracts with industrial customers are in force. The estimated contribution for 2008 is 240 MW. These contracts are part of the system services reserve and were in 2008 activated three times, namely 28/2/2008, 14/5/2008 and 30/10/2008.

DE Germany

A large part of the generating capacity of wind-energy plants needs to be considered as “non-usable” or “unavailable” capacity owing to the stochastic nature of wind energy availability

As a result of legal unbundling, the German transmission system operators do not receive detailed data on all these power balance items from power plant operators. The data have partly been determined on the basis of estimations made prior to the liberalisation of the German electricity market.

GR Greece

A strike by the electricity unions in PPC, the main producer in Greece, occured from 3.3.2008 to 21.3.2008, causing extended outages of generating units.

LU Luxembourg

Non-usable capacity consists of temporary lack of wind.

The overhaul of the major thermal plant, scheduled from April 15th to Mai 25th, was executed from April 19th to the 1st of June.

Due to a technical problem the major thermal plant had an outage from the 11th to the 30th of July.

SK Slovakia

Unavailable capacity is significantly lower in May (-700 MW) due to better hydro conditions and in September and November (-500 MW) due to significantly lower maintenance and overhauls than in 2007.

3.5 RELIABLY AVAILABLE CAPACITY

	Jan GW	Feb GW	Mar GW	Apr GW	May GW	Jun GW	Jul GW	Aug GW	Sep GW	Oct GW	Nov GW	Dec GW
Net Generating Capacity	**643.2**	**644.1**	**645.4**	**647.2**	**648.2**	**649.2**	**650.7**	**653.2**	**656.4**	**656.2**	**658.0**	**660.5**
Non-Usable Capacity	118.3	135.0	128.0	134.7	133.6	136.9	143.2	148.9	145.3	145.0	131.2	131.1
System services Reserve	27.8	28.7	28.3	27.3	26.5	26.8	26.9	25.9	26.6	26.2	28.0	28.1
Maintenance & Overhauls	21.7	25.9	31.9	43.9	57.7	55.0	49.3	48.2	54.5	44.5	31.2	16.8
Outages	19.1	14.1	17.4	14.9	15.5	18.3	16.1	18.9	19.4	18.3	18.4	18.2
Unavailable Capacity	186.9	203.7	205.6	220.8	233.4	237.1	235.5	241.9	245.8	233.9	208.7	194.2
Reliably Available Capacity	**456.3**	**440.4**	**439.9**	**426.4**	**414.9**	**412.2**	**415.2**	**411.3**	**410.6**	**422.2**	**449.2**	**466.3**

Tab. 15 UCTE Reliably Available Capacity in 2008

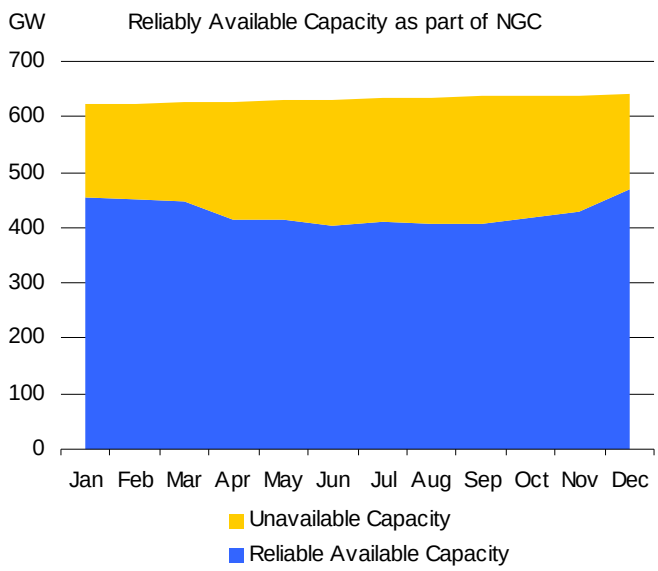


Fig. 29 UCTE Reliably Available Capacity in 2007 as part of Net Generating Capacity

Reliably Available Capacity (RAC) of a power system is the difference between Net Generating Capacity and Unavailable Capacity.

Reliably Available Capacity is the part of Net Generating Capacity actually available to cover the load at a reference point.

In 2008, Reliably Available Capacity on the UCTE grid had its minimum value in September with more than 410 GW, see Tab. 16.

RAC	Jan GW	Feb GW	Mar GW	Apr GW	May GW	Jun GW	Jul GW	Aug GW	Sep GW	Oct GW	Nov GW	Dec GW
2008	456.3	440.4	439.9	426.4	414.9	412.2	415.2	411.3	410.6	422.2	449.2	466.3
2007	455.5	449.6	446.8	412.4	415.1	404.4	412.0	405.8	407.8	416.9	430.2	470.0
2006	450.1	444.0	432.8	414.8	403.0	407.9	397.6	397.5	404.3	419.0	437.6	455.2
2005	434.7	434.7	408.1	394.7	384.8	385.7	384.8	381.1	393.7	408.9	426.0	440.3
2004	419.4	413.6	393.4	383.7	373.9	378.4	380.3	371.4	387.4	401.5	415.9	431.2

Tab. 16 UCTE Reliably Available Capacity Retrospect

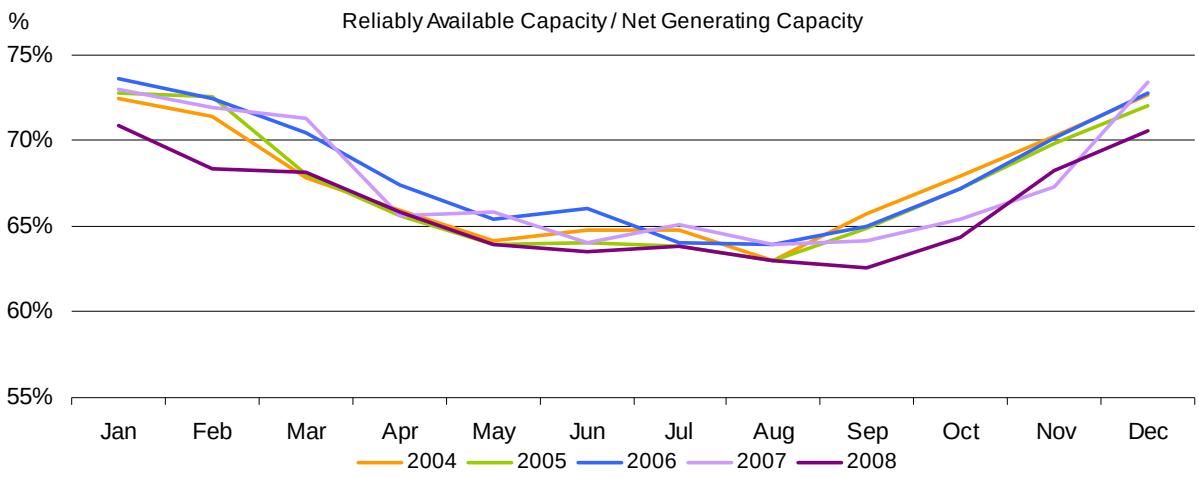


Fig. 30 UCTE Reliably Available Capacity Retrospect as part of Net Generating Capacity

As shown in Fig. 30, the minimum UCTE Reliably Available Capacity expressed as a percentage of the Net Generating Capacity was lower than in the previous years, at almost 63%. More this minimum was unusually in September and not in July or August. Although Non Usable capacity was higher in July and August than in September, it could not compensate for the higher Maintenance & Overhauls and Outages capacities in September.

3.6 GENERATION ADEQUACY

3.6.1 REMAINING CAPACITY

Remaining Capacity (RC) is the part of Net Generating Capacity left on the system to cover any unexpected load variation and unplanned outages at a Reference Point. Remaining Capacity (RC) on a power system is the difference between Reliably Available Capacity and Load.

Remaining Capacity should not be confused with the Surplus of available capacity defined by UCTE in its statistical data[23] and which does not include operational margin left to the system operators.

3.6.1.1 UCTE OVERVIEW

	Jan GW	Feb GW	Mar GW	Apr GW	May GW	Jun GW	Jul GW	Aug GW	Sep GW	Oct GW	Nov GW	Dec GW
NGC	643.2	644.1	645.4	647.2	648.2	649.2	650.7	653.2	656.4	656.2	658.0	660.5
RAC	456.3	440.4	439.9	426.4	414.9	412.2	415.2	411.3	410.6	422.2	449.2	466.3
Load	371.1	360.0	343.0	336.0	318.2	319.8	324.2	300.8	322.0	323.6	344.1	361.4
RC	**85.1**	**80.2**	**96.8**	**90.3**	**96.5**	**92.2**	**94.7**	**110.3**	**88.5**	**98.5**	**106.2**	**104.8**
RC/NGC (%)	13.2	12.5	15.0	14.0	14.9	14.2	14.6	16.9	13.5	15.0	16.1	15.9

Tab. 17 UCTE Remaining Capacity in 2008

[23] http://www.ucte.org/services/statisticalterms/capacity/

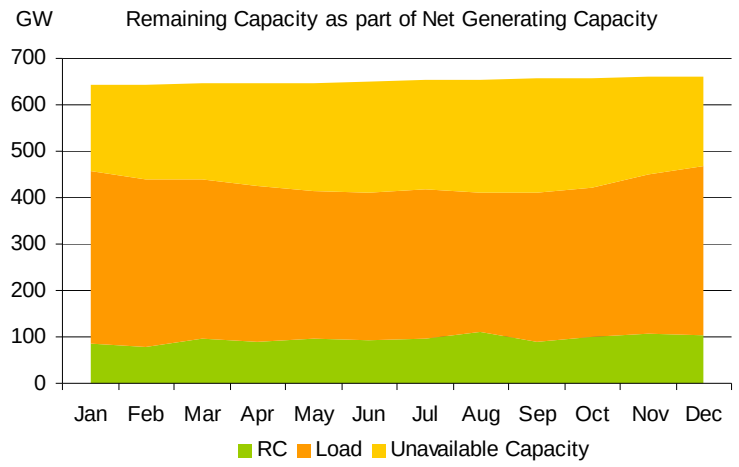


Fig. 31 shows that UCTE Remaining Capacity was positive at all Reference Points. It means that the UCTE power system had enough internal generating capacity available to cover its load at all reference times.

More, Remaining Capacity reached its 2008 minimum value in February with 80.3 GW or 12.5% of Net Generating Capacity. This minimum value was about 9 GW higher than in the previous years, as shown in Tab. 18.

Fig. 31 UCTE Remaining Capacity in 2008 as part of Net Generating Capacity

RC	Jan GW	Feb GW	Mar GW	Apr GW	May GW	Jun GW	Jul GW	Aug GW	Sep GW	Oct GW	Nov GW	Dec GW
2008	85.2	80.3	96.9	90.4	96.7	92.4	91.0	110.5	88.6	98.6	105.2	104.9
2007	95.9	100.2	95.4	94.6	96.9	75.0	79.4	136.8	86.5	87.3	71.5	86.0
2006	80.6	78.7	80.4	97.4	92.9	83.1	72.1	123.2	89.9	93.8	102.7	87.0
2005	73.1	74.7	79.2	72.1	74.7	71.9	69.3	104.5	84.3	84.8	83.4	70.8
2004	71.3	70.4	78.8	74.7	74.4	73.8	67.6	91.7	77.2	81.0	74.0	70.6

Tab. 18 UCTE Remaining Capacity Retrospect

As shown in Fig. 32, Remaining Capacity in July 2008 is quite high compare to the previous 4 years with 14% of the Net Generating Capacity instead of about 12%.

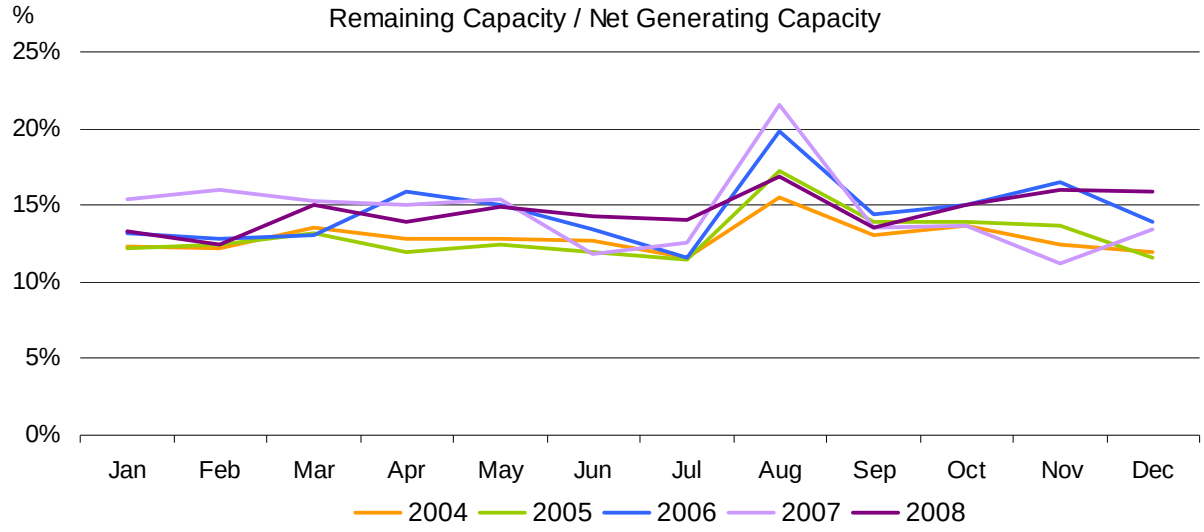
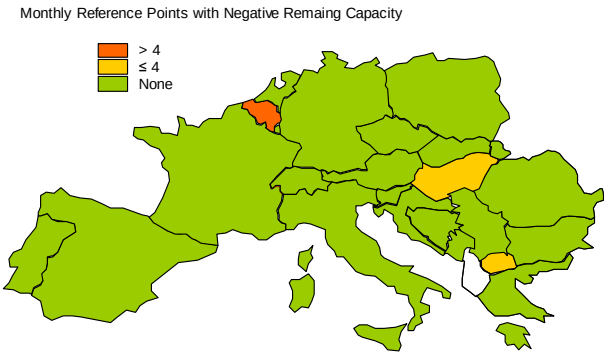
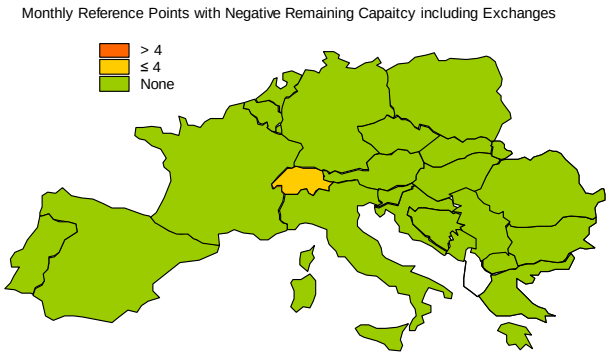


Fig. 32 UCTE Remaining Capacity as part of the Net Generating Capacity.

3.6.1.2 NATIONAL ASSESSMENT



Map 13 Number of Monthly Reference Points with Negative Remaining Capacity without Exchanges in 2008



Map 14 Number of Monthly Reference Points with Negative Remaining Capacity including Exchanges in 2008

As seen in Map 13 and Map 14, the adequacy assessment of the national power systems is better when taking into account the Exchanges through the interconnection lines, which help some grids to keep their Remaining Capacity high enough to ensure generation adequacy at all Reference Points. In 2008, as shown Tab. 19, Remaining Capacity including Exchanges (Remaining Capacity plus Exchange Balance) had a single atypical value on a national basis, namely Switzerland at the Reference Points August and September. With overhauls of nuclear power plants in Switzerland during the summer period, and probably a favourable market price background abroad, Switzerland appears to have been able to rely on imports.

RCincX / NGC	Jan %	Feb %	Mar %	Apr %	May %	Jun %	Jul %	Aug %	Sep %	Oct %	Nov %	Dec %
AT	26.4	28.5	21.3	23.2	22.9	23.4	16.6	18.5	25.1	24.2	36.7	24.7
BA	43.9	39.0	36.6	31.7	36.6	43.9	41.5	39.0	39.0	36.6	26.8	34.1
BE	13.1	10.8	11.1	4.3	8.3	12.5	12.5	11.6	7.0	6.8	11.8	10.1
BG	6.5	8.6	9.6	5.6	11.7	6.2	2.0	9.8	5.5	10.9	2.7	10.9
CH	20.1	15.9	17.9	10.4	6.7	0.5	0.9	- 3.1	- 7.4	13.9	19.6	14.6
CZ	4.1	5.0	5.4	6.1	8.9	7.1	7.8	6.6	6.8	7.4	9.1	8.6
DE	10.6	14.7	14.7	16.5	16.0	19.3	18.3	18.2	16.7	13.8	12.4	17.1
ES	22.4	15.5	26.0	19.0	22.8	21.8	21.4	22.0	20.6	18.8	23.9	19.8
FR	3.5	1.9	3.1	2.4	1.4	1.8	0.7	1.6	2.2	3.4	4.8	3.0
GR	11.8	16.5	19.2	18.8	12.8	13.0	16.7	20.6	18.8	22.1	18.5	21.9
HR	43.8	47.8	53.7	50.4	50.6	50.6	52.2	54.1	54.2	57.2	56.0	41.9
HU	15.8	17.8	20.0	12.5	16.1	12.7	12.7	16.6	8.4	14.6	12.7	17.9
IT	13.8	14.0	17.5	20.7	20.1	14.4	13.9	26.9	14.3	21.4	22.2	20.8
LU	62.9	63.5	68.1	62.9	63.6	65.1	70.5	76.3	76.8	61.8	64.7	80.2
ME	26.7	36.6	40.7	17.7	57.0	52.4	42.0	44.9	47.5	76.0	41.6	47.9
MK	37.3	37.0	38.2	46.6	25.7	30.7	34.9	35.3	38.2	41.3	30.9	37.0
NL	22.4	26.6	21.2	21.2	28.6	31.4	33.0	36.6	32.6	29.8	29.4	27.1
PL	8.7	7.6	5.6	8.1	10.0	6.7	12.6	9.4	6.3	10.6	14.8	16.8
PT	28.2	22.3	31.8	27.6	19.8	22.6	25.4	26.7	18.7	25.2	29.6	20.9
RO	15.1	11.8	19.9	14.5	21.7	17.0	14.3	17.4	12.1	18.1	20.3	23.1
RS	12.7	14.4	12.4	11.4	8.4	2.0	65.2	14.4	10.1	22.1	12.3	26.1
SI	6.1	12.0	7.9	11.3	7.6	8.2	9.3	11.2	6.1	13.2	15.2	16.4
SK	11.0	9.0	14.4	8.4	10.2	8.2	14.5	6.2	11.0	9.1	7.6	9.2
UA_W	-	-	-	-	-	-	-	-	-	-	-	-
UCTE	**13.3**	**13.0**	**15.3**	**14.3**	**14.9**	**14.3**	**14.9**	**16.6**	**13.5**	**15.3**	**16.6**	**16.3**

Tab. 19 Remaining Capacity including Exchanges as part of Net Generating Capacity in 2008

3.6.1.3 NATIONAL COMMENTS ON REMAINING CAPACITY

BE Belgium

From February to April 2008 and in August and October 2008 the remaining capacity without exchanges at the reference time was insufficient to reach an adequacy between generation and consumption in Belgium without having to rely on import. During the period March-April 2008 a high level of simultaneous unavailable power units resulted in a necessity to import up to 30 to 35 percent of the peak load. Only in July and December 2008 the remaining capacity without exchanges at the reference time was higher than 5% of the net generation capacity. The relatively high level of remaining capacity in December is partially correlated with the impact of the financial and economic crisis on the load. In the other months, the remaining capacity without exchanges at the reference time was lower than 5% of the net generation capacity.

Nevertheless, when taking into account the import balance, the remaining capacity was higher than 5% of the net generation capacity for all months except for April 2008 (the remaining capacity was 4.3% of the net generating capacity). As a consequence, the interconnection capacity was crucial to maintain system adequacy for the year 2008.

GR Greece

There were cases of extended load shedding, reaching up to 800 MW in daily demand peaks, due to the outages of generation units caused during the strike by the electricity unions in PPC, the main producer in Greece, from 3.3.2008 to 21.3.2008.

HU Hungary

August reference point was national holiday in Hungary.

Temporary shortages - caused by overhauls and outages - were covered by import.

PT Portugal

The remaining capacity was kept comfortably above the 10% threshold during the whole year, even without resorting to imports.

SK Slovak Republic

Remaining capacity was positive during whole the year 2008. The minimal and very low value 31 MW was recorded in October and was caused by high Unavailable capacity value (the outage of one generator in NPP Jaslovske Bohunice). In that month the Maintenance and Overhauls were also a bit higher (710 MW, the fourth highest value in the year 2008).

3.6.2 REMAINING MARGIN

3.6.2.1 UCTE OVERVIEW

Remaining Margin (RM) on a power system is the difference between Remaining Capacity and Margin Against Peak Load. Remaining Margin is the part of Net Generating Capacity left on the system to cover

any unexpected load variation and unplanned outages over the analysed period the Margin Against Peak Load is representative of.

As reference points in the System Adequacy Retrospect are monthly, the related Margin Against Peak Load must be monthly too and is called Margin Against Monthly Peak Load (MaMPL). It is calculated as the difference between the actual monthly peak load metering and the Load at the reference point.

Remaining Margin	Jan GW	Feb GW	Mar GW	Apr GW	May GW	Jun GW	Jul GW	Aug GW	Sep GW	Oct GW	Nov GW	Dec GW
Reliably Available Capacity	**456.3**	**440.4**	**439.9**	**426.4**	**414.9**	**412.2**	**415.2**	**411.3**	**410.6**	**422.2**	**449.2**	**466.3**
Non Usable Capacity	118.3	135.0	128.0	134.7	133.6	136.9	143.2	148.9	145.3	145.0	131.2	131.1
Overhauls	21.7	25.9	31.9	43.9	57.7	55.0	49.3	48.2	54.5	44.5	31.2	16.8
Outages	19.1	14.1	17.4	14.9	15.5	18.3	16.1	18.9	19.4	18.3	18.4	18.2
System Services Reserves	27.8	28.7	28.3	27.3	26.5	26.8	26.9	25.9	26.6	26.2	28.0	28.1
Load	**371.1**	**360.0**	**343.0**	**336.0**	**318.2**	**319.8**	**324.2**	**300.8**	**322.0**	**323.6**	**344.1**	**361.4**
Remaining Capacity	85.1	80.2	96.8	90.3	96.5	92.2	94.7	110.3	88.5	98.5	106.2	104.8
Margin Against Monthly Peak Load	22.0	18.7	29.0	18.5	15.3	25.6	19.1	32.5	24.1	23.1	34.4	31.5
Remaining Margin	**63.1**	**61.5**	**67.8**	**71.8**	**81.2**	**66.6**	**75.6**	**77.9**	**64.3**	**75.4**	**71.8**	**73.3**

Tab. 20 UCTE Remaining Margin in 2008

As shown in Tab. 20, UCTE Remaining Margin was definitely positive for all month in 2008, it means that the UCTE power system had enough internal generating capacity left to cover its load at any time of the month.

Fig. 33, reveals that UCTE Remaining Margin in 2008 was also above the indicative level of 5% of the Net Generating Capacity used within UCTE to forecast generation adequacy like in the latest System Adequacy Forecast 2009-2020 report[24].

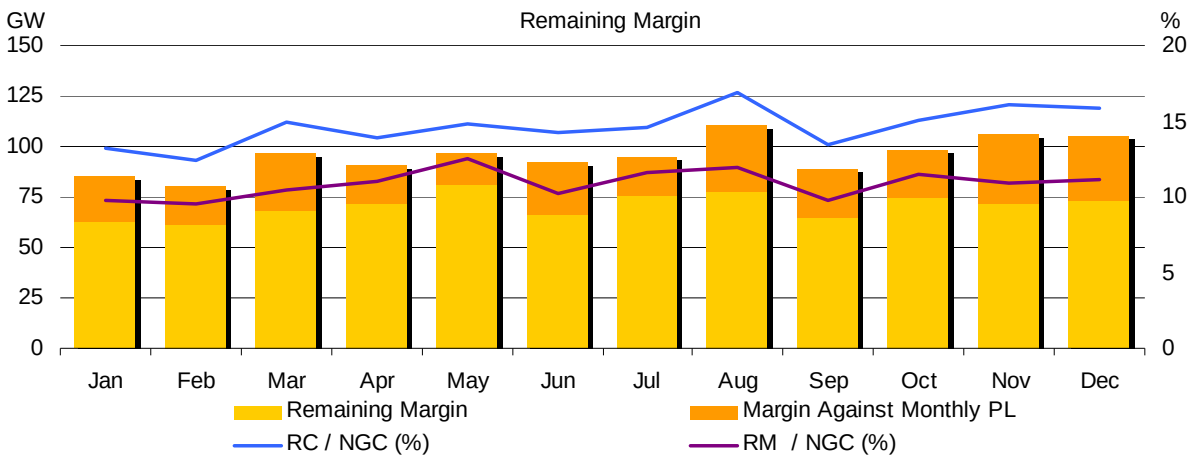


Fig. 33 UCTE Remaining Margin in 2008

The lowest value of the Remaining Margin in 2008 was in February. It is the results of the aggregation of the national values. No UCTE wide explanation can be founded as minimum Remaining Margin occurred in different months in the various countries.

[24] http://www.ucte.org/_library/systemadequacy/saf/UCTE_SAF_2008-2020.pdf

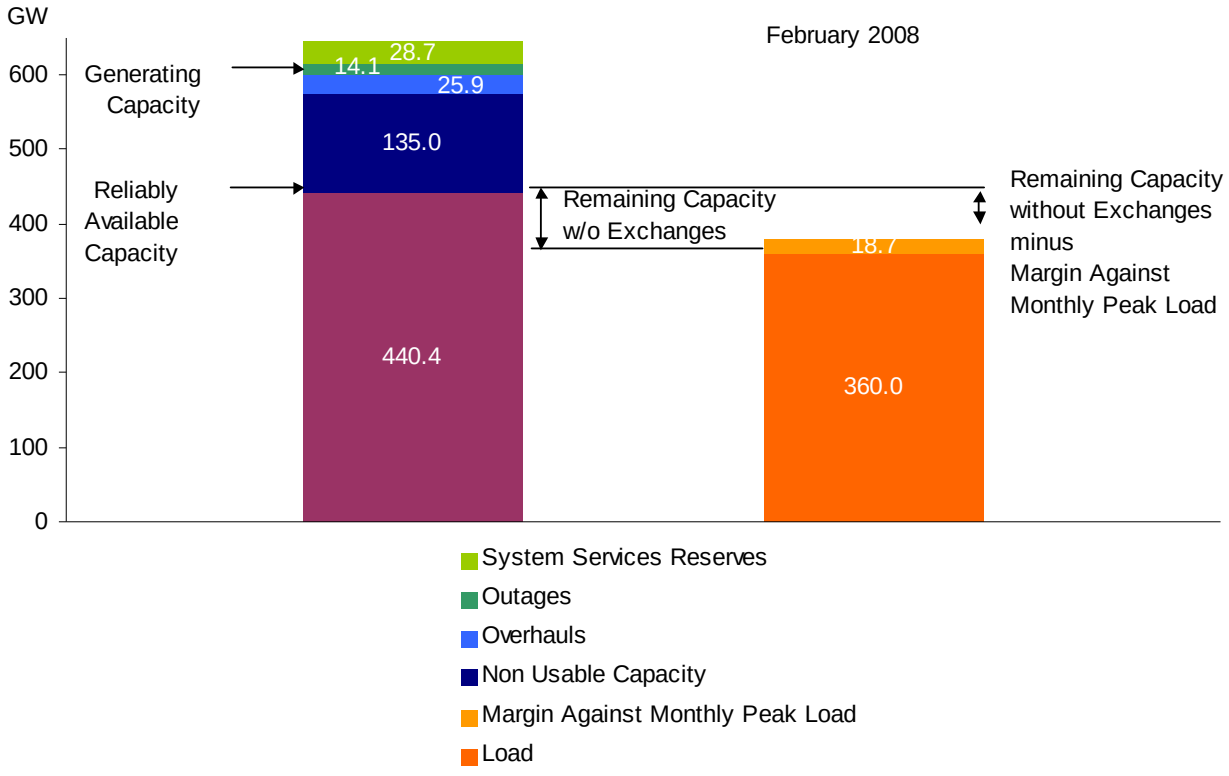


Fig. 34 UCTE Generation Adequacy at Minimum Remaining Margin in 2008

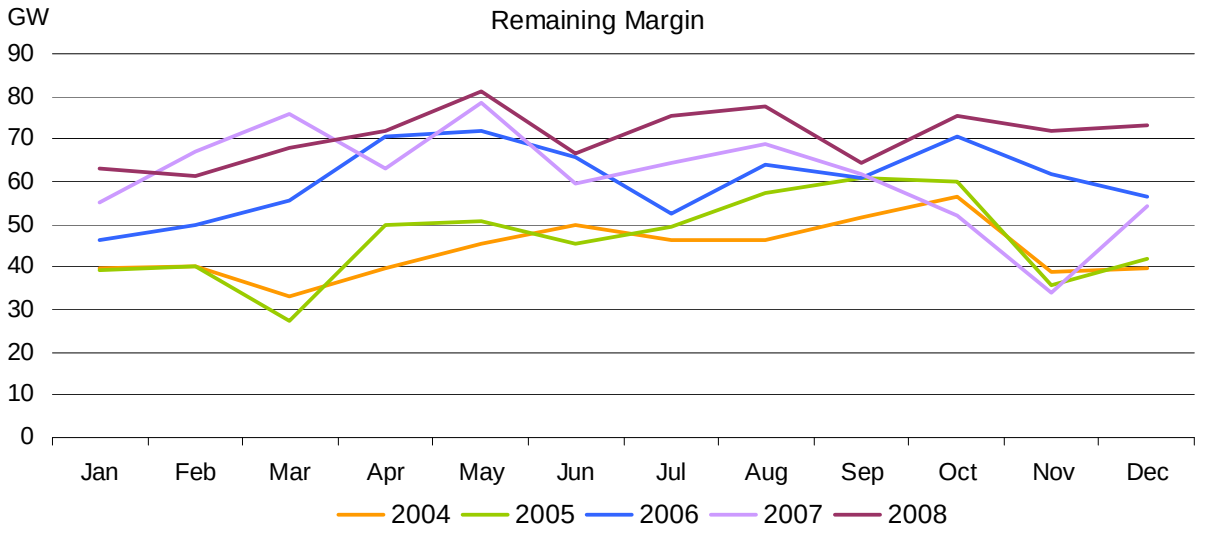


Fig. 35 UCTE Remaining Margin Retrospect

Fig. 35 shows that the Remaining Margin in 2008 was quite stable compared to the previous 4 years. Yet almost all months are above previous years and especially at the end of the year when the economic crisis had significant effect on load. The peak in August can be explained by the fact that the reference point in

August 2008 was out of the week of August 15th (major holiday week all around UCTE) unlike the ones in the previous years.

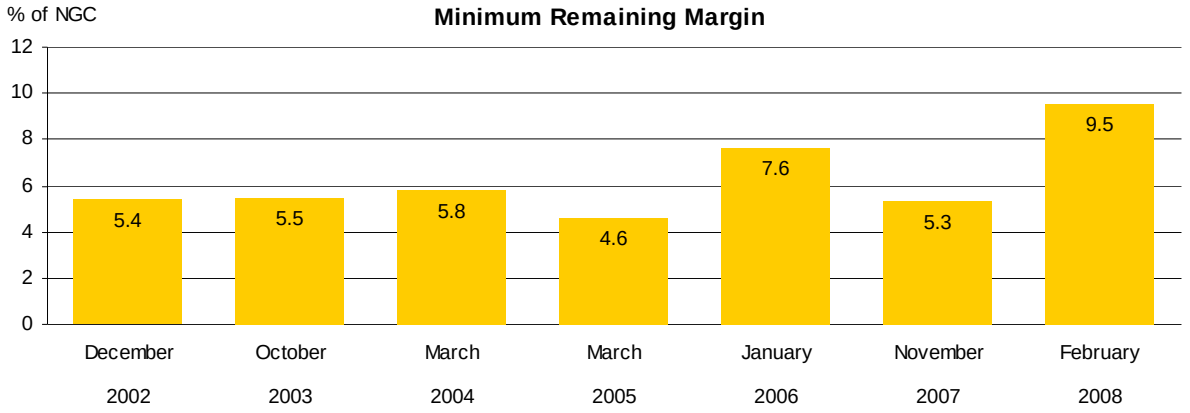
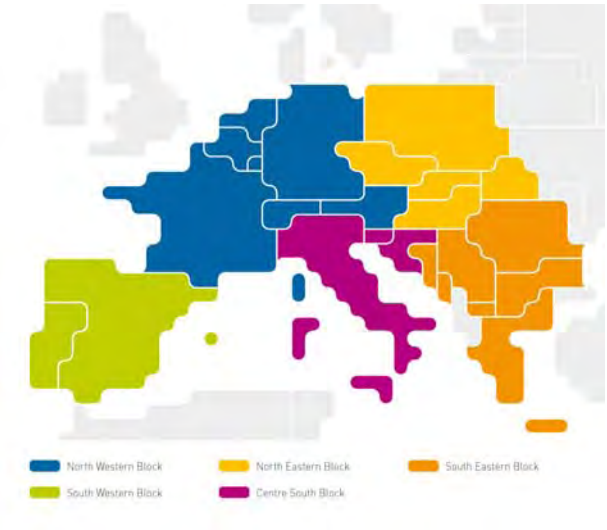


Fig. 36 UCTE Minimum Remaining Margin as part of Net Generating Capacity Retrospect

The level of the minimum Remaining Margin in 2008 was a higher than the usual level with 9.5 % of the Net Generating Capacity compared to 5.7% in average from 2002[25]. No deterioration of the adequacy of the UCTE electrical system has been detected.

3.6.2.2 Regional Assessment



Map 2 Regional Blocks for Adequacy Analysis

[25] The high level of 2006 was exceptional due to very mild temperature all year long.

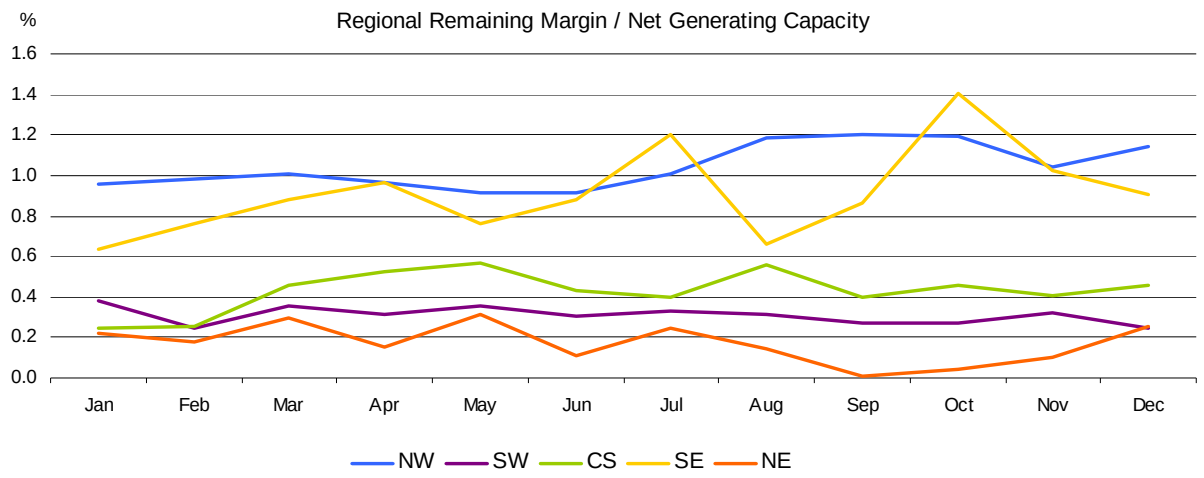


Fig. 37 Regional Remaining Margins as part of Net Generating Capacity in 2008

Regional Remaining Margin was positive for all months in all regional blocks.

The minimum Remaining Margin was in February for the whole UCTE but not for any regional block. As shown in Fig. 37, minimum regional remaining capacity was in January for the North Western block, in February for the South Western block, in June for the Centre South block and in September for the North Eastern and South Eastern blocks.

Unlike in 2007, there was no massive decrease of the Remaining Capacity in the North Western block in the second part of the year, down to its lowest value in November. Remaining Capacity, even at the UCTE level, is therefore much more stable through the year 2008 than in 2007.

3.6.2.3 National Comments on Remaining Margin

GR Greece

The value of the remaining margin in March is not representative, since its negative sign is obtained due to the extended outages of generating units, caused during the strike by the electricity unions in PPC, the main producer in Greece, from 3.3.2008 to 21.3.2008.

4 TRANSMISSION ADEQUACY

4 TRANSMISSION ADEQUACY

Transmission adequacy is the ability of the electric system to deal with exchanges resulting from market behaviour. Transmission adequacy retrospect analysis looks back at the potential relieves and constraints on cross-border capacities and commercial exchanges during the previous year considering two aspects:

- The main grid developments with an emphasis on commissioned transmission devices, which had a significant impact on cross-border capacities;
- Cross-border bottlenecks retrospect analysis based on average usage of interconnection transmission capacities[26], considering whether access to the cross-border transmission capacities has been granted or not to market players who requested it.

This document reports about the transmission adequacy in the previous year but not about transmission adequacy in the future. Therefore, any decision to enhance the transmission adequacy of the UCTE system in the future will require specific adequacy, market and network forecast analyses, jointly performed by TSOs on a regional basis, which are out of the scope of this report.

4.1 MAIN GRID DEVELOPMENTS

In this Chapter are reported the main developments and upgrades on the UCTE network in 2008 with an emphasis on commissioned transmission devices, which had a significant impact on cross-border transmission capacities, by increasing the capacity offered to the market, by reducing or increasing physical constraints, by decreasing potential congestion costs, etc.

AT Austria

Commissioning				
Line or Equipment Name	**Voltage (kV)**	**Date**	**Main Characteristics**	**Comments on Impact on Interconnection Capacity**
No:438; Second system: Duernrohr (AT) - Slavetice (CZ)	380	01/11		

BA Bosnia-Herzegovina

No commissioning or decommissioning took place in 2008.

[26] This part of the methodology for transmission adequacy analysis has been updated to get more reliable results compared to the previous reports. It is not reporting about physical congestions on transmission lines anymore. Potential sources of cross-border bottlenecks could be either actual limited transmission capacities or the allocation mechanisms of these transmission capacities.

BE Belgium

Commissioning				
Line or Equipment Name	**Voltage (kV)**	**Date**	**Main Characteristics**	**Comments Impact on Interconnection Capacity**
Scheldelaan – 7de Havendok	150kV	27/5/2008	Second circuit including a partial replacement of an existing circuit (~1.15km), ~6 km, AC line	No impact
Mercator – Lint	380kV	30/6/2008	Fourth circuit, ~3km, AC line	No impact
Moen – Zwevegem	150kV	29/9/2008	Single circuit, ~2.6km, AC line	No impact
Dhanis – Wiertz	150kV	21/11/2008	Single circuit, ~2,5 km, AC cable	No impact
Burcht – Petrol – Zurenborg	150kV	30/12/2008	Double circuit replacing an existing single circuit AC cable, ~1.9 km	No impact
Van Eyck	380/380kV	2/9/2008	Phase Shifting Transformer 1400 MVA	The commission of a phase shifter in Zandvliet and two phase shifters in Van Eyck allows a better control of loop flows. This commissioning permits to minimize the negative effect of increasing loop flows on the NTC-values.
Van Eyck	380/380kV	11/9/2008	Phase Shifting Transformer 1400 MVA	The commission of a phase shifter in Zandvliet and two phase shifters in Van Eyck allows a better control of loop flows. This commissioning permits to minimize the negative effect of increasing loop flows on the NTC-values.

Zandvliet	380/380kV	9/6/2008	Phase Shifting Transformer 1400 MVA	The commission of a phase shifter in Zandvliet and two phase shifters in Van Eyck allows a better control of loop flows. This commissioning permits to minimize the negative effect of increasing loop flows on the NTC-values.
Brume	380/70kV	6/6/2008	Transformator 110 MVA	No impact
Schelle	150/70/10-15kV	3/12/2008	Replacement of an existing transformator 145 MVA	No impact
Mechelen	150/70kV	30/5/2008	Transformator 125 MVA	No impact
Mechelen	150/10kV	30/5/2008	Transformator 40 MVA	No impact
Walgoed	150/10kV	16/12/2008	Transformator	No impact
Wiertz	150/11kV	21/11/2008	Transformator 50 MVA	No Impact
Baudour	150kV	8/12/2008	Capacitor bank 75 Mvar	The installation of the capacitor bank was needed, to maintain the voltage level when importing significant amounts.
Kallo	150kV	30/6/2008	Capacitor bank 75 Mvar	The installation of the capacitor bank was needed, to maintain the voltage level when importing significant amounts.
Merksem	150kV	21/5/2008	Capacitor bank 75 Mvar	The installation of the capacitor bank was needed, to maintain the voltage level when importing significant amounts.

Mol	150kV	25/6/2008	Capacitor bank 75 Mvar	The installation of the capacitor bank was needed, to maintain the voltage level when importing significant amounts.
Petrol	150kV	14/10/2008	New substation	No impact

Decommissioning				
Line or Equipment Name	**Voltage (kV)**	**Date**	**Main Characteristics**	**Comments on Impact on Interconnection Capacity**
Antoing	150/6kV	23/6/2008	Transformator	No impact

CH Switzerland

Commissioning				
Line or Equipment Name	**Voltage (kV)**	**Date**	**Main Characteristics**	**Comments on Impact on Interconnection Capacity**
Mendrisio (CH) - Cagno (IT)	380 kV	01/07/2008	8 km cable	No significant increase

CZ Czech Republic

Commissioning				
Line or Equipment Name	**Voltage (kV)**	**Date**	**Main Characteristics**	**Comments on Impact on Interconnection Capacity**
Slavetice (CZ) - Durnrohr (AT)	380 kV	03/11/2008	double circuit (replacing existing single circuit)	The new double line will significantly contribute to the enhancement of the transmission system security.
transformer T403 Dasny	400/110	30/07	350 MVA	

DE Germany

Commissioning				
Line or Equipment Name	**Voltage (kV)**	**Date**	**Main Characteristics**	**Comments on Impact on Interconnection Capacity**
Ragow	380/220 kV		transformer	none
Lauchstdt - Vieselbach	380		OHL (2 circuits)	none

Ragow - Wustermark	380		OHL (circuit1)	none
Ragow - Streumen	380		OHL (circuit 2)	none

Decommissioning				
Line or Equipment Name	**Voltage (kV)**	**Date**	**Main Characteristics**	**Comments on Impact on Interconnection Capacity**
Erfurt/Nord - Vieselbach	220		OHL 2 (2 circuits)	none
Ragow - Wustermark	220		OHL (circuit 1)	none
Ragow - Streumen	220		OHL (circuit 2)	none
Tiengen - Trossingen (schwarz)	220	16/12		none

FR France

MAIN TRANSMISSION FACILITIES COMMISSIONED DURING THE YEAR 2008:

21 new substations connected to the RTE network, including 1 at 400 kV (Yvelines Ouest), 8 at 225 kV (Bergholz, Chartres Sud, Espiers, Favary, Le Long Champ, Le Soler, Quartes, Salles Curan), 1 at 150 kV, 5 at 90 kV, 6 at 63 kV.

At 400 kV, 217 km of new or refurbished circuits (combined with 72 km of removed installations and various modifications) including:

- the overhead line between Marlenheim, near Strasbourg, and Vigy, near Metz to improve the security of electricity supply of the regions Alsace and Lorraine;
- the overhead lines Warande – Weppes and Avelin – Warande after partial replacement of the conductors.
- At 225 kV, 329 km of new or refurbished circuits (combined with 260 km of removed installations and various modifications) including:
- the underground line Elancourt – Yvelines Ouest to secure the electricity supply of south-west Paris region ;
- the overhead lines Bergholz – Marlenheim and Bergholz – St Avold - Sarreguemines in the departments of Moselle and Bas-Rhin, to supply Bergholz substation ; Beautor – Le Long Champ and Beautor – Soissons Notre Dame - Rupreux in the department of Aisne, to reinforce the supply of Soissonnais area ;
- the overhead lines Pusy – Rolampont in Haute-Saône and Haute-Marne departments, Montahut - St Vincent in Hérault and Aveyron departments, Jonquières – St Césaire in Gard department, Compiègne – Moru in Oise department, after replacement of the conductors.

Source: Electrical Energy in France 2008.

http://grte/htm/an/mediatheque/telecharge/electrical_energy_in_france_2008.pdf

GR Greece

Commissioning				
Line or Equipment Name	**Voltage (kV)**	**Date**	**Main Characteristics**	**Comments on Impact on Interconnection Capacity**
				The construction of the new OHL 400kV S/S N. Santa (Greece)-Babaeski (Turkey) has been completed in 2008. The official commissioning of this line is expected for 2009. This line will comprise an upgrade of the existing OHL 150kV S/S Didymotiho (Greece)-Hamibat (Turkey), which has been commissioned in 2007.

IT Italy

Commissioning				
Line or Equipment Name	**Voltage (kV)**	**Date**	**Main Characteristics**	**Comments on Impact on Interconnection Capacity**
Phase shift transformer	220		PST of 370 MVA	device installed in the 220kV border substation Padriciano
Lines	150/132		A total of 23 new lines	
Bari Ovest - Palo del Colle	380		New line for a total lenght of 11,5 Km	
Avenza - Sarmato	220		New line for atotal lenght of 131,2 Km	
Capacitors banks	380		Capacitor banks of 54 MVAr	
Reactor bank	380		Reactor bank, of 200 MVAr	
Transformers	380/220		New transformers, for a total of 1030 MVA	
Mendrisio - Cagno	380		New interconnection line Italy and Switzerland	

Palo del Colle - Foggia	380		New line for a total lenght of 113,9 Km	
Substations	380/150/132		Two substation at 380KV. Also new substation at 150 kV - 132 kV were installed	

MK Former Yugoslavian Republic of Macedonia

Line or Equipment Name	Voltage (kV)	Date	Main Characteristics	Comments on Impact on Interconnection Capacity
Stip - Cervena Mogila	400	October		interconnection line Macedonia-Bulgaria

PT Portugal

Commissioning				
Line or Equipment Name	**Voltage (kV)**	**Date**	**Main Characteristics**	**Comments on Impact on Interconnection Capacity**
Alto Lindoso - Riba de Ave line 2	400	July	Reinforcement of transmission capacity on already existing circuits (lines & bays).	Facilitates flows on Minho (PT)-Galiza (ES) interconnection
Pedralva substation autotransformation	400/150	August	New 400/150 kV, 2x 450 MVA, autotransformation.	This reinforcement is associated with Minho(PT) - galiza (ES) interconnection. Besides, facilitates renewable energy reception.
Alto Lindoso - Pedralva line	400	April	Opening of Alto Lindoso - Riba de Ave 1 already existent 400 kV line at new Pedralva substation (39.2 km plus 21.2 km minus 59.1 km).	This reinforcement is associated with Minho (PT) - Galiza (ES) interconnection. Besides, facilitates renewable energy reception.
Valdigem - Vermoim 4 line	400	August	Refurbishment of an old 220 kV line into a 400 kV double line (74 km)	Reinforcement of Douro axis, preparing future 400 kV connections between Aldeadavila (ES) - Lagoaa (PT) and Oporto areas.

Vila Pouca de Aguiar substation	220	November	New 220 kV substation	First stages on the creation of a 220 kV loop in Portugal Northern area, facilitating renewable energy reception and also facilitating flows on Douro interconnections.
Macedo de Cavaleiros substation	220	December	New 220 kV substation	First stages on the creation of a 220 kV loop in Portugal Northern area, facilitating renewable energy reception and also facilitating flows on Douro interconnections.
Alto Lindoso - Riba de Ave line 1	400	March	Reinforcement of transmission capacity on already existing circuits (lines & bays).	Facilitates flows on Minho (PT)-Galiza (ES) interconnection
Valdigem - Vila Pouca de Aguiar line	220	November	New 220 kV line (45 km)	First stages on the creation of a 220 kV loop in Portugal Northern area, facilitating renewable energy reception and also facilitating flows on Douro interconnections.
Valdigem - Macedo de Cavaleiros line	220	December	New 220 kV line (31 km)	First stages on the creation of a 220 kV loop in Portugal Northern area, facilitating renewable energy reception and also facilitating flows on Douro interconnections.
Pedralva - Riba de Ave line	400	April	Opening of Alto Lindoso - Riba de Ave 1 already existent 400 kV line at new Pedralva substation (39.2 km plus 21.2 km minus 59.1 km).	This reinforcement is associated with Minho(PT)-Galiza(ES) interconnection. Besides, facilitates renewable energy reception.

HU Hungary

Commissioning				
Line or Equipment Name	**Voltage (kV)**	**Date**	**Main Characteristics**	**Comments on Impact on Interconnection Capacity**

OHL Békéscsaba (HU) – Nadab (RO)	400kV	10/12/2008		increasing the capacity offered to the market

RO Romania

Commissioning				
Line or Equipment Name	**Voltage (kV)**	**Date**	**Main Characteristics**	**Comments on Impact on Interconnection Capacity**
OHL Nadab (RO) - Bekescsaba (HU)	400	10/12	Thermal Transmission Capacity = 1860A; Temporary Capacity Limitation = 1600A due to the curent transformer	Increasing of RO interconnection capacity with 100MW export / 200MW import.

4.2 CROSS BORDER BOTTLENECKS

This Chapter reports about cross-border bottlenecks retrospect analysis based on average usage of interconnection transmission capacities[27], considering whether access to the cross-border transmission capacities has been granted or not to market players who requested it. Cross-border bottlenecks retrospect analysis is therefore performed on every mechanism where a cross-border transmission capacity is offered to the market[28].

Cross-border bottlenecks retrospect analysis is based on the following yearly average indicator:

$$\text{Nomination Rate}_Y = \frac{\sum_{h \in Y} \frac{\text{Net Schedule}_h}{\text{NTC}_{NetSchedule,h}}}{Count(h \in Y)}$$

Y is the whole year 2008 in this report and h are every hours of year 2008.

Net Schedule is the netting of import and export commercial schedules[29], if such ones exist, i.e. the final global commercial schedule.

NTC is the Net Transmission Capacity offered to the market in the direction of the Net Schedule:

[27] This part of the methodology for transmission adequacy analysis has been updated and made more explicit to make sure that all TSOs use the same rules to get more transparent and reliable results compared to the previous reports. It is not reporting about physical congestions on transmission lines anymore but on commercial bottlenecks based the average usage of the cross-border transmission capacities. Potential sources of cross-border bottlenecks could be either actual limited transmission capacities or the allocation mechanisms of these transmission capacities.

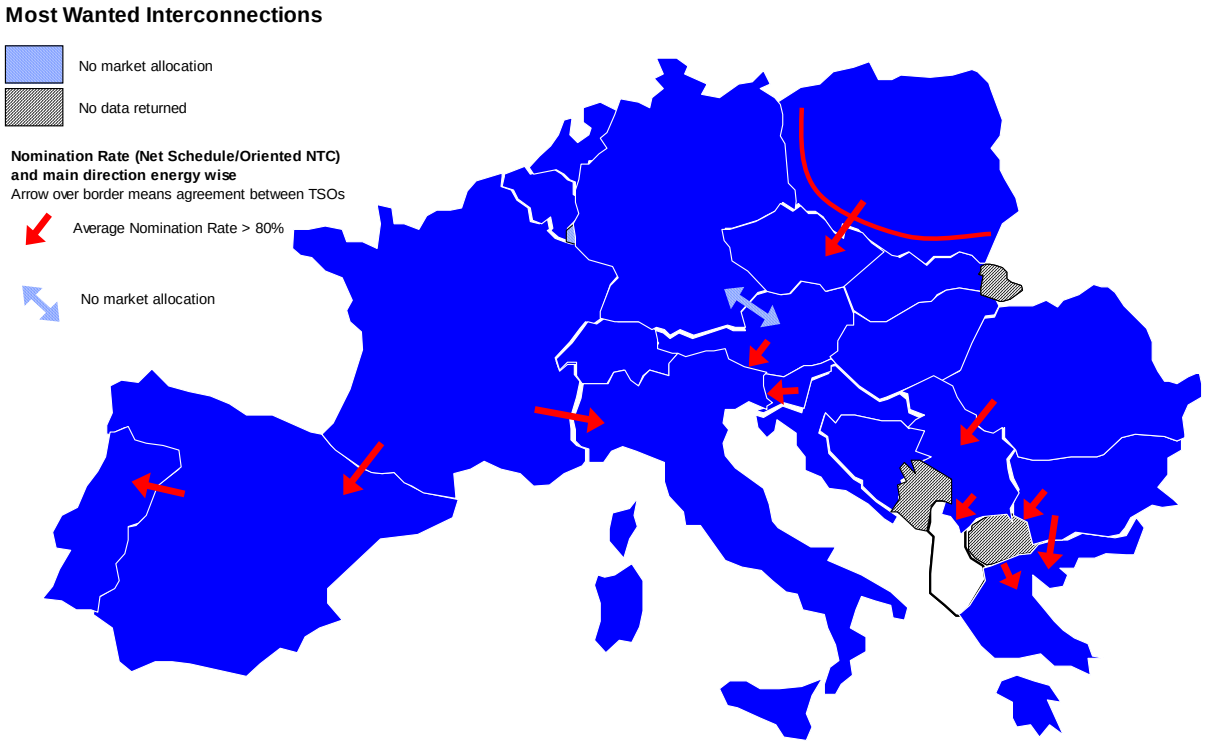
[28] Allocation of cross-border transmission capacity is usually done on a border basis but in some cases a single mechanism is put in place on several neighbouring borders. In that later case, the analysis is done for the set of neighbouring borders.

[29] Although allocation mechanisms may include intra-day allocations, they could be ignored in the collected data for simplification purposes. Hence the nominated schedules do not include intra-day nominations. More inter-TSO schedules are ignored, as they are not nominated as part of the capacity offered to the market.

- When Net Schedule is positive (actual net commercial flows go from country AA to country BB), the NTC is the export one (i.e. for exchanges from AA to BB);
- When Net Schedule is negative (actual net commercial flows go from country BB to country AA), the NTC is the import one (i.e. for exchanges from BB to AA)

When no capacity has been offered to the market, i.e. NTC=0, there was a complete bottleneck from a market point of view and so is the net schedule and NTC ratio is considered to be 1.

Map 15 shows the most severe cross-border bottlenecks based on average market usage of interconnections (Nomination Rate below) above 80%.



Map 15 Yearly Average Cross-Border Commercial Bottlenecks in 2008

Border	Nomination Rate
BG - MK	100%
RO - RS	97%
GR - MK	95%
AT - IT	94%
PL to DE+CZ+SK	85%
IT - SI	85%
FR - IT	85%
ES - PT	84%
ES - FR	81%

Tab. 21 Cross-Border Transmission Capacity with Nomination Rate above 80% in 2008

Tab. 21 shows the cross-border mechanisms with Nomination Rate higher than 80%.

As the indicator is computed on average all over the year, a Nomination Rate higher than 80% reflects a particularly high commercial flow on the interconnection, probably up to the capacity itself quite often (and seldom very low, whatever the direction).

The high values highlighted above regards interconnections heavily used in one single direction, with little hours in the year showing weaker power flows (in either direction):

- Bottlenecks occur at the Northern border of Italy, with Nomination Rates between 85% and 94% with Austria, France and Slovenia, as Italy relies on a relatively high and constant level of imports.
- Exchanges between France to Spain (mostly from France to Spain, sometime also in reverse direction) and Spain to Portugal look also constrained.
- The average Nomination Rate for exports from Poland to its South-Western neighbours[30] reached 84%. Such high level is mainly caused by low level of NTC offered to the market for export due to the tight balance situation in Polish power system in the first half of 2008.
- In South-East RB, the bottlenecks map illustrate that power tend to flow from North to South, Romania and Bulgaria being net exporters and Greece, FYROM and Montenegro mostly importing.

2008 show no case of interconnection being heavily – i.e. with a Nomination Rate greater than 80% – used in both directions alternatively.

4.2.1 National Comments on Cross-Border Bottlenecks

AT Austria

There is no allocation method applied between Germany and Austria.

FR France

Capacity between France and Italy is offered to market players in both directions, through explicit auctions but power flows are oriented in export direction almost all year long. Less stronger exports and even import situations were however encountered during few winter peak hours, with cold spell over France.

Capacity between France and Spain is offered to market players in both directions, through explicit auctions. Power mostly flowed from France to Spain, but some bottlenecks in reverse direction were also experienced. Congestion in both directions on this border are even stronger, with specific regulation and safety issues in the Iberian Peninsula limiting further improvement opportunities of the allocation mechanism.

GR Greece

The area including Greece, FYROM, Albania and Montenegro is an importing block. In general, each one of these countries is importer along the whole year. More extensively:

1. There are limited power exchanges between Greece and FYROM.

[30] Exports from Poland to its South-Western neighbours are managed with a merged common export capacity; whereas in import direction, 3 separate capacities with the three neighbouring countries Germany, Czech Republic and Slovakia to Poland are considered.

2. Greece imports power from Bulgaria, while there are no exports from Greece to Bulgaria.

The completion of the new interconnection line Stip (FYROM) – C. Mogila (Bulgaria) is expected to increase the NTC in both of Greece-Bulgaria (mainly) and Greece-FYROM borders, reducing therefore the average Nomination Rate in these borders.

PL Poland

There is a common auction concerning whole 220/400 kV synchronous connection, therefore PSE Operator S.A. provides aggregated data of Net Transmission Capacity (NTC) for whole PL - DE/CZ/SK profile. Average value of NTC offered to the market in export direction in 2008 amounted 400MW.

Almost all Net Schedules (NS) in this common profile during the year (except for 2 hours) were in export direction. Average level of NS amounted 328MW.

Average Nomination Rate (NR) factor for PL – DE/CZ/SK profile reached 84%. Such high level is mainly caused by low level of NTC offered to the market for export due to the tight balance situation in Polish power system in the first half of 2008.

PT Portugal

During 2008 power flows were oriented in import direction with an Average Nomination Rate above the 80%. Cross-border bottlenecks had occurred in 59.3% of the time periods, with an higher incidence during the months of November and June.

RO Romania

According to present bilateral agreements with Romanian neighbours Transelectrica's NTC allocation procedure does not foresee the netting schedule mechanism.

However based on a netting schedules approach, the average market usage of interconnection capacity from Romania towards Serbia was above 80 % mainly due to two reasons:

- being one single tie-line between Romania and Serbia, a commercial congestion on this border occurs during the maintenance time period;
- the possible greater interest of the traders to use this tie-line capacity to carry out export activities towards Albania, FYROM even Greece as well as towards Serbia.

SI Slovenia

The Slovenian transmission network is connected with the European electricity transmission system via interconnections to Austria, Croatia and Italy. The connections with Austria and Croatia are stronger than to Italy. While the latter is a traditional high importer, loop-flows from CEE and SEE regions transit via Slovenian power system. These loop-flows have strong impact on the Slovenian security of operation. In the future high RES (wind) production is expected in the northern part of continental Europe. Fluctuation in RES production can result in wide area changes of power flow patterns. It is expected that changes in injections from NEE to SEE and vice versa will increase loop-flows over Slovenia towards Italy.

5 MARKET DEVELOPMENTS

5 MARKET DEVELOPMENTS

AS far as possible, comments are sorted per European Regional Initiative (almost matching the Regional Blocks, but overlapping each other). General comments for several TSOs of an ERI can be proposed in the common part; additional National Comments are also welcome.

5.1 CWE - CENTRAL WEST EUROPE

Second anniversary of the Trilateral Market Coupling (TLC)

The Trilateral Market Coupling (TLC) celebrates today its second anniversary. This inventive market mechanism linking the Belgian, Dutch and French electricity markets was launched on 21 November 2006 by the Dutch, Belgian and French power exchanges (APX, Belpex and Powernext respectively) and TSOs (TenneT, Elia and RTE). This price coupling mechanism has been jointly operated with constant success, using a single algorithm, and enabling a coordinated and efficient day-ahead power price formation on all three markets, as well as the optimisation of day-ahead cross-border trades between the three countries.

CASC-CWE comes to life

The Transmission System Operators Cegedel Net, Elia, EnBW TNG, E.ON Netz, RTE, RWE TSO and TenneT announced on October 1st the incorporation of CASC-CWE (Capacity Allocation Service Company for the Central West-European Electricity market), their joint cross-border services company. Clearance from the European Commission was obtained on August 14th, thus opening the way for this important leap towards integrating the five electricity markets into a regional electricity market for Central-West Europe. On November 28, 2008, CASC-CWE organized the first joint auctioning of year and month capacities on the common borders between France, Belgium, the Netherlands, and Germany. This is a premiere for such an extended region in Europe.

RTE and Elia create a new company, Coreso,

RTE and Elia, the French and Belgian electricity transmission system operators (TSOs), founded on December 19th a new company named Coreso (Coordination of Electricity SystemOperators). The joint venture houses the first regional technical coordination centre to be shared by several TSOs.

The creation of Coreso is a first concretisation of the increased operational cooperation that has been started between TSOs, in line with the need clearly expressed by the European Commission in its draft Directive and by electricity market players. Its main aim is to enable a better regional integration of renewable generation and to guarantee safe management of cross-border flows, which are increasing sharply with the development of intraday markets.

Coreso started its activities on February 16th 2009 and National Grid joined RTE and Elia on May 8th 2009.

BE Belgium

As from July 1st, 2008 RTE and Elia are using a new method for the calculation of the daily available capacities (ATC). The netted values of the yearly and monthly nominations are taken into account for the

calculation of the daily capacities on the France-Belgium interconnection. The same principle was introduced 26 September 2008 on the interconnection between Belgium and the Netherlands.

On March 13, 2008, Belpex successfully launched its continuous day-ahead market segment (CoDAM) and its continuous intraday market segment (CIM). Already from the first day on, contracts were created on both market segments. The continuous intraday market (CIM) of Belpex is characterized by a strong growth during its first 10 months. Liquidity, indicated by the volume and number of registered trades, increases each month, as the market gains in maturity. In October, a record monthly volume of 17 415 MWh has been traded, over 394 trades that month. A total volume of 88 889 MWh was cleared in 2008, over 1807 transactions. This development is driven by a successful market design, the intraday capacity allocation facilitated by Elia and RTE on the French-Belgian border and the support of SPE as liquidity provider on the CIM.

DE Germany

In spite of the economic crisis, the political discussion about climate change was also in 2008 the central focus of the electricity industry. Thus, two EU-driven fundamental reorganization processes (climate protection and liberalization) within the energy industry, planned to be implemented over several decades, are overlapping.

The Renewable Energy Sources Act (Erneuerbare Energien-Gesetz - EEG) was amended in 2008, and the incentive regulation ordinance of 29 October 2007 was implemented during the year 2008. Since January 2009, it has led to new, efficiency-based network charges. In Brussels, the Third Internal Energy Market Package was intensively discussed but not yet adopted. On the other hand, the “Green Package” was passed in December 2008.

The concrete application of incentive regulation gives rise to investment uncertainties which are difficult to handle for network operators. But in general, the fundamental model of electricity market liberalization has meanwhile been firmly anchored throughout Europe. Wholesale electricity trading is prospering, and competition for domestic customers is also functioning. The strong fluctuations in primary energy prices during the year 2008, not only for oil and gas but also for hard coal, have given rise to new uncertainties regarding decisions on investments in power stations which, however, are ever more urgently required. Investments in the development of transmission and distribution networks are also absolutely necessary in many places to cope with the integration of renewable energies. Delays attributable to local opposition cause network operators and politics great concern as they lead ever more frequently to difficult considerations of weighing secure network operation against overall utilization of CO2-free wind energy.

5.2 NEE – NORTH EAST EUROPE

Eight TSOs founded the Central Allocation Office GmbH on July 17, 2008 in Freising, Germany for the purpose of strengthening the development of regional electricity market in the region of Austria, Czech Republic, Germany, Hungary, Poland, Slovakia and Slovenia. CAO GmbH will allocate yearly, monthly, and daily rights for cross-border electricity transmission in the CEE region on behalf of the eight TSOs and will provide the settlement. The allocation process should be based on flow-based methodology.

<u>SEPS, a.s. and CEPS, a.s., prepare common allocation mechanism for day-ahead electricity market.</u>

SEPS, a.s. and CEPS, a.s., in cooperation with Czech Electricity Market Operator prepare framework of day-ahead electricity market on CEPS/SEPS border based on the Protocol on interconnection of national

electricity markets signed on May 22, 2008 by Czech Minister of Industry and Trade and Slovak Minister of Economy. It is referred to as Market Coupling, which means that cross-border transmission capacity at this profile will be allocated in so called daily implicit auction. Two national markets will be interconnected in second half of 2009, after the day-ahead electricity market is launched in Slovakia.

SK Slovakia

The Energy Security Strategy of the Slovak Republic was approved by government resolution on October 15, 2008. Concerning the energy legislation framework, The Energy Act (Act. No. 656/2004) and The Regulation Act (Act No. 276/2001) were amended several times in 2008. The revision of The Energy Act was invoked particularly by necessity of SOS directive transposition (Directive 2005/89/ES), necessity of effective system control as well as system stability and prevention from security threat.

Consequently, the secondary legislation was executed in 2008 that had its impact on operation of Power System: Regulation of the Ministry of Economy of the Slovak Republic No. 459/2008 by which the procedure on announcement of the state of emergency was set up and Regulation of the Regulatory Office for Network Industries No. 315/2008 by which the quality standards of supplied electricity and provided services was set up.

Following documents necessary for control of transmission system of the Slovak Republic were updated in 2008:

- Dispatch Order for Control of Power System of the Slovak Republic,
- Operation Order of TSO SEPS, a.s.,
- Technical Conditions for Connections, Access and Operation of Transmission System

Valid regulatory policy was set for one-year period in 2008 with the aim to put into effect regulatory tools and methods to ensure non-discriminatory and transparent system performance in network industries. Since 2005, the price for services related to Power System operation and purchasing prices for electricity generated from RES and COGEN have been regulated. The price for electricity as commodity has been deregulated by regulatory office (except households). During 2008 new regulatory policy was elaborated for on-coming period of 2009-2011.

5.3 SEE – South East Europe

Until now, the TSOs of the countries participating in the 8th region of South Eastern Europe governed by Energy Community, have set the theoretical basis of a flow based allocation mechanism, which has been tested by a one year dry run trial operation. The next step will be the establishment of a central auction office (Coordinated Auction Office - CAO) in Montenegro to implement the allocation of the capacities.

GR Greece

The implementation of the Directive 2004/8/EC to national legislation (law 3734/2009) introduced the basic methodology for the estimation of the efficiency of a CHP plant.

Furthermore, law 3734/2009 provides incentives for the installation of new open cycle flexible Gas Turbines with capacity up to 150MW (which will be connected to the system until 1/12/2009), aiming to preserve a satisfactory power balance level in high load demand periods.

Finally, law 3734/2009 provides detailed information about the PV systems Feed-In-Tariffs (FIT) (reference prices) according to grid connection date. A recent ministerial decree targeted to households and small scale businesses, is expected to boost the installation of roof-top PV systems up to 10kWp.

5.4 SWE – SOUTH WEST EUROPE

RTE and REE set to create a joint venture for developing a new line through the Eastern Pyrenees.

Following Franco-Spanish summit on January 10th, the Chairmen of the two electricity transmission system operators, Dominique Maillard for Réseau de Transport d'Electricité (RTE) and Luis Atienza for Red Electrica de Espana (REE), signed an agreement aimed at boosting the electric interconnection capacities between France and Spain. Under the agreement, a new line will be built between the 400kV substations at Baixas in France, and Santa Llogaia in Spain.

Iberian Electricity Market

As 2008 was the first whole year since the beginning of MIBEL, the Iberian Electricity Market, we continued to assist to a continuous progress towards maturity . Last year a total volume of 266083 GWh was cleared in the daily market.
Cross-border bottlenecks, which triggers the market splitting mechanism, is still the main opponent factor for a complete market integration.

APPENDIX

Appendix 1 COMMENTS ON DATA REPRESENTATIVENESS

Every national correspondent company is in charge of collecting data aggregated for the whole country. Yet, in some countries, the collected data do not cover the entire national system. It might be due to a limited access to data on the distribution network, to production units connected to private grids for own consumption, etc.

National Representativeness index is the estimation of the percentage of the national value the collected data are representative of.

	2003		2004		2005		2006		2007		2008	
	Generation	Load	Generation	Load	Generation	Load	Generation	Load	Generation	Load	Generation	Load
AT	**84.0**	**82.0**	**90.0**	100.0	**90.0**	**88.0**	**90.0**	**88.0**	100.0	100.0	100.0	100.0
BG	100.0	100.0	100.0	100.0	100.0	100.0	**99.8**	**99.9**	**99.8**	**99.8**	**99.9**	**99.9**
DE	100.0	**91.0**	100.0	**91.0**	100.0	**91.0**	100.0	**91.0**	100.0	100.0	100.0	100.0
ES	**94.0**	**94.0**	**94.0**	**94.0**	**94.0**	**94.0**	**98.0**	**98.0**	**98.0**	**98.0**	**98.0**	**98.0**
PT	**92.0**	**92.0**	**94.0**	**94.0**	**92.0**	**92.0**	**97.0**	**97.0**	**97.0**	**97.0**	**97.0**	**97.0**
SI	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	**93.0**	**93.0**

Tab. 22 National Data Representativeness

As generation adequacy is based on the comparison of load and generation, National Representativeness of load data and generation data should be almost identical to make the generation adequacy assessment reliable.

BE Belgium

The reported figures are best estimates based on actual measurements and extrapolations from survey results.

DE Germany

The reported figures are best estimates based on actual measurements and extrapolations from survey results.

GR Greece

The data representativeness referring to the Greek Interconnected System is 100%. The remote systems of the Greek Islands are not included.

PT Portugal

In general our statistics refer to the consumption supplied by the public grid, about 97% of the national consumption. This means that in the auto-production we consider the surplus delivered to the public grid, but not the auto-consumption. However, in the case co-generators use the legal possibility to sell all the energy produced (including the auto-consumption), to profit from special status regime tariff, we consider all that production.

SI Slovenia

data for distribution level generation is not available

Appendix 2 ADDITIONAL ENERGY TABLES

Further to the table in this Appendix, all energy data are downloadable on the UCTE website in http://www.ucte.org/resources/publications/systemadequacy/

TWh	AT	BA	BE	BG	CH	CZ	DE	ES	FR	GR	HR	HU	IT	LU	ME	MK	NL	PL	PT	RO	RS	SI	SK	UA_W
Nuclear Power	-	-	43.4	14.8	26.1	25.0	141.1	56.3	418.3	-	-	14.0	-	-	-	-	3.9	-	-	10.3	-	6.0	15.5	-
Fossil Fuels	21.6	8.7	31.3	22.6	2.1	49.4	362.8	163.5	53.3	46.7	6.1	18.3	248.5	2.4	1.2	5.0	91.5	140.8	27.3	32.6	29.7	4.9	7.3	-
of which Lignite	-	*8.7*	-	-	-	*38.0*	*137.6*	*13.5*	-	*29.9*	-	*4.7*	-	-	*1.2*	*4.9*	-	*49.6*	-	*19.0*	*28.5*	*4.4*	*2.0*	-
of which Hard Coal	*5.2*	-	*3.5*	-	-	*5.6*	*118.3*	*30.2*	*21.4*	-	*2.3*	*1.6*	*48.1*	-	-	-	*26.1*	*87.3*	*10.4*	*4.3*	-	*0.4*	*1.4*	-
of which Gas	*10.9*	-	*23.0*	-	-	*4.3*	*80.2*	*113.3*	*14.6*	*13.3*	*1.6*	*9.9*	*145.6*	*2.4*	-	-	*53.7*	*3.9*	*14.3*	*2.6*	*0.4*	*0.0*	*1.7*	-
of which Oil	*1.2*	-	*0.1*	-	-	*0.2*	*9.5*	*5.8*	*7.2*	*3.5*	*1.0*	*0.0*	*21.9*	-	-	*0.1*	*2.3*	-	*2.0*	-	-	-	-	-
of which Mixed Fuels	-	-	*3.5*	-	-	*1.2*	-	-	-	-	*1.2*	*2.0*	*17.9*	-	-	-	*9.4*	-	*0.5*	*6.7*	*0.8*	-	-	-
Renewable Energy Sources (other than hydro)	-	-	4.2	-	1.2	0.3	70.6	36.1	9.6	1.9	0.0	1.5	11.8	0.2	-	-	8.9	0.9	7.4	0.0	-	-	0.3	-
of which Wind	-	-	0.6	-	0.0	0.2	40.2	31.1	5.6	1.7	0.0	0.2	6.6	0.1	-	-	4.3	0.8	5.7	0.0	-	-	0.0	-
of which Solar	-	-	-	-	-	0.0	4.0	1.0	0.0	0.0	-	-	-	-	-	-	0.0	-	0.0	-	-	-	-	-
Hydro Power	36.7	4.6	1.7	3.2	37.6	2.4	26.5	25.7	68.0	3.3	5.3	0.2	44.9	0.9	1.5	0.9	0.1	2.7	7.1	16.8	10.0	3.5	4.3	-
of which Storage	-	-	1.3	-	-	-	-	15.7	27.4	2.5	1.9	-	-	0.0	1.5	-	-	0.4	1.5	9.4	0.7	-	1.8	-
of which Run-of-River	-	-	0.4	-	-	-	-	7.8	34.6	-	1.0	0.2	-	0.0	0.0	-	-	1.4	4.6	7.4	8.8	3.5	2.2	-
of which Pumped-Storage	-	-	-	-	-	0.4	-	2.1	6.0	0.8	0.2	-	-	0.4	-	-	-	0.6	1.0	-	0.5	-	0.1	-
Non-Identifiable Energy Sources	8.5	-	-	-	-	-	-	0.4	-	-	-	2.4	-	-	-	-	-	-	-	-	-	0.1	-	-
Total Generation	**66.8**	**13.2**	**80.6**	**40.6**	**67.0**	**77.1**	**601.0**	**281.9**	**549.1**	**51.9**	**11.4**	**36.3**	**305.2**	**3.5**	**2.7**	**5.9**	**104.4**	**144.4**	**41.8**	**59.8**	**39.7**	**14.4**	**27.4**	**-**
Physical Imports	19.8	3.4	17.2	3.1	30.5	8.5	40.2	5.9	10.3	7.6	12.2	12.8	43.3	6.8	3.4	3.9	25.0	9.0	10.6	2.6	9.1	6.2	9.4	-
Physical Exports	14.9	5.0	6.6	8.4	30.5	20.0	62.7	16.5	58.3	2.0	5.7	8.9	3.4	2.5	1.5	1.2	9.1	9.7	1.3	7.0	8.6	7.8	8.9	-
Exchange	**4.9**	**- 1.7**	**10.6**	**- 5.3**	**- 0.0**	**- 11.5**	**- 22.5**	**- 10.6**	**- 48.0**	**5.6**	**6.6**	**3.9**	**39.9**	**4.4**	**1.9**	**2.7**	**16.0**	**- 0.7**	**9.3**	**- 4.4**	**0.6**	**- 1.6**	**0.5**	**-**
Pumped Storage	3.3	-	1.8	0.7	2.7	0.5	7.8	3.7	6.6	1.2	0.2	-	7.5	1.2	-	-	-	0.9	0.6	0.1	0.9	-	0.3	-
Consumption	**68.4**	**11.6**	**89.5**	**34.5**	**64.2**	**65.1**	**570.7**	**267.6**	**494.5**	**56.3**	**17.8**	**40.2**	**337.6**	**6.7**	**4.6**	**8.6**	**120.3**	**142.9**	**50.4**	**55.2**	**39.4**	**12.8**	**27.6**	**-**

Tab. 23 Energy Balance 2008

TWh	AT	BA	BE	BG	CH	CZ	DE	ES	FR	GR	HR	HU	IT	LU	ME	MK	NL	PL	PT	RO	RS	SI	SK	UA_W
Nuclear Power	-	-	45.9	13.6	26.3	24.6	133.2	52.7	418.6	-	-	13.8	-	-	-	-	4.0	-	-	7.1	-	5.4	14.2	-
Fossil Fuels	21.1	7.8	33.8	22.1	2.1	54.0	372.8	157.5	55.0	47.6	6.8	21.4	253.6	2.9	0.8	5.0	88.6	145.1	26.8	33.7	29.0	4.8	7.1	8.1
of which Lignite	-	*7.8*	-	-	-	*41.6*	*142.3*	*20.7*	-	*31.1*	-	*4.9*	-	-	*0.8*	*4.6*	-	*47.5*	-	*18.0*	*28.5*	*4.3*	*1.7*	-
of which Hard Coal	*6.3*	-	*0.9*	-	-	*7.4*	*130.8*	*47.3*	*23.2*	-	*2.2*	*1.6*	*43.4*	-	-	-	*25.3*	*93.8*	*11.7*	*4.4*	-	*0.4*	*1.7*	-
of which Gas	*9.4*	-	*22.3*	-	-	*3.7*	*73.4*	*84.8*	*14.5*	*13.2*	*1.8*	*13.5*	*142.6*	*2.9*	-	-	*57.5*	*3.8*	*10.5*	*10.3*	*0.5*	*0.1*	*1.4*	-
of which Oil	*1.3*	-	*0.1*	-	-	*0.2*	*8.6*	*4.5*	*7.1*	*3.3*	*1.2*	*0.5*	*24.9*	-	-	*0.4*	*2.1*	-	*1.1*	*0.8*	-	-	-	-
of which Mixed Fuels	-	-	*9.0*	-	-	-	-	-	-	-	*1.6*	-	*23.9*	-	-	-	*3.8*	-	*0.2*	-	-	-	-	-
Renewable Energy Sources (other than hydro)	4.2	-	3.7	-	1.1	0.3	65.2	31.0	7.9	1.5	0.1	1.5	9.4	0.2	-	-	6.6	0.6	6.1	0.0	-	-	0.3	-
of which Wind	2.0	-	0.5	-	-	0.1	39.7	26.6	4.0	1.3	0.0	0.1	4.2	0.1	-	-	3.4	0.5	4.0	0.0	-	-	0.0	-
of which Solar	-	-	-	-	-	-	3.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hydro Power	34.9	4.0	1.7	2.4	36.4	2.5	27.6	29.9	63.2	3.4	4.4	0.2	38.5	0.9	1.3	1.1	0.1	2.7	10.2	15.6	10.1	2.8	4.5	0.1
of which Storage	11.6	-	-	-	16.5	-	-	16.6	23.3	3.4	2.9	-	10.6	0.0	1.3	1.1	-	-	3.0	4.9	0.8	-	2.0	-
of which Run-of-River	23.3	-	0.4	-	19.8	-	-	7.2	33.3	-	1.4	0.2	27.9	0.1	-	-	-	-	5.9	10.1	8.7	2.8	2.2	0.1
of which Pumped-Storage	-	-	1.3	-	-	-	-	2.4	2.8	-	-	-	-	0.8	-	-	-	-	-	-	0.6	-	0.1	-
Non-Identifiable Energy Sources	3.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Generation	**63.7**	**11.8**	**85.1**	**38.2**	**65.9**	**81.4**	**598.8**	**271.1**	**544.7**	**52.5**	**11.3**	**36.9**	**301.5**	**3.9**	**2.0**	**6.1**	**99.3**	**148.4**	**43.1**	**56.4**	**39.0**	**13.1**	**26.1**	**8.2**
Physical Imports	24.0	3.7	15.8	3.1	33.8	10.2	44.3	8.8	10.4	6.4	11.9	14.7	48.8	6.8	3.9	3.4	23.2	7.8	9.5	4.0	8.8	6.1	13.6	2.9
Physical Exports	17.1	4.3	9.0	7.5	34.6	26.4	63.3	14.1	65.5	2.1	5.6	10.7	2.6	2.9	1.2	0.9	5.6	13.1	2.2	6.1	8.6	5.7	11.9	6.8
Exchange	**6.9**	**- 0.6**	**6.8**	**- 4.5**	**- 0.9**	**- 16.1**	**- 19.0**	**- 5.3**	**- 55.1**	**4.4**	**6.3**	**4.0**	**46.2**	**4.0**	**2.7**	**2.5**	**17.6**	**- 5.4**	**7.3**	**- 2.1**	**0.3**	**0.4**	**1.7**	**- 4.0**
Pumped Storage	3.0	-	1.7	0.5	2.1	0.6	9.1	4.3	7.7	1.1	-	-	7.6	1.1	-	-	-	0.9	0.5	0.2	0.9	-	0.2	-
Consumption	**67.7**	**11.2**	**90.2**	**33.2**	**62.9**	**64.7**	**570.7**	**261.5**	**481.9**	**55.7**	**17.6**	**40.9**	**340.1**	**6.8**	**4.7**	**8.6**	**116.9**	**142.2**	**49.9**	**54.1**	**38.4**	**13.5**	**27.6**	**4.3**

Tab. 24 Energy Balance 2007

Physical Exchanges	Imports					Exports					Balance (Import - Export)				
	2004 TWh	2005 TWh	2006 TWh	2007 TWh	2008 TWh	2004 TWh	2005 TWh	2006 TWh	2007 TWh	2008 TWh	2004 TWh	2005 TWh	2006 TWh	2007 TWh	2008 TWh
AT	16.500	20.261	21.257	23.979	19.796	13.300	17.648	14.407	17.067	14.933	3.200	2.613	6.850	6.912	4.863
BA	1.700	1.055	3.000	3.743	3.354	3.600	2.466	5.200	4.344	5.004	-1.900	-1.411	-2.200	-0.601	-1.650
BE	14.600	14.328	18.853	15.816	17.157	6.800	8.024	8.695	9.037	6.561	7.800	6.304	10.158	6.779	10.596
BG	0.700	0.799	1.139	3.057	3.096	6.600	8.379	8.882	7.520	8.440	-5.900	-7.580	-7.743	-4.463	-5.344
CH	37.700	47.084	48.788	33.756	30.494	38.400	40.734	46.085	34.649	30.525	-0.700	6.350	2.703	-0.893	-0.031
CS	6.000	8.500				4.000	7.300				2.000	1.200			
CZ	9.800	12.351	11.466	10.209	8.524	25.500	24.985	24.097	26.354	19.986	-15.700	-12.634	-12.631	-16.145	-11.462
DE	44.200	53.400	46.100	44.300	40.200	51.500	61.900	65.900	63.300	62.700	-7.300	-8.500	-19.800	-19.000	-22.500
ES	8.100	10.212	9.093	8.796	5.894	11.100	11.555	12.373	14.098	16.485	-3.000	-1.343	-3.280	-5.302	-10.591
FR	6.600	8.061	8.300	10.360	10.341	68.700	68.390	71.500	65.465	58.345	-62.100	-60.329	-63.200	-55.105	-48.004
GR	4.900	5.618	6.100	6.421	7.575	2.000	1.837	1.900	2.055	1.964	2.800	3.800	4.800	4.366	5.611
HR	10.100	8.802	8.373	11.897	12.247	6.400	3.633	2.691	5.554	5.669	3.700	5.169	5.682	6.343	6.578
HU	13.800	15.635	15.270	14.680	12.772	6.300	9.411	8.062	10.696	8.867	7.500	6.224	7.208	3.984	3.905
IT	46.500	50.300	46.600	48.799	43.284	0.800	1.100	1.600	2.646	3.394	45.700	49.200	45.000	46.153	39.890
LU	6.500	6.401	6.830	6.845	6.819	3.100	3.151	3.275	2.886	2.464	3.400	3.250	3.555	3.959	4.355
ME			2.932	3.893	3.378			1.066	1.243	1.484			1.866	2.650	1.894
MK	2.000	2.395	2.998	3.388	3.920	0.800	0.796	1.202	0.905	1.203	1.200	1.599	1.796	2.483	2.717
NL	21.400	23.691	27.346	23.150	25.023	5.200	5.398	5.887	5.568	9.068	16.200	18.293	21.459	17.582	15.955
PL	5.300	5.003	4.774	7.752	9.021	14.600	16.189	15.775	13.107	9.704	-9.300	-8.300	-11.001	-5.355	-0.683
PT	8.600	9.620	8.624	9.483	10.597	2.100	2.801	3.183	2.154	1.315	6.500	6.819	5.441	7.329	9.282
RO	1.700	1.605	1.635	3.965	2.604	3.000	4.520	5.884	6.051	7.037	-1.100	-1.100	-4.249	-2.086	-4.433
RS			8.568	8.844	9.136			8.489	8.569	8.574			0.079	0.275	0.562
SI	4.300	9.325	7.706	6.106	6.233	5.000	9.548	7.477	5.680	7.827	-0.800	-0.800	-0.800	0.426	-1.594
SK	8.700	8.570	9.320	13.580	9.412	10.600	11.292	10.923	11.855	8.891	-1.900	-2.722	-1.603	1.725	0.521
UA_W	1.600	1.780	1.770	2.852	-	4.900	5.500	5.840	6.821	-	-3.300	-3.720	-4.070	-3.969	-
UCTE	**281.300**	**324.796**	**326.843**	**325.671**	**300.877**	**294.300**	**326.557**	**340.393**	**327.624**	**300.440**	**-13.000**	**2.382**	**-13.980**	**-1.953**	**0.437**

Tab. 25 National Seasonal Consumption Retrospect

Seasonal Consumption	2003		2004		2005		2006		2007		2008	
	Summer TWh	Winter TWh	Summer TWh	Winter TWh	Summer TWh	Winter TWh	Summer TWh	Winter TWh	Summer TWh	Winter TWh	Summer TWh	Winter TWh
AT	25.6	30.0	26.0	30.6	26.1	31.0	31.4	36.0	31.5	35.8	32.5	35.9
BA	4.6	5.7	4.7	6.0	5.1	6.0	5.2	6.0	5.2	6.0	5.4	6.2
BE	45.4	39.9	41.0	46.6	41.2	46.7	42.4	48.0	42.3	47.8	42.7	46.8
BG	12.5	17.9	15.3	20.3	15.9	20.7	14.3	19.0	14.4	18.8	15.3	19.2
CH	27.8	31.3	27.6	32.8	28.2	33.5	28.4	33.8	28.3	33.5	29.9	34.3
CS	16.2	23.0	16.8	23.1	17.4	24.3						
CZ	26.3	33.6	27.2	34.3	27.8	34.9	28.7	35.5	29.3	35.4	30.0	35.1
DE	237.7	269.8	263.1	298.1	264.1	299.1	267.1	301.2	268.2	302.5	273.9	296.8
ES	109.7	114.0	115.0	120.4	119.6	127.2	124.0	129.8	126.2	134.8	130.5	137.0
FR	200.4	250.4	209.8	269.4	209.9	273.3	206.3	272.1	207.5	272.8	216.6	277.9
GR	25.4	24.4	25.8	25.4	26.7	26.2	27.2	26.8	28.7	27.0	29.3	27.0
HR	7.1	8.4	7.3	8.7	7.7	9.0	8.0	9.2	8.3	9.3	8.5	9.3
HU	18.3	20.2	18.1	20.2	18.7	20.6	19.4	21.3	19.8	21.1	19.6	20.6
IT	159.6	160.0	159.9	165.4	162.9	167.5	166.5	171.0	168.2	171.7	169.2	168.4
LU	2.9	3.2	3.0	3.3	3.0	3.3	3.2	3.5	3.2	3.5	3.3	3.3
ME							2.1	2.5	2.1	2.5	2.1	2.5
MK	1.9	2.7	3.1	4.3	3.4	4.7	3.4	5.0	3.5	5.1	3.9	4.7
NL	52.7	57.4	52.7	58.5	54.8	59.8	55.2	61.1	55.4	61.5	56.7	63.4
PL	57.4	69.3	60.0	70.6	60.0	70.7	63.0	73.5	66.3	75.9	67.7	75.2
PT	20.6	22.5	21.7	23.8	22.8	25.1	23.4	25.7	23.8	26.2	24.2	26.2
RO	23.0	26.4	23.5	27.2	24.0	27.9	24.9	28.2	25.6	28.5	26.5	28.7
RS							18.9	19.1	16.2	22.2	17.0	22.4
SI	6.0	6.4	6.1	6.5	6.7	6.1	6.4	6.9	6.6	6.9	6.2	6.5
SK	11.7	14.7	11.9	14.4	11.9	14.4	12.6	14.7	12.8	14.8	13.0	14.6
UA_W	1.6	2.5	1.8	2.6	1.8	2.6	1.9	2.5	1.9	2.4	-	-
UCTE	**1,089.0**	**1,239.2**	**1,141.4**	**1,312.5**	**1,159.6**	**1,334.5**	**1,183.8**	**1,352.3**	**1,195.4**	**1,366.1**	**1,224.0**	**1,362.1**

Tab. 26 Physical Exchanges Energy Retrospect

Appendix 3 ADDITIONAL POWER TABLES

Further to the table in this Appendix, all power data are downloadable on the UCTE website in:

http://www.ucte.org/resources/publications/systemadequacy/

	Net values in GW, at the reference time 11 AM on 3rd Wednesday	Jan.	Feb,	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	Nuclear Power	112.1	112.1	112.1	112.1	112.1	112.1	112.1	112.1	112.1	112.1	112.1	111.9
2	Fossil Fuels	332.6	332.7	333.2	333.9	334.2	334.6	335.4	337.2	337.9	338.2	339.1	340.5
2A	*of which, Lignite*	60.2	60.2	60.2	60.2	60.2	60.2	60.2	60.6	60.6	60.6	60.6	60.6
2B	*of which, Hard Coal*	*82.3*	*82.3*	*82.2*	*82.2*	*82.1*	*82.1*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*	*82.0*
2C	*of which, Gas*	*113.2*	*113.3*	*113.4*	*113.9*	*114.1*	*114.5*	*115.9*	*116.0*	*116.2*	*116.2*	*116.4*	*117.2*
2D	*of which, Oil*	*32.0*	*32.0*	*32.2*	*34.9*	*32.3*	*32.3*	*32.4*	*32.4*	*32.5*	*32.6*	*33.0*	*33.2*
2E	*of which, Mixed Fuels*	*34.8*	*34.8*	*35.1*	*32.6*	*35.4*	*35.4*	*35.8*	*36.0*	*36.4*	*36.6*	*36.9*	*37.4*
3	Renewable Energy Sources (other than hydro)	*62.0*	*62.7*	*63.6*	*64.6*	*65.3*	*65.8*	*66.5*	*67.2*	*69.6*	*69.1*	*70.1*	*71.3*
3A	*of which, Wind*	47.7	48.2	48.9	49.6	50.1	50.4	50.7	51.0	51.4	52.0	52.5	53.1
3B	*of which, Solar*	*5.1*	*5.3*	*5.3*	*5.5*	*5.6*	*5.8*	*6.1*	*6.2*	*6.1*	*7.2*	*7.5*	*8.1*
4	Hydro power (total)	135.5	135.5	135.5	135.5	135.6	135.6	135.6	135.6	135.6	135.6	135.6	135.6
5	Not Clearly Identifiable Energy Sources	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
6	**Net Generating Capacity (6=1+2+3+4+5)**	**643.2**	**644.1**	**645.4**	**647.2**	**648.2**	**649.2**	**650.7**	**653.2**	**656.4**	**656.2**	**658.0**	**660.5**
7	Non-Usable Capacity	118.3	135.0	128.0	134.7	133.6	136.9	143.2	148.9	145.3	145.0	131.2	131.1
8	Maintenance and Overhauls	21.7	25.9	31.9	43.9	57.7	55.0	49.3	48.2	54.5	44.5	31.2	16.8
9	Outages	19.1	14.1	17.4	14.9	15.5	18.3	16.1	18.9	19.4	18.3	18.4	18.2
10	System Services Reserve	27.8	28.7	28.3	27.3	26.5	26.8	26.9	25.9	26.6	26.2	28.0	28.1
11	**Unavailable Capacity (11=7+8+9+10)**	**186.9**	**203.7**	**205.6**	**220.8**	**233.4**	**237.1**	**235.5**	**241.9**	**245.8**	**233.9**	**208.7**	**194.2**
12	Reliably Available Capacity (12=6-11)	456.3	440.4	439.9	426.4	414.9	412.2	415.2	411.3	410.6	422.2	449.2	466.3
13	Load	371.1	360.0	343.0	336.0	318.2	319.8	324.2	300.8	322.0	323.6	344.1	361.4
14	**Remaining Capacity (14=12-13)**	**85.1**	**80.2**	**96.8**	**90.3**	**96.5**	**92.2**	**94.7**	**110.3**	**88.5**	**98.5**	**106.2**	**104.8**
15	Margin Against Monthly Peak Load	22.0	18.7	29.0	18.5	15.3	25.6	19.1	32.5	24.1	23.1	34.4	31.5
16	**Remaining Margin (17=14-15)**	**63.1**	**61.5**	**67.8**	**71.8**	**81.2**	**66.6**	**75.6**	**77.9**	**64.3**	**75.4**	**71.8**	**73.3**
17	Physical Imports	42.5	41.7	40.7	36.0	29.0	31.3	34.8	28.7	24.3	37.0	41.4	38.7
18	Physical Exports	42.0	38.2	38.9	33.5	28.7	30.6	32.5	30.6	24.4	35.2	38.1	35.9
19	**Exchanges (19=17-18)**	**0.5**	**3.5**	**1.8**	**2.5**	**0.3**	**0.6**	**2.3**	**- 2.0**	**- 0.0**	**1.8**	**3.3**	**2.8**

Tab. 27 UCTE Power Balance 2008

December	Hydro Power	Nuclear Power	Fossil Fuel	Renewable Energy Sources	Not Clearly Identified	NGC
	GW	GW	GW	GW	GW	GW
AT	11.853	-	6.344	0.985	-	19.182
BA	2.064	-	1.790	-	-	3.854
BE	1.412	5.825	8.335	1.147	-	16.719
BG	2.700	2.000	5.900	0.046	-	10.646
CH	13.329	3.220	0.321	0.322	0.241	17.433
CZ	2.200	3.500	10.600	0.200	-	16.500
DE	9.700	20.300	72.300	32.400	-	134.700
ES	18.972	7.465	43.000	19.308	0.083	88.828
FR	25.392	63.260	24.718	4.283	-	117.653
GR	3.177	-	8.375	0.940	-	12.492
HR	2.071	-	1.700	0.055	-	3.826
HU	0.050	1.822	5.360	0.518	0.791	8.541
IT	21.125	-	73.020	4.274	-	98.419
LU	1.128	-	0.498	0.080	-	1.706
ME	0.660	-	0.210	-	-	0.870
MK	0.503	-	0.907	-	-	1.410
NL	0.038	0.485	21.702	3.036	-	25.261
PL	2.327	-	29.709	0.473	-	32.509
PT	4.957	-	6.804	3.170	-	14.931
RO	5.843	1.300	9.431	0.007	-	16.582
RS	2.831	-	5.524	-	-	8.355
SI	0.863	0.696	1.324	-	-	2.883
SK	2.430	1.798	2.650	0.061	-	7.189
UA_W	-	-	-	-	-	-
UCTE	**135.6**	**111.7**	**340.5**	**71.3**	**1.1**	**660.5**

Tab. 28 Net Generating Capacity per Primary Sources in December 2008

Load	Jan GW	Feb GW	Mar GW	Apr GW	May GW	Jun GW	Jul GW	Aug GW	Sep GW	Oct GW	Nov GW	Dec GW
AT	8.742	8.496	8.442	7.914	7.883	7.844	7.798	7.880	8.011	8.123	8.782	8.627
BA	1.624	1.627	1.588	1.447	1.409	1.417	1.465	1.458	1.504	1.510	1.601	1.622
BE	12.490	12.478	12.390	11.998	11.301	11.340	11.154	11.198	11.457	11.757	11.318	12.064
BG	6.358	5.950	5.096	4.646	4.051	4.191	4.229	4.302	4.118	4.378	5.368	5.347
CH	9.610	9.348	8.655	9.071	8.623	8.416	7.943	8.669	8.714	8.458	9.268	9.483
CZ	9.615	9.399	9.210	8.944	8.531	7.777	7.687	7.682	8.275	8.148	9.006	8.696
DE	72.677	69.965	68.423	67.911	65.590	65.086	64.817	65.839	66.602	68.502	69.878	68.220
ES	39.780	37.773	31.306	34.775	34.263	34.704	36.347	32.725	35.078	33.530	35.775	39.867
FR	74.468	71.400	71.181	67.199	56.931	56.501	57.469	51.227	57.455	59.506	68.408	81.049
GR	7.671	7.889	5.986	6.580	7.269	8.731	8.777	8.537	7.529	6.821	7.299	7.201
HR	2.495	2.556	2.427	2.256	2.184	2.190	2.284	2.310	2.187	2.141	2.349	2.540
HU	6.104	5.848	5.754	5.547	5.375	5.559	5.519	4.232	5.588	5.518	5.764	5.440
IT	51.936	51.845	48.322	46.695	46.836	48.492	51.498	37.761	46.305	46.462	46.192	47.100
LU	1.014	0.918	1.026	0.842	0.963	0.958	0.909	0.866	0.943	0.848	0.756	0.724
ME	0.628	0.623	0.591	0.462	0.462	0.469	0.520	0.535	0.509	0.484	0.528	0.542
MK	1.285	1.198	1.273	0.996	0.882	0.909	0.956	0.958	0.853	0.919	1.043	1.088
NL	17.191	15.945	16.230	15.483	15.102	14.624	14.817	15.422	14.613	15.045	15.956	16.294
PL	20.100	20.160	20.019	19.058	17.886	17.828	17.300	17.898	18.836	18.657	19.518	19.605
PT	7.415	7.198	7.052	6.567	6.678	6.695	6.989	5.583	6.610	6.407	7.011	7.717
RO	7.862	7.722	7.055	7.068	6.461	6.770	6.804	6.632	6.679	6.563	7.246	7.066
RS	6.146	5.901	5.333	5.219	4.147	4.148	3.923	4.070	4.757	4.496	5.343	5.703
SI	1.805	1.814	1.719	1.666	1.702	1.691	1.639	1.669	1.699	1.731	1.738	1.665
SK	4.120	3.991	3.895	3.636	3.646	3.460	3.373	3.368	3.648	3.625	3.931	3.763
UA_W	-	-	-	-	-	-	-	-	-	-	-	-
UCTE	**371.1**	**360.0**	**343.0**	**336.0**	**318.2**	**319.8**	**324.2**	**300.8**	**322.0**	**323.6**	**344.1**	**361.4**

Tab. 29 Load at Reference Time in 2008

Services System Reserve	Jan GW	Feb GW	Mar GW	Apr GW	May GW	Jun GW	Jul GW	Aug GW	Sep GW	Oct GW	Nov GW	Dec GW
AT	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700
BA	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250
BE	0.971	0.971	0.971	0.971	0.971	0.971	0.971	0.971	0.971	0.971	0.971	0.971
BG	1.200	1.400	1.300	1.300	1.300	1.300	1.300	1.300	1.300	1.300	1.400	1.400
CH	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
CZ	1.100	1.100	1.200	0.900	1.000	1.100	0.900	0.900	0.900	1.000	0.900	1.200
DE	6.600	7.000	6.500	6.500	6.600	6.900	6.500	7.200	6.500	6.300	7.000	6.800
ES	0.888	0.893	0.898	0.797	0.699	0.877	0.891	0.893	0.897	0.496	0.693	0.892
FR	4.667	4.589	4.685	4.864	4.478	3.848	4.005	3.379	3.782	4.288	4.576	4.000
GR	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800
HR	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
HU	0.810	0.725	0.595	0.484	0.787	0.469	0.652	0.616	0.661	0.367	0.771	0.810
IT	3.510	3.760	3.860	3.760	3.120	3.600	3.560	2.900	3.630	3.480	3.470	3.640
LU	-	-	-	-	-	-	-	-	-	-	-	-
ME	0.025	0.025	-	0.025	0.025	-	0.025	0.025	-	0.025	0.025	-
MK	-	-	-	-	-	-	-	-	-	-	-	-
NL	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400
PL	1.329	1.518	1.663	1.142	0.970	1.196	1.466	1.099	1.362	1.319	1.390	1.588
PT	0.731	0.716	0.711	0.696	0.689	0.695	0.704	0.669	0.688	0.668	0.710	0.741
RO	1.100	1.080	0.950	1.000	1.000	1.000	1.063	1.058	1.053	1.088	1.093	1.093
RS	0.600	0.653	0.643	0.623	0.613	0.613	0.603	0.613	0.613	0.623	0.633	0.653
SI	0.297	0.297	0.297	0.297	0.297	0.297	0.297	0.297	0.297	0.297	0.297	0.297
SK	0.660	0.639	0.654	0.637	0.624	0.624	0.629	0.608	0.602	0.645	0.672	0.662
UA_W	-	-	-	-	-	-	-	-	-	-	-	-
UCTE	**27.838**	**28.716**	**28.277**	**27.346**	**26.523**	**26.840**	**26.916**	**25.878**	**26.606**	**26.217**	**27.951**	**28.097**

Tab. 30 System Services Reserve in 2008

	Average Net Generating Capacity	Average Overhauls Capacity		Maximum Overhauls Capacity					
	GW (1)	GW	% of (1)	GW	% of (1)	2008	2007	2006	2005
AT	19.2	-	-	-	-	-	-	-	-
BA	3.9	0.321	8.325	0.550	14.3	April	April	April	May
BE	16.4	1.197	7.281	2.520	15.3	April	September	September	September
BG	10.6	1.668	15.680	2.666	25.1	July	September	June	July
CH	17.4	0.328	1.884	1.885	10.8	August	August	August	July
CZ	16.4	1.658	10.096	2.900	17.7	September	September	September	September
DE	133.5	6.558	4.911	11.400	8.5	June	May	May	June
ES	86.5	2.407	2.782	3.603	4.2	May	November	April	April
FR	116.5	11.339	9.732	20.150	17.3	May	August	May	August
GR	12.2	0.870	7.111	1.939	15.9	April	April	May	November
HR	3.8	0.067	1.742	0.100	2.6	April	October	October	September
HU	8.5	0.558	6.558	1.109	13.0	April	April	October	September
IT	95.8	4.911	5.127	5.550	5.8	February	June	August	November
LU	1.7	0.096	5.666	0.385	22.7	May	April	January	February
ME	0.9	0.085	9.770	0.300	34.5	July	August	-	-
MK	1.4	0.229	16.229	0.503	35.7	May	June	May	May
NL	24.3	0.882	3.631	1.555	6.4	May	July	November	May
PL	32.3	2.776	8.603	4.793	14.9	May	May	July	July
PT	14.6	0.754	5.170	1.345	9.2	May	May	September	October
RO	16.4	1.731	10.523	2.710	16.5	July	June	July	June
RS	8.4	1.019	12.193	1.944	23.3	June	September	-	-
SI	2.9	0.091	3.171	0.196	6.8	May	October	April	July
SK	7.3	0.490	6.671	1.098	14.9	April	September	April	April
UA_W	-	-	-	-	-	-	August	July	July
UCTE	**651.0**	**40.034**	**6.149**	**57.697**	**8.862**	**May**	**June**	**May**	**May**

Tab. 31 Maintenance & Overhauls Characteristics in 2008

	Average Net Generating Capacity	Average Outages Capacity		Maximum Outages Capacity					
	GW (1)	GW	% of (1)	GW	% of (1)	2008	2007	2006	2005
AT	19.2	-	-	-	-	-	-	-	-
BA	3.9	-	-	-	-	-	May	April	August
BE	16.4	0.934	5.683	2.454	14.9	August	October	May	June
BG	10.6	0.203	1.906	0.405	3.8	November	June	July	January
CH	17.4	-	-	-	-	-	-	-	April
CZ	16.4	0.433	2.638	0.900	5.5	December	April	November	December
DE	133.5	3.492	2.615	4.500	3.4	November	November	December	November
ES	86.5	2.100	2.427	3.264	3.8	October	September	August	August
FR	116.5	2.507	2.152	5.154	4.4	January	March	March	July
GR	12.2	0.501	4.092	2.634	21.5	March	January	August	June
HR	3.8	-	-	-	-	-	January	n.a.	November
HU	8.5	0.090	1.052	0.376	4.4	November	January	May	March
IT	95.8	2.957	3.087	3.930	4.1	August	June	April	August
LU	1.7	-	-	-	-	-	January	-	-
ME	0.9	-	-	-	-	-	May	-	-
MK	1.4	-	-	-	-	-	January	-	-
NL	24.3	1.000	4.116	1.000	4.1	January	January	January	-
PL	32.3	1.483	4.597	2.326	7.2	June	October	November	October
PT	14.6	0.066	0.451	0.358	2.5	July	July	October	April
RO	16.4	1.063	6.463	1.543	9.4	April	January	December	February
RS	8.4	0.507	6.072	1.106	13.2	June	June	August	November
SI	2.9	0.009	0.320	0.110	3.8	January	January	-	December
SK	7.3	0.037	0.505	0.225	3.1	October	August	November	April
UA_W	-	-	-	-	-	-	October	August	Sepember
UCTE	**651.0**	**17.381**	**2.670**	**19.436**	**2.985**	**September**	**November**	**May**	**May**

Tab. 32 Outages Characteristics in 2008

Non Usable	Jan GW	Feb GW	Mar GW	Apr GW	May GW	Jun GW	Jul GW	Aug GW	Sep GW	Oct GW	Nov GW	Dec GW
AT	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000
BA	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700
BE	1.016	1.300	1.340	1.283	1.536	1.594	1.570	1.875	1.824	1.534	1.659	1.579
BG	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200
CH	4.500	4.500	4.500	4.500	4.500	4.500	4.500	4.500	4.500	4.500	4.500	4.500
CZ	2.800	2.800	2.100	2.500	2.200	2.600	2.900	2.900	2.800	2.900	2.700	2.400
DE	25.700	27.000	26.500	26.700	26.600	26.200	26.600	25.700	26.900	27.000	26.800	27.900
ES	20.750	28.382	23.522	25.437	25.508	24.812	24.047	28.657	28.843	30.868	25.151	23.426
FR	17.823	24.622	24.079	27.176	28.243	29.358	34.457	37.312	29.973	29.554	24.068	22.937
GR	0.800	1.000	0.800	1.000	1.100	1.200	1.100	1.000	1.000	1.200	1.200	1.200
HR	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
HU	0.941	0.986	0.971	1.106	1.309	1.257	1.308	1.417	1.286	1.222	1.078	1.145
IT	24.273	23.062	24.438	22.943	23.104	24.742	25.891	22.665	24.826	24.494	25.076	25.913
LU	0.040	0.064	0.059	0.061	0.062	0.061	0.061	0.065	0.068	0.065	0.068	0.074
ME	-	-	-	-	-	-	-	-	-	-	-	-
MK	-	-	-	-	-	-	-	-	-	-	-	-
NL	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
PL	4.604	5.268	5.011	5.657	3.489	4.277	4.499	5.973	5.389	4.842	2.871	3.459
PT	2.390	3.239	2.218	3.500	3.532	3.413	3.589	4.009	4.710	4.242	3.164	4.138
RO	2.310	2.297	2.324	2.583	2.427	2.254	2.294	2.209	2.494	1.858	2.051	1.724
RS	0.300	0.311	0.311	0.311	0.311	0.311	0.311	0.311	0.311	0.311	0.311	0.311
SI	0.203	0.291	0.249	0.211	0.052	0.058	0.158	0.185	0.239	0.268	0.163	0.047
SK	1.840	1.912	1.623	1.720	1.661	2.283	1.918	2.107	2.106	2.144	2.350	2.356
UA_W	-	-	-	-	-	-	-	-	-	-	-	-
UCTE	**118.3**	**135.0**	**128.0**	**134.7**	**133.6**	**136.9**	**143.2**	**148.9**	**145.3**	**145.0**	**131.2**	**131.1**

Tab. 33 Non Usable Capacity in 2008

RAC	Jan GW	Feb GW	Mar GW	Apr GW	May GW	Jun GW	Jul GW	Aug GW	Sep GW	Oct GW	Nov GW	Dec GW
AT	13.482	13.482	13.482	13.482	13.482	13.482	13.482	13.482	13.482	13.482	13.482	13.482
BA	2.604	2.604	2.604	2.354	2.404	2.604	2.704	2.454	2.554	2.754	2.804	2.554
BE	12.699	11.851	11.420	10.450	11.458	11.915	12.088	11.190	11.949	11.636	11.934	13.294
BG	7.105	6.869	6.863	6.097	5.860	5.554	5.194	5.984	5.256	6.487	6.591	7.118
CH	11.933	11.933	11.933	11.933	11.933	10.598	11.568	10.048	11.558	11.933	11.933	11.933
CZ	12.200	11.500	11.800	11.600	10.800	9.900	10.100	9.500	9.400	9.300	10.500	11.600
DE	91.400	91.500	93.100	92.300	87.700	86.900	86.000	89.700	86.600	90.400	92.800	93.500
ES	59.677	51.797	55.611	53.248	55.201	55.149	56.877	52.871	54.844	51.640	58.633	59.396
FR	83.948	80.346	76.332	71.313	63.174	64.952	62.369	58.821	61.688	65.742	76.798	85.699
GR	8.845	8.953	7.173	8.220	8.498	9.437	10.195	10.045	9.198	9.104	9.096	9.373
HR	3.526	3.526	3.526	3.426	3.426	3.426	3.426	3.426	3.426	3.426	3.426	3.526
HU	6.586	6.442	6.590	5.769	5.596	5.695	5.575	5.715	5.485	6.327	6.256	6.497
IT	58.676	58.685	58.818	59.722	60.450	59.520	59.811	61.375	60.504	60.951	61.392	61.462
LU	1.655	1.631	1.636	1.634	1.248	1.249	1.249	1.630	1.638	1.641	1.638	1.632
ME	0.845	0.845	0.870	0.635	0.635	0.870	0.545	0.545	0.870	0.845	0.845	0.870
MK	1.410	1.410	1.410	1.410	0.907	0.907	1.019	1.019	1.019	1.221	1.221	1.221
NL	20.997	20.641	20.259	19.779	19.735	19.942	20.539	22.364	21.445	21.819	21.909	22.756
PL	23.026	22.808	21.768	21.389	21.314	20.181	20.760	20.922	20.786	22.079	24.196	25.531
PT	11.046	9.568	10.245	9.168	8.854	9.308	9.621	9.169	8.431	9.044	10.301	9.847
RO	11.052	10.675	11.148	10.270	10.388	10.004	9.650	9.825	8.929	10.259	10.764	11.480
RS	6.755	6.714	6.200	6.069	4.838	4.381	5.855	5.281	5.449	6.263	6.120	6.818
SI	2.096	2.101	2.237	2.358	2.321	2.398	2.286	2.271	2.195	2.230	2.423	2.539
SK	4.753	4.504	4.866	3.786	4.637	3.785	4.283	3.685	3.858	3.655	4.177	4.171
UA_W	-	-	-	-	-	-	-	-	-	-	-	-
UCTE	**456.3**	**440.4**	**439.9**	**426.4**	**414.9**	**412.2**	**415.2**	**411.3**	**410.6**	**422.2**	**449.2**	**466.3**

Tab. 34 Reliably Available Capacity in 2008

RC w/o X	Jan GW	Feb GW	Mar GW	Apr GW	May GW	Jun GW	Jul GW	Aug GW	Sep GW	Oct GW	Nov GW	Dec GW
AT	4.682	4.906	4.918	5.480	5.420	5.544	5.533	5.410	5.347	5.273	4.608	4.801
BA	0.980	0.977	1.016	0.907	0.995	1.187	1.239	0.996	1.050	1.244	1.203	0.932
BE	0.209	- 0.627	- 0.970	- 1.548	0.157	0.575	0.934	- 0.008	0.492	- 0.121	0.616	1.230
BG	0.747	0.919	1.767	1.451	1.809	1.363	0.965	1.682	1.138	2.109	1.223	1.771
CH	2.323	2.585	3.278	2.862	3.310	2.182	3.625	1.379	2.844	3.475	2.672	2.454
CZ	2.585	2.101	2.590	2.656	2.269	2.123	2.413	1.818	1.125	1.152	1.494	2.904
DE	18.700	21.500	24.700	24.400	22.100	21.800	21.200	23.900	20.000	21.900	24.100	25.300
ES	19.897	14.024	24.305	18.473	20.938	20.445	20.530	20.146	19.766	18.110	22.858	19.529
FR	9.480	8.946	5.151	4.114	6.243	8.451	4.900	7.594	4.233	6.236	8.390	4.650
GR	1.174	1.064	1.187	1.640	1.229	0.706	1.418	1.508	1.669	2.283	1.797	2.172
HR	1.031	0.970	1.099	1.170	1.242	1.236	1.142	1.116	1.239	1.285	1.077	0.986
HU	0.482	0.594	0.836	0.222	0.221	0.136	0.056	1.483	- 0.103	0.809	0.492	1.057
IT	6.740	6.840	10.496	13.027	13.614	11.028	8.313	23.614	14.199	14.489	15.200	14.362
LU	0.641	0.713	0.610	0.792	0.285	0.291	0.340	0.764	0.695	0.793	0.882	0.908
ME	0.217	0.222	0.279	0.173	0.173	0.401	0.025	0.010	0.361	0.361	0.317	0.328
MK	0.125	0.212	0.137	0.414	0.025	- 0.002	0.063	0.061	0.166	0.302	0.178	0.133
NL	3.806	4.696	4.029	4.296	4.633	5.318	5.722	6.942	6.832	6.774	5.953	6.462
PL	2.926	2.648	1.749	2.331	3.428	2.353	3.460	3.024	1.950	3.422	4.678	5.926
PT	3.630	2.370	3.193	2.600	2.175	2.613	2.632	3.586	1.821	2.645	3.301	2.138
RO	3.190	2.953	4.093	3.202	3.927	3.234	2.846	3.193	2.250	3.696	3.518	4.414
RS	0.609	0.813	0.867	0.850	0.691	0.233	5.855	1.211	0.692	1.767	0.777	1.115
SI	0.269	0.263	0.487	0.659	0.616	0.683	0.616	0.567	0.477	0.474	0.663	0.845
SK	0.633	0.513	0.971	0.150	0.991	0.325	0.910	0.317	0.210	0.030	0.246	0.408
UA_W	-	-	-	-	-	-	-	-	-	-	-	-
UCTE	**85.1**	**80.2**	**96.8**	**90.3**	**96.5**	**92.2**	**94.7**	**110.3**	**88.5**	**98.5**	**106.2**	**104.8**

Tab. 35 Remaining Capacity without Exchanges in 2008

RM w/o X	Jan GW	Feb GW	Mar GW	Apr GW	May GW	Jun GW	Jul GW	Aug GW	Sep GW	Oct GW	Nov GW	Dec GW
AT	4.328	4.518	4.647	4.908	5.293	5.237	5.236	5.337	4.947	4.800	4.086	4.257
BA	0.529	0.660	0.744	0.665	0.786	1.012	1.135	0.831	0.738	0.987	0.877	0.437
BE	- 0.947	- 1.797	- 1.422	- 2.092	- 0.432	- 0.209	0.168	- 0.650	0.065	- 0.544	- 0.958	0.150
BG	0.071	0.056	0.965	0.632	1.104	0.831	0.533	1.209	0.080	0.923	0.217	0.116
CH	2.123	2.385	3.078	2.662	3.110	1.982	3.425	1.179	2.644	3.275	2.472	2.254
CZ	2.285	1.501	2.190	2.356	2.169	1.623	2.013	1.618	0.825	0.452	0.694	1.904
DE	14.600	16.100	19.600	20.800	17.800	18.100	18.700	21.600	16.000	18.700	17.600	19.100
ES	18.065	11.315	15.102	15.839	19.830	15.314	17.019	13.826	16.411	13.819	16.610	16.476
FR	5.100	8.944	1.946	2.221	5.190	6.573	3.169	5.694	2.766	4.199	3.725	1.476
GR	0.059	0.205	- 0.531	0.547	-	- 0.613	- 0.022	0.450	0.226	1.548	1.136	0.363
HR	0.568	0.570	1.099	0.852	1.049	0.785	0.789	1.116	0.863	0.882	0.552	0.517
HU	0.198	0.119	0.455	- 0.115	- 0.268	- 0.557	- 0.382	- 0.284	- 0.481	0.207	- 0.032	0.239
IT	5.482	5.726	7.363	10.942	10.758	4.228	4.775	10.262	7.773	11.921	10.306	9.235
LU	0.601	0.595	0.584	0.602	0.238	0.258	0.258	0.707	0.682	0.640	0.631	0.678
ME	0.154	0.160	0.219	0.127	0.127	0.354	- 0.027	- 0.044	0.310	0.313	0.264	0.274
MK	0.125	0.212	0.137	0.414	0.025	- 0.002	0.063	0.061	0.166	0.302	0.178	0.133
NL	3.806	3.996	4.029	3.596	3.933	4.618	5.022	6.242	6.132	6.074	5.253	5.762
PL	- 0.089	1.258	0.104	1.267	3.171	1.806	2.516	2.015	0.506	0.994	2.381	3.898
PT	2.429	1.559	2.497	1.847	1.846	1.832	1.994	2.224	1.308	1.631	1.933	0.883
RO	2.463	2.239	3.117	2.447	3.372	2.551	2.334	2.635	1.425	2.496	2.732	3.435
RS	0.609	0.813	0.867	0.850	0.691	0.233	5.855	1.211	0.692	1.767	0.777	1.115
SI	0.106	0.124	0.271	0.524	0.523	0.534	0.399	0.469	0.267	0.291	0.448	0.662
SK	0.412	0.243	0.757	- 0.115	0.866	0.122	0.674	0.148	- 0.024	- 0.308	- 0.069	- 0.041
UA_W	-	-	-	-	-	-	-	-	-	-	-	-
UCTE	**63.1**	**61.5**	**67.8**	**71.8**	**81.2**	**66.6**	**75.6**	**77.9**	**64.3**	**75.4**	**71.8**	**73.3**

Tab. 36 Remaining Margin without Exchanges in 2008

Imports - Exports	Jan GW	Feb GW	Mar GW	Apr GW	May GW	Jun GW	Jul GW	Aug GW	Sep GW	Oct GW	Nov GW	Dec GW
AT	0.390	0.559	- 0.837	- 1.039	- 1.034	- 1.051	- 2.340	- 1.867	- 0.530	- 0.632	2.429	- 0.054
BA	- 0.250	- 0.264	- 0.160	- 0.321	- 0.302	- 0.456	- 0.239	- 0.068	- 0.312	- 0.249	- 0.293	- 0.214
BE	1.929	2.374	2.782	2.252	1.209	1.480	1.119	1.913	0.665	1.241	1.332	0.457
BG	- 0.054	- 0.008	- 0.750	- 0.856	- 0.567	- 0.708	- 0.750	- 0.642	- 0.553	- 0.948	- 0.939	- 0.615
CH	1.187	0.188	- 0.160	- 1.041	- 2.140	- 2.090	- 3.460	- 1.921	- 4.132	- 1.054	0.737	0.098
CZ	- 1.919	- 1.279	- 1.704	- 1.650	- 0.812	- 0.966	- 1.138	- 0.737	- 0.006	0.067	0.007	- 1.483
DE	- 4.600	- 2.000	- 5.100	- 2.400	- 0.800	4.000	3.300	0.400	2.300	- 3.400	- 7.400	- 2.200
ES	- 1.018	- 0.946	- 2.286	- 2.226	- 1.355	- 1.599	- 1.989	- 1.023	- 1.472	- 1.568	- 1.784	- 1.972
FR	- 5.477	- 6.708	- 1.568	- 1.377	- 4.651	- 6.412	- 4.109	- 5.762	- 1.647	- 2.306	- 2.791	- 1.135
GR	0.231	0.910	1.111	0.609	0.310	0.903	0.654	1.043	0.665	0.473	0.506	0.560
HR	0.646	0.857	0.957	0.758	0.693	0.701	0.855	0.954	0.834	0.904	1.065	0.616
HU	0.856	0.913	0.861	0.837	1.153	0.948	1.027	- 0.066	0.822	0.439	0.594	0.472
IT	6.213	6.289	6.104	6.628	5.543	2.690	5.074	2.303	- 0.331	6.213	6.410	6.086
LU	0.426	0.364	0.545	0.274	0.793	0.813	0.855	0.529	0.616	0.261	0.221	0.460
ME	0.015	0.096	0.075	- 0.019	0.323	0.055	0.340	0.381	0.052	0.300	0.045	0.089
MK	0.401	0.310	0.402	0.243	0.338	0.435	0.429	0.437	0.373	0.280	0.257	0.389
NL	1.470	1.583	0.987	0.713	2.135	2.133	2.152	2.235	1.361	0.736	1.467	0.377
PL	- 0.136	- 0.203	0.037	0.260	- 0.233	- 0.219	0.564	0.036	0.099	0.020	0.139	- 0.477
PT	0.387	0.818	1.386	1.395	0.692	0.666	1.073	0.343	0.948	1.082	1.086	0.981
RO	- 0.708	- 1.014	- 0.835	- 0.820	- 0.366	- 0.442	- 0.503	- 0.339	- 0.248	- 0.707	- 0.157	- 0.581
RS	0.455	0.389	0.166	0.105	0.012	- 0.069	- 0.411	- 0.008	0.155	0.081	0.253	1.067
SI	- 0.096	0.075	- 0.264	- 0.334	- 0.399	- 0.448	- 0.349	- 0.246	- 0.301	- 0.091	- 0.226	- 0.372
SK	0.178	0.151	0.083	0.469	- 0.242	0.275	0.157	0.141	0.604	0.643	0.314	0.252
UA_W	-	-	-	-	-	-	-	-	-	-	-	-
UCTE	**0.526**	**3.454**	**1.832**	**2.460**	**0.300**	**0.639**	**2.311**	**- 1.964**	**- 0.038**	**1.785**	**3.272**	**2.801**

Tab. 37 Exchange Balance (Import-Export) in 2008

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