European Network of
Transmission System Operators
for Electricity

SYSTEM ADEQUACY RETROSPECT 2009

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GENERAL INTRODUCTION

ABOUT ENTSO-E

ENTSO-E is a pan-European association with 42 members - 42 TSOs from 34 countries. It is an association which continues to successfully help co-ordinate TSO work following its six predecessor associations[1]. Within ENTSO-E, the different committees, working groups and task forces have transferred their work into the new ENTSO-E structure where the well-established work will continue, but will also be enhanced through the new pan-European perspective of ENTSO-E.

ENTSO-E was established in line with EU legislation (Third legislative energy package). More precisely the ground for establishing ENTSO-E is Regulation (EC) No 714/2009 on conditions for access to the network for cross-border exchanges in electricity ,replacing Regulation (EC) No 1228/2003.

According to the above-mentioned legislation the main purpose of ENTSO-E is

- to pursue the co-operation of the European TSOs both on the pan-European and regional level;
- to promote the TSOs' interests; and
- to have an active and important role in the European rule-setting process in compliance with EU legislation.

The main objective of ENTSO-E is to promote the reliable operation, optimal management and sound technical evolution of the European electricity transmission system in order to ensure security of supply and to meet the needs of the Internal Energy Market. ENTSO-E activities include:

- Coordination of the development of an economic, secure and environmentally sustainable transmission system. The emphasis lies in the coordination of cross-border investments and meeting the European security and quality of supply requirements, while the implementation of investments lies with the TSOs;
- Development of technical codes for the interoperability and coordination of system operation in order to maintain the reliability of the power system and to use the existing resources efficiently;
- Development of network related market codes in order to ensure non-discriminatory access to the grid and to facilitate consistent European electricity market integration;
- Monitoring and, where applicable, enforcing the compliance of the implementation of the codes;
- Monitoring network development, promotion of R&D activities relevant for the TSO industry and promotion of public acceptability of transmission infrastructure;

[1] ATSOI (Association of the Transmission System Operators of Ireland); BALTSO (Baltic Transmission System Operators); ETSO (European Transmission System Operators); NORDEL (Association of TSOs from Norway, Finland, Denmark and Sweden); ENTSO-E (Union for the Coordination of the Transmission of Electricity); UKTSOA (UK Transmission System Operators Association)

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- Taking positions on issues that can have an impact on the development and operation of the transmission system or market facilitation;
- Enhancing communication and consultation with stakeholders and transparency of TSO operations.

ABOUT THE SYSTEM ADEQUACY RETROSPECT REPORT

This ENTSO-E System Adequacy Retrospect 2009 report aims at providing stakeholders in the European electricity market with an overview of generation, demand and their adequacy in the ENTSO-E Power System in the year 2009, with a focus on the power balance, margins and the generation mix.

This System Adequacy Retrospect 2009 analysis is the first one done under ENTSO-E's umbrella and can serve as a tool for monitoring processes performed by ENTSO-E members as an input to the forecast analysis of system adequacy. ENTSO-E published its latest adequacy forecast report in January 2010. **ENTSO-E's System Adequacy Forecast 2010-2025** is available on the ENTSO-E website[2].

SHORT NOTICE ABOUT THIS REPORT´S BACKGROUND

As this System Adequacy Retrospect (hereafter "SAR") report is a new report for countries from outside the former UCTE perimeter, the data collection process was new for these data correspondents. This could be one of the reasons why complete data sets are missing for some of these countries (see paragraph 1.3). Furthermore some other countries had difficulties to provide all requested data. These missing data influence the whole evaluation process and assessment and should be kept in mind when reading the report.

Although this report focuses on the year 2009, it is very interesting to compare outcomes for 2009 with results from previous years. The collection of data was, however, limited to the years 2008 and 2009 for former non-UCTE countries, since the collected data for one year is extensive and the way of entering these data into the ENTSO-E database is quite demanding. Therefore, given the previous mentioned background and also considering that this is only the first ENTSO-E SAR report, some outcomes and conclusions might may be of limited robustness.

[2] http://www.entsoe.eu/fileadmin/user_upload/_library/publications/entsoe/outlookreports/SAF_2010-2025_final.pdf

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EXECUTIVE SUMMARY

The reader should bear in mind that the assessments, evaluations and outcomes/results in this System Adequacy Retrospect 2009 can be influenced by the following facts:

- Lack of data for 2009 and 2008 for some countries;
- Lack of data for new hydro categories and for other renewable energy sources in case of some countries in relation to a new methodology introduced for this SAR 2009.

For more information see the General Introduction and Chapter 1.3.

ENERGY BALANCE

	2008	2009	CHANGE 2009 TO 2008	
			ABSOLUTE VALUE (TWh)	%
Total Generation	**3.249,248**	**3.144,173**	**-105,075**	**-3%**
Fossil Fuels	1.718,868	1.623,203	-95,665	-6%
Nuclear Power	856,726	825,531	-31,195	-4%
Total Non-renewable Hydro Power	63,289	79,091	15,802	25%
Renewable Energy (incl. renewable Hydro)	521,144	589,270	68,126	13%
Not identifiable energy sources	12,064	10,914	-1,150	-10%
Imports	343,090	336,478	-6,612	-2%
Exports	333,863	333,956	93	0,028%
Exchanges Balance	**9,227**	**2,522**	**-6,705**	**-73%**
Pumping	41,406	39,875	-1,531	-4%
Consumption	**3.217,069**	**3.106,819**	**-110,250**	**-3%**

ENTSO-E Energy Summary (TWh)

The worldwide financial and economic crisis that started in 2008 has still a quite important influence on the consumption of electricity in ENTSO-E countries. Its influence was significant in 2008 (mainly in the second half of 2008). Due to the continuation of the crisis in 2009, a similar but bigger effect on the ENTSO-E electricity consumption was expected for 2009.

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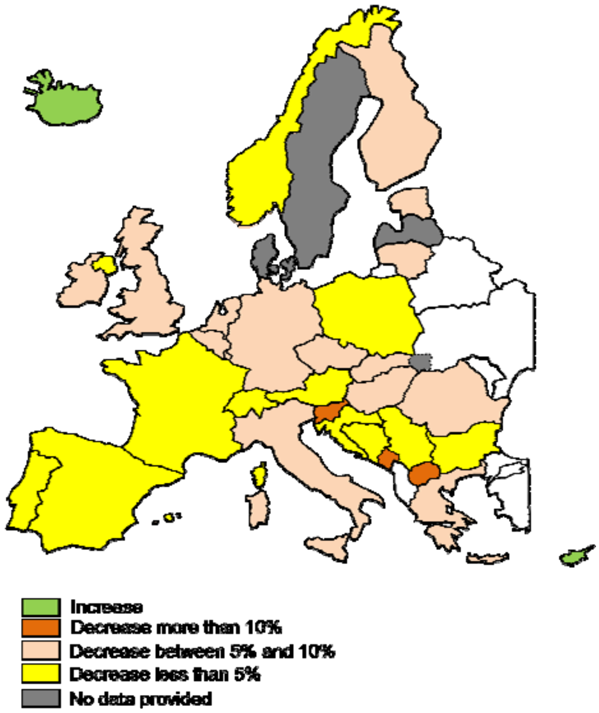
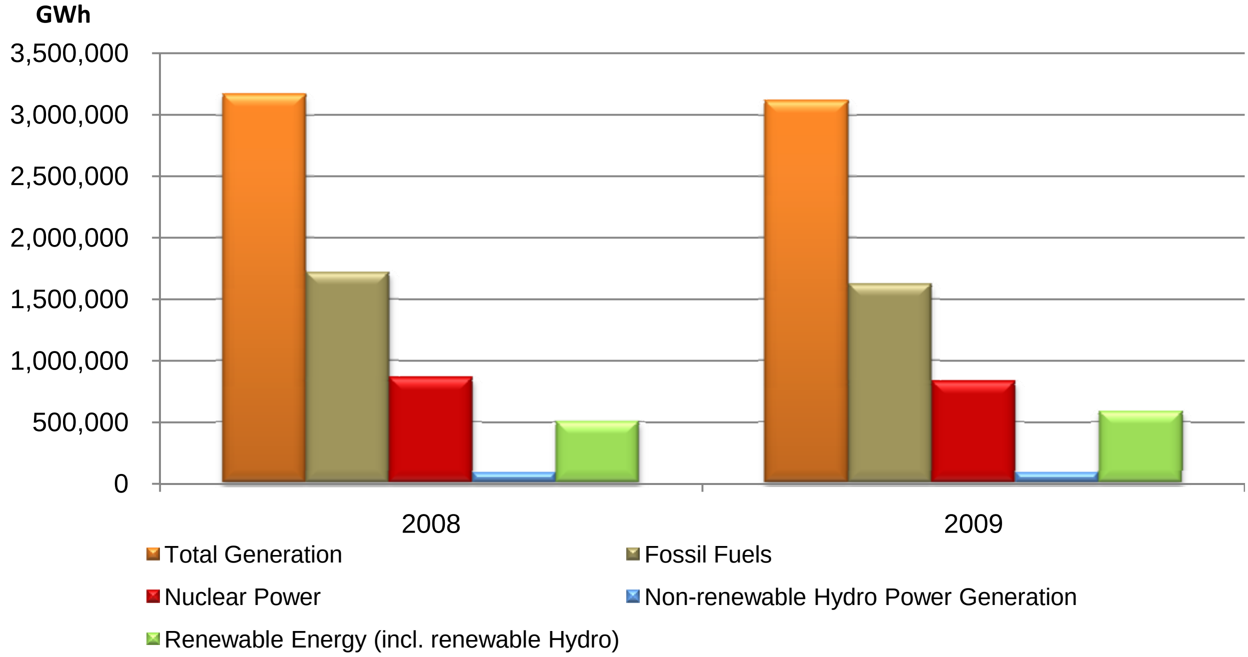


Total consumption growth per country

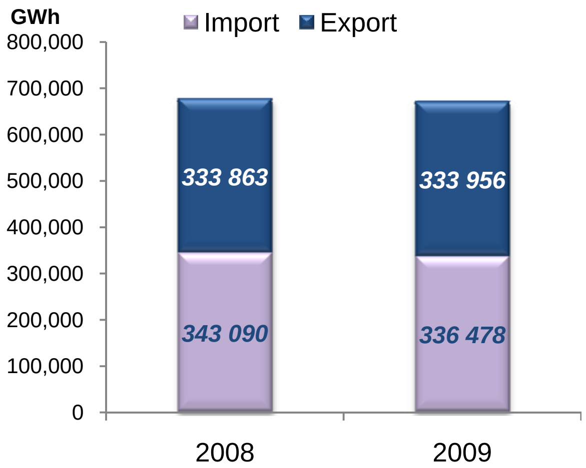
The decrease of electricity consumption in winter was lower than in the summer period in 2009. A revival of the economy in the ENTSO-E countries in the second half of the year 2009, could have resulted in an electricity consumption that started to increase. Although this increase is probably more temperature-related. Winter electricity consumption was in 2008 higher than in 2009 even with the average winter temperatures in 2009 in the majority of ENTSO-E countries were lower. For more information see chapter 2.1.

The total ENTSO-E generation in 2009 was about 3% lower than in 2008. At the same time the generation of each type of fuel decreased except the generation from renewable energy sources, where an increase of about 12% was observed.

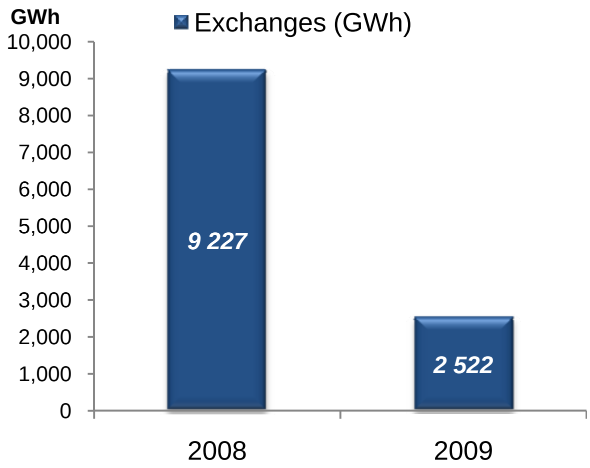


ENTSO-E generation overview

Most of the energy was produced through fossil fuels (coal, oil, etc.), namely 52%. The second most used fuel was nuclear (26%) followed by renewable energy sources (19%). Non renewable hydro power generation covered 3% of the total generation. The rest is provided by a category covering not clearly identifiable energy sources (0.05%). Very similar numbers were notable in 2008. For more information see chapter 2.2.



ENTSO-E Imports/Exports summary



ENTSO-E Exchanges Balance summary

ENTSO-E was a net[3] importing system both in 2008 and in 2009. Net Energy flows (Imports minus Exports) of the whole ENTSO-E system decreased from 9 227 GWh in 2008 down to 2 522 GWh in 2009, i.e. decrease of 73%. Imports were higher in 2008 than in 2009 (2%); for exports the situation was the opposite (decrease of 0.03%). The main net exporting countries

[3] „net export"/„net import" means that the difference between Imports and Exports was in favour of Export and Import respectively.

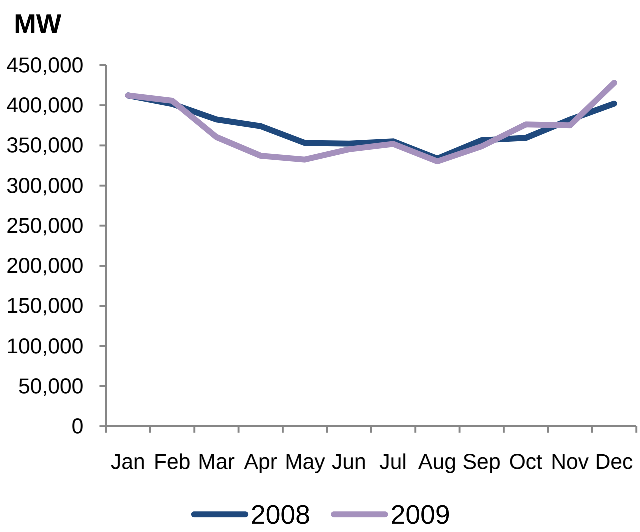
were France (25.7 TWh), Germany (14.3 TWh), Czech Republic (13.6 TWh); the main net importing countries were for example Italy (44.8 TWh) and Finland (12 TWh). For more information see chapter 2.3.

POWER BALANCE

	2008	2009	Difference between 2009 and 2008	
			ABSOLUTE VALUE (MW)	%
Net Generating Capacity	799 771	839 233	39 461	5%
Reliable Available Capacity	592 275	610 772	18 497	3%
Load	402 027	428 097	26 070	6%
Exchanges Balance Capacity	344	2 083	1 739	506%

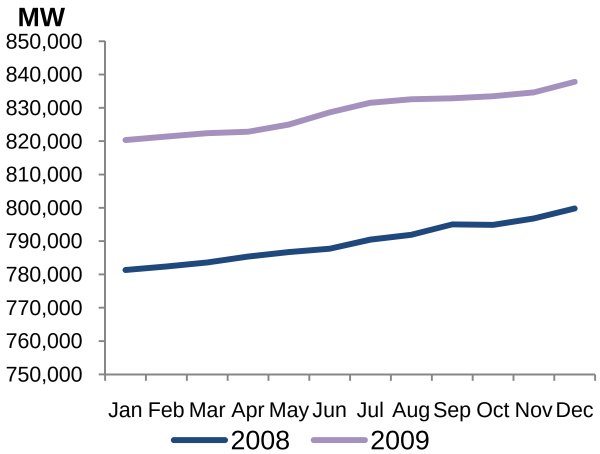
ENTSO-E Power Balance Summary (MW)

The load of 2009 follows more or less the curve of 2008. The deviations between 2008 and 2009 tend towards positive values in the winter months (December, October, January and February). Exceptions for the winter period were November and March when a decrease of the load between 2009 and 2008 was recorded. A decrease or a minimal increase of load in November 2009 is visible in a majority of ENTSO-E countries, e.g. France, the Netherlands and Poland, etc. A decrease of the load between February and March is characteristic for all ENTSO-E countries (except for Luxemburg) and could be caused e.g. by the extremely mild temperatures in this month. During summer months, especially during April and May the Load in 2009 was lower than in 2008 (possibly the influence of financial crisis at the beginning of 2009).



Load comparison between 2008 and 2009

Austria, Switzerland, France, Croatia, Cyprus, Iceland, Great Britain and Portugal recorded a new absolute historical Peak Load value in 2009. For more information see chapter 3.2.



ENTSO-E Net Generating Capacity

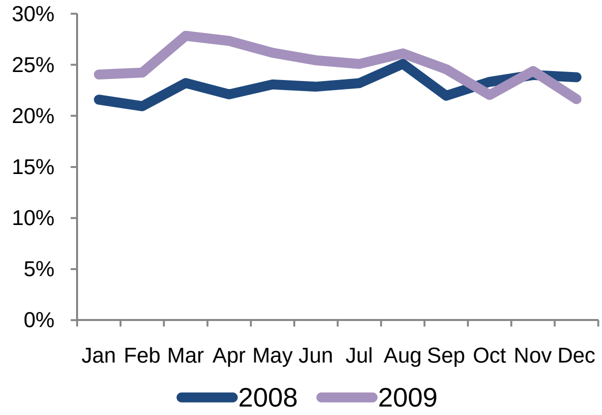
Net Generating Capacity (NGC) was increasing during the whole of 2009 without significant decreases. Crucial for the ENTSO-E generating capacity mix in 2009 were the fossil fuels with more than 51 % followed by renewable energy sources (more than 23% including renewable hydro power plants), nuclear power (15%) and hydro power plants considered as non-renewable energy source (about 10%). Very similar values were observable also in 2008. For more information see chapter 3.1.

Minimum values of Reliably Available Capacity (RAC) in 2009 are reported during the summer months (May and August), when Unavailable Capacity is at the highest level. Although in absolute values the RAC in each month of 2009 was higher than in 2008 its share in NGC was lower. Probably this is caused by the fact that the Unavailable Capacity was higher as well, namely its part related to maintenance and overhauls. For more information see chapters 3.4 and 3.5.

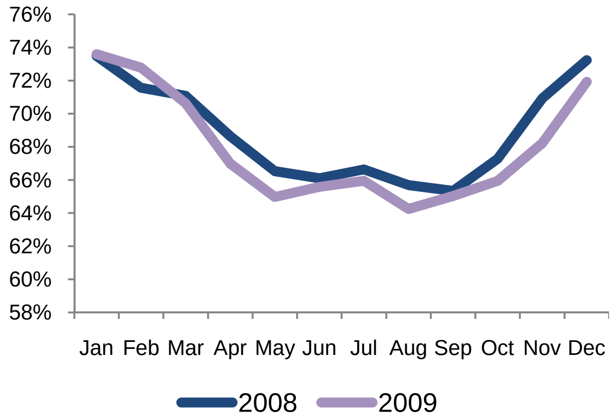
GENERATION ADEQUACY

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2008	168 652	163 935	181 983	173 616	181 593	180 052	183 381	198 712	174 603	185 493	191 231	190 248
2009	198 306	200 087	230 158	226 691	217 519	211 950	210 144	218 983	206 014	185 464	205 295	182 675

ENTSO-E Remaining Capacity Overview (MW)



ENTSO-E Remaining Capacity as a part of NGC



ENTSO-E Reliable Available Capacity as a part of NGC

Remaining capacity (with consideration of importing/exporting capacity) was during the whole year 2009 higher than in 2008 except for the months of October and December when RC was lower. The reason could have been the higher load in these two months comparing to 2008 and by the lower RAC.

Number of reference points with negative RC in 2009 (w/o exchanges)

The whole year 2009 this value was positive and higher than 5 % of NGC, i.e. the ENTSO-E system did not rely on imports of electricity from third countries and had enough generating capacity to cover its demand at any time during the year. For more information see chapter 3.6.

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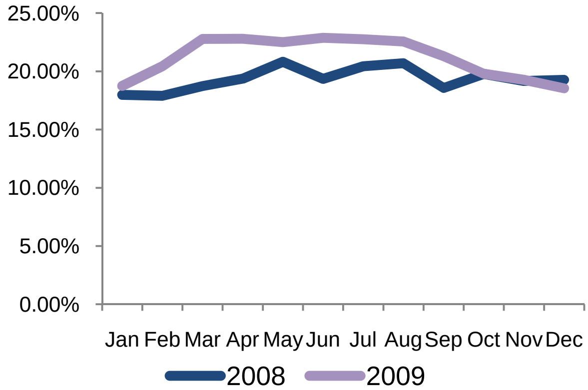

ENTSO-E Remaining Margin as a part of NGC

1. INTRODUCTION

1.1 METHODOLOGY SUMMARY AND DEFINITIONS

ENTSO-E SAR Report is published by the middle of every year (Y) with a retrospect of the year before the publishing date (Y-1).

The data and the methodology for the system adequacy analysis in this System Adequacy Retrospect report are described in more detail in the ENTSO-E System Adequacy Methodology document downloadable on the ENTSO-E 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 standard conditions. System adequacy is analysed mainly through generation adequacy.

Analyses in this report are made particularly for ENTSO-E as a whole and for individual countries. The list of countries together with list of data correspondents is reported in Table 1.1 below.

Country	*Name*	*Company*	*E-mail*
AT	E. Reittinger-Hubmer	VERBUND APG	ernst.reittinger-hubmer@verbund.at
AT	J. Naber	VERBUND APG	johannes.naber@verbund.at
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BA	M. Dzizic	ISO BiH	m.dzizic@nosbih.ba
BE	V. Illegems	Elia	viviane.illegems@elia.be
BE	H. Lamberts	Elia	Hans.Lamberts@elia.be
BG	A. Georgiev	ESO EAD	georgiev@ndc.bg
CH	A. Mondovic	Swissgrid	alexander.mondovic@swissgrid.ch
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CZ	Z. Fucik	CEPS	fucik@ceps.cz
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DK	C.N. Rasch	Energinet	CHR@Energinet.dk
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GR	A. Dagoumas	HTSO/DESMIE	adagoumas@desmie.gr
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HR	S. Boronjek	HEP-OPS	slavko.boronjek@hep.hr
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HU	D. Gálócsy	MAVIR ZRt.	galocsy@mavir.hu
IT	D. Camuffo	Terna S.p.A.	dionisio.camuffo@terna.it
IT	P. Leone	Terna S.p.A.	piero.leone@terna.it

[4] http://www.entsoe.eu/fileadmin/user_upload/_library/publications/ce/UCTE_System_Adequacy_Methodology.pdf

LU	R. Gengler	CEGEDEL Net S.A.	roby.gengler@creos.net
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PT	M. Jerónimo	REN	miguel.jeronimo@ren.pt
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RO	A. Ionescu	Transelectrica	amada.ionescu@transelectrica.ro
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SI	D. Novakovic	ELES	dragan.novakovic@eles.si
SK	S. Dudášik	SEPS a.s.	dudasik_stanislav@sepsas.sk
SK	P. Pekárova	SEPS a.s.	pekarova_petra@sepsas.sk
UK	S. Thompson	National Grid	steven.thompson@uk.ngrid.com
UK	P. Auckland	National Grid	paul.auckland@uk.ngrid.com
UK	K. Dan	National Grid	keith.dan@uk.ngrid.com
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UK	R. Skillen	SONI	raymond.skillen@soni.ltd.uk
UK	A. Henning	SONI	adrian.henning@soni.ltd.uk
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IE	M. Norton	EirGrid	mark.norton@eirgrid.com
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LV	S. Mukane	Latvenergo	Svetlana.Mukane@latvenergo.lv
LT	R. Platakiene	Litgrid	regina.platakiene@litgrid.eu
LT	A. Zasytis	Litgrid	andrius.zasytis@litgrid.eu
LT	V. Tamasauskaite	Litgrid	vaida.tamasauskaite@litgrid.eu
EE	K. Romeo	ELERING	kristel.romeo@elering.ee
EE	R. Attikas	ELERING	raivo.attikas@elering.ee
CY	C. Hadjilaou	DSM	chadjilaou@dsm.org.cy
CY	G. Christofi	DSM	gchristofi@dsm.org.cy
UA	I. Saluk	NPC Ukrenergo	saluk@wps.com.ua

Table 1.1: List of data correspondents

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 two levels:

- Individual countries
- The whole of ENTSO-E.

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 evolution of the results, similar reference points are specified for each month and from one report to another.

Data collected for the hour H are the average value from the hour H-1 to the hour H. A single monthly reference point is defined in the retrospect reports. It is the 3rd Wednesday of each month on the 11th hour (from 10:00 CEST to 11:00 CEST) in summer and (10:00 CET to 11:00 CET) in winter.

As much as possible, power data used in the retrospect power balance are based on hourly average values of the actual metering at every reference point.

Load

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)

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

It 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)

RAC on a power system is the difference between NGC and Unavailable Capacity. RAC is the part of NGC actually available to cover the load at a reference point.

Remaining Capacity (RC)

RC on a power system is the difference between RAC and Load. RC is the part of NGC left on the system to cover any unexpected load variation and unplanned outages at a reference point.

Margin Against Peak Load

Margin Against Peak Load is the difference between Load at the reference point and the peak load over the period the reference point 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 (RM)

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 Figure 1.1

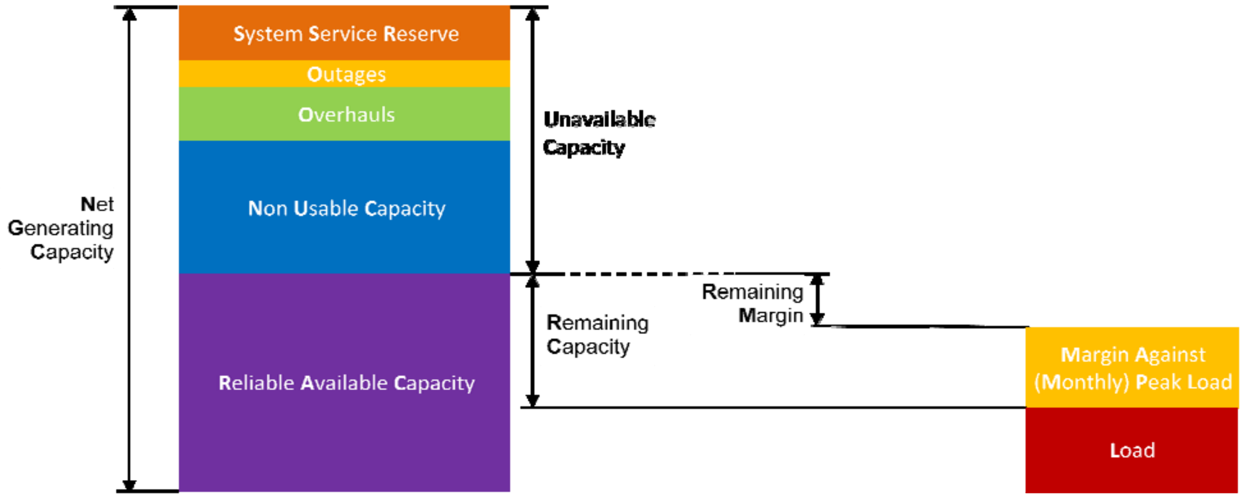

Figure 1.1: Generation adequacy analysis

1.2 ADEQUACY ASSESSMENT

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.

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.

1.3 SYSTEM ADEQUACY RETROSPECT DATA

As it was mentioned in the General Introduction chapter this SAR report is completely new for countries which were not a member of the former UCTE. For data correspondents from these countries it meant a completely new request for a broad and extensive range of different data which had to be entered into ENTSO-E database in a relatively short time. Furthermore as this is a report reflecting on 2009, the legitimate request is limited to data related to that year. However to be able to assess some evolutions in power and energy balance and in generation adequacy in ENTSO-E system, it was necessary to collect at least data for 2008 as well.

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The above mentioned facts could be the reason that some of the countries did not provide data at all or they were only able to provide data in a limited set. The following table shows the data delivery status (Table 1.2).

Country	SAR Energy data		SAR Power data		SAR Peak Load	
	2008	2009	2008	2009	2008	2009
AT	✓	✓	✓	✓	✓	✓
BA	✓	✓	✓	✓	✓	✓
BE	✓	✓	✓	✓	✓	✓
BG	✓	✓	✓	✓	✓	✓
CH	✓	✓	✓	✓	✓	✓
CY	✓	✓	✓	✓	✓	✓
CZ	✓	✓	✓	✓	✓	✓
DE	✓	✓	✓	✓	✓	✓
DK	✗	✓	✗	✓	✗	✓
EE	✓	✓	✗	✓	✓	✓
ES	✓	✓	✓	✓	✓	✓
FI	✓	✓	✓	✓	✓	✓
FR	✓	✓	✓	✓	✓	✓
GB	✓	✓	✓	✓	✓	✓
GR	✓	✓	✓	✓	✓	✓
HR	✓	✓	✓	✓	✓	✓
HU	✓	✓	✓	✓	✓	✓
IE	✓	✓	✓	✓	✓	✓
IS	✓	✓	✓	✓	✓	✓
IT	✓	✓	✓	✓	✓	✓
LT	✓	✓	✓	✓	✓	✓
LU	✓	✓	✓	✓	✓	✓
LV	✗	✓	✗	✓	✗	✗
ME	✓	✓	✓	✓	✓	✓
MK	✓	✓	✓	✓	✓	✓
NI	✓	✓	✓	✓	✓	✓
NL	✓	✓	✓	✓	✓	✓
NO	✓	✓	✓	✓	✓	✓
PL	✓	✓	✓	✓	✓	✓
PT	✓	✓	✓	✓	✓	✓
RO	✓	✓	✓	✓	✓	✓
RS	✓	✓	✓	✓	✓	✓
SE	✗	✗	✗	✗	✗	✗
SI	✓	✓	✓	✓	✓	✓
SK	✓	✓	✓	✓	✓	✓
UA_W	✗	✗	✗	✗	✗	✗

Table 1.2: Data delivery status

Significant differences between 2008 and 2009 in the reported graphs, more specific significant drops are increases of values between December 2008 and January 2009, probably result from missing data for some ENTSO-E countries.

Another change only relevant for former UCTE member countries is associated with the methodology regarding hydro and renewable energy sources (other than hydro) categories. In former SAR reports the category of renewable energy sources (other than hydro) (RES) consisted only of wind and solar and other not attributable renewable energy sources. According to the new methodology and division of RES, this category includes also:

- Hydro power plants (HPP) which can be considered as renewable (i.e. run-of-river HPP and pure storage HPP). Hydro power plants were assessed separately in category Hydro in former SAR reports published before 2010.
- Biomass power plants (which were in previous UCTE SAR reports counted as non attributable RES or in mixed fuels).

This change resulted in an adaptation of thedata collection for 2009 and it was necessary to respect it also in database for 2008. Therefore each data correspondent from the former UCTE countries was asked to check and correct data for her/his country accordingly. However not everybody did these corrections, mostly due to the data unavailability.

All before mentioned changes and facts have to be beard in mind when reading this SAR 2009 report.

2. ENERGY BALANCE

	2008	2009	CHANGE 2009 TO 2008	
			ABSOLUTE VALUE (TWh)	%
Total Generation	**3.249,248**	**3.144,173**	**-105,075**	**-3%**
Fossil Fuels	1.718,868	1.623,203	-95,665	-6%
Nuclear Power	856,726	825,531	-31,195	-4%
Total Non-renewable Hydro Power	63,289	79,091	15,802	25%
Renewable Energy (incl. renewable Hydro)	521,144	589,270	68,126	13%
Not identifiable energy sources	12,064	10,914	-1,150	-10%
Imports	343,090	336,478	-6,612	-2%
Exports	333,863	333,956	93	0,028%
Exchanges Balance	**9,227**	**2,522**	**-6,705**	**-73%**
Pumping	41,406	39,875	-1,531	-4%
Consumption	**3.217,069**	**3.106,819**	**-110,250**	**-3%**

Table 2.1: ENTSO-E Energy Summary (TWh)

2.1 ENERGY CONSUMPTION

Consumption of electricity was affected by the financial and economic crisis which started at the end of 2008. Its consequences were firstly visible in 2008 but 2009 was expected to be influenced much more. These expectations are confirmed in the next figure 2.1.

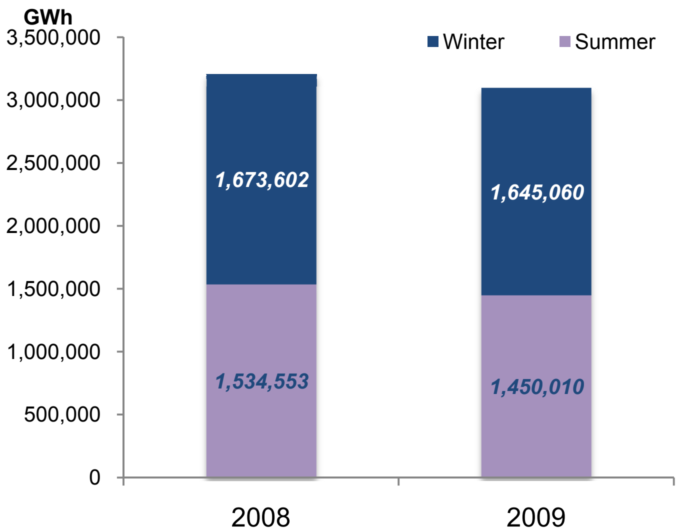
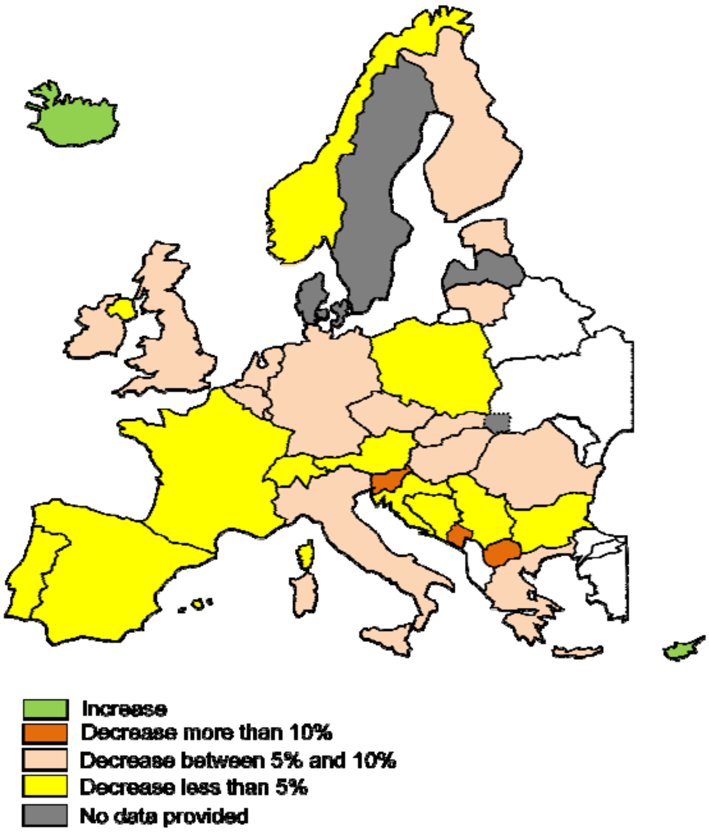


Figure 2.1: Summer/Winter Consumption

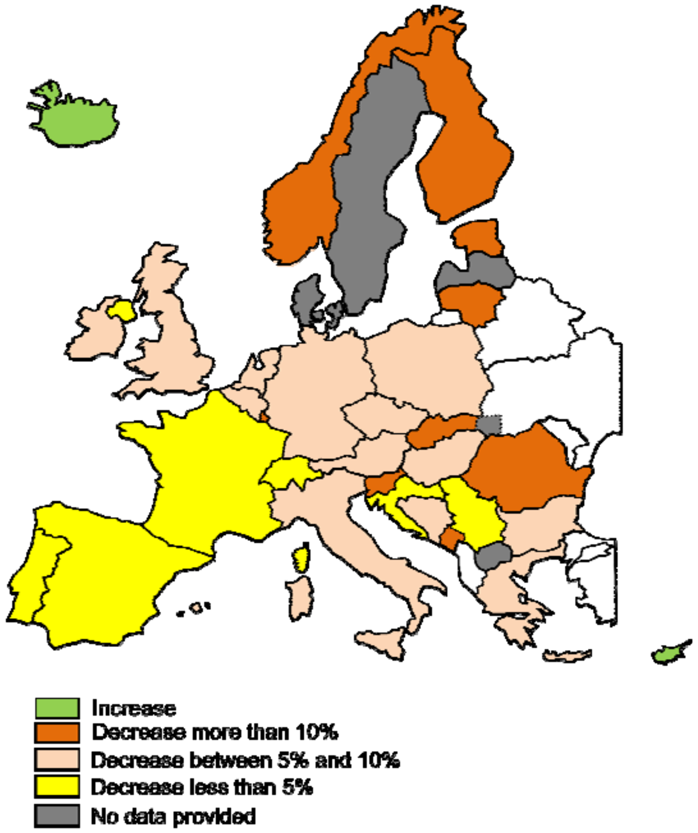
It is clearly visible that the total consumption in the ENTSO-E decreased from about 3217 TWh in 2008 down to 3107 TWh in 2009 which makes a decrease of almost 3%. Summer consumption decreased almost 6% and winter consumption almost 2%.

The only countries with an increasing consumption were Iceland (+2.3%; 1.8% in summer and 6.5% in winter) and Cyprus (+1.6%; 2.2% in summer and 1% in winter). In the rest of the countries the total consumption decreased. The highest decreases were reported by Montenegro (33.9%), Former Yugoslavian Republic of Macedonia (11.8%), and Slovenia (10.9%).

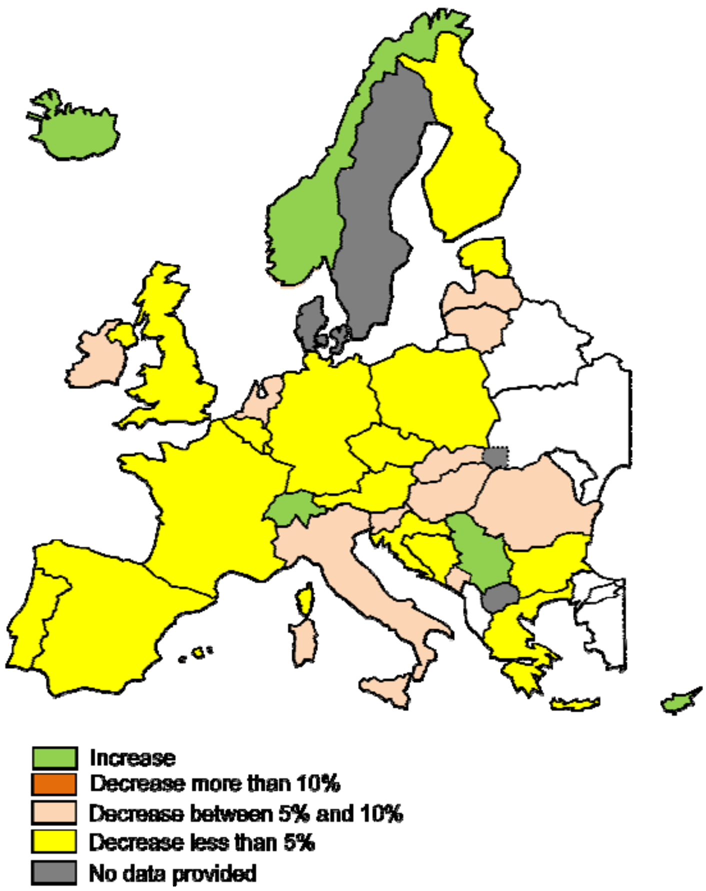
The situation for summer, winter and total consumption for all countries is showed on the following maps (2.1, 2.2, and 2.3).



Map 2.1: Total consumption growth per country



Map 2.2 : Summer consumption growth per country



Map 2.3: Winter consumption growth per country

Comparing the maps 2.2 and 2.3 one can see that the decrease of consumption in winter is lower than in the summer period. It could be caused by a revival of the economy in the ENTSOE-E countries in second half of the year 2009, resulting in the electricity consumption started to increase. However, the average winter temperatures in most of ENTSO-E countries in 2009 were lower than in winter 2008. This indicates that during 2009 more severe winter conditions occur than during 2008. The winter consumption in 2009 was, however, lower than in 2008 (see table 2.2 below)[5].

	2008			2009			2009 minus 2008		
	Summer temperature	Winter temperature	Average temperature	Summer temperature	Winter temperature	Average temperature	Summer temperature	Winter temperature	Average temperature
AT	no data	no data	no data	no data	no data	no data	no data	no data	no data
BA	no data	no data	no data	no data	no data	no data	no data	no data	no data
BE	15.20	6.50	10.90	16.20	5.80	11.00	1.00	-0.70	0.10
BG	23.90	2.50	13.50	22.60	1.70	12.40	-1.30	-0.80	-1.10
CH	14.40	3.60	9.00	9.40	2.90	16.00	-5.00	-0.70	7.00
CY	29.24	8.66	20.63	29.00	10.60	19.30	-0.24	1.94	-1.33
CZ	15.40	4.30	9.85	16.00	2.20	9.10	0.60	-2.10	-0.75
DE	15.30	5.10	10.20	16.10	3.70	9.90	0.80	-1.40	-0.30
DK	no data	no data	no data	no data	no data	no data	no data	no data	no data
EE	11.00	1.50	7.30	12.00	-1.00	6.10	1.00	-2.50	-1.20
ES	21.30	11.70	16.60	21.80	10.90	16.40	0.50	-0.80	-0.20
FI	no data	no data	no data	no data	no data	no data	no data	no data	no data
FR	16.40	7.70	12.10	17.50	7.40	12.40	1.10	-0.30	0.30
GB	14.40	4.90	9.10	14.80	3.20	9.20	0.40	-1.70	0.10
GR	25.50	10.40	17.90	24.00	10.80	17.40	-1.50	0.40	-0.50
HR	no data	no data	no data	23.00	10.00	17.00	no data	no data	no data
HU	18.30	5.80	12.00	19.40	4.10	11.80	1.10	-1.70	-0.20
IE	13.00	6.00	10.00	12.60	6.40	9.40	-0.40	0.40	-0.60
IT	20.70	13.30	15.80	21.50	10.00	15.50	no data	no data	no data
IS	11.26	-0.26	4.76	10.90	-0.26	4.80	-0.36	0.00	0.04
LT	17.10	0.90	8.30	17.8	-2.20	8.00	0.7	-3.10	-0.3
LU	14.78	4.57	9.67	15.23	3.82	9.53	0.45	-0.75	-0.14
LV	no data	no data	no data	17.20	-2.10	6.00	no data	no data	no data
ME	26.80	7.00	16.90	no data	no data	no data	no data	no data	no data
MK	no data	no data	no data	no data	no data	no data	no data	no data	no data
NI	13.00	6.00	9.00	13.00	6.00	9.00	0.00	0.00	0.00
NL	17.30	5.10	10.60	17.00	5.00	10.00	-0.30	-0.10	-0.60
NO	13.30	1.90	7.70	13.70	1.60	7.70	0.40	-0.30	0.00
PL	15.00	4.10	9.60	15.50	2.00	8.80	0.50	-2.10	-0.80
PT	22.30	13.10	17.20	20.30	14.80	17.90	-2.00	1.70	0.70
RO	17.00	4.20	10.60	18.20	3.80	11.00	1.20	-0.40	0.40
RS	20.00	7.80	13.90	18.40	6.40	13.60	-1.60	-1.40	-0.30
SI	17.20	5.10	11.20	16.60	4.70	11.50	-0.60	-0.40	0.30
SE	no data	no data	no data	no data	no data	no data	no data	no data	no data
SK	17.30	5.00	11.10	18.30	3.30	10.80	1.00	-1.70	-0.30
UA_W	no data	no data	no data	no data	no data	no data	no data	no data	no data

Table 2.2: Temperature overview per country (°C)

[5] Focusing only on former UCTE countries a decrease of consumption from about 2 587 TWh down to 2 456 TWh is noticeable (5%). It is for first time since 2003 that electricity consumption decreased.

2.1.1 NATIONAL COMMENTS ON CONSUMPTION

BE – Belgium

The reported figures are best estimates based on actual measurements and extrapolations from survey results. The load and energy figures for 2009 are provisional data based on information given by the Ministry of Energy. These data will become final in February 2011. Past experience has learned that the provisional data does not include all the generation from very small decentralized units and that the correction for small decentralized units between provisional and final figures is increasing over time. Therefore the provisional figures for 2009 of the Ministry of Energy were augmented with 1.2 TWh. This correction is an estimation of the compensation for the production from small decentralized units that will be included in the final figures.

The average monthly temperature in 2009 was lower than the corresponding decennial monthly average temperature (2000-2009) for January, February, March, June, October and December. The highest deviation from the decennial monthly average temperature was measured in January 2009, namely 3.1°C lower than the decennial average temperature for that month. The maximum peak load for Belgium in 2009 was observed in this month. The average temperatures in summer were 0.7°C higher than the corresponding decennial average (2000-2009) combined with the impact of the financial and economic crisis on the load, this double negative effect on the load growth resulted in a decrease of the Belgian consumption during this period by 8.5 %. Winter 2009 had lower than decennial average temperatures, with exception of the temperatures measured in November 2009 that were extremely mild. However, this positive effect on consumption was more than compensated by the impact of the financial and economic crisis on the load, therefore the consumption during the winter decreased by 4.3% compared to 2008.

DE – Germany

As a result of the financial and economic crisis, total electricity consumption (including grid losses, without pumping energy consumption) decreased by approximately 5%.

FR – France

The national consumption adjusted for climatic contingencies reaches 478.1 TWh in 2009, 1.8% lower than in 2008, after adjustment for the impact of the 29th February 2008.This evolution results essentially from the decrease of the consumption of end customers connected to the RTE network (large-scale industry). As for customers supplied by the distribution networks, the growth found for business and private customers almost completely offsets the decline of the consumption of SMI/SME.

IE – Ireland

Electricity demand in 2009 has decreased by 5.8% against 2008.

IS – Iceland

In 2009 the electrical consumption in Iceland was total 16839 GWh and was increasing by 2.3% from 2008. Power intensive industry consumption was 12925 GWh and was increasing by 3.9%. The public consumption decreased by 2.1%. The network losses decreased about 11% between 2008 and 2009 due to unusual maintenance situation in the network in 2008.

IT – Italy

During the year, electricity demand reached 317.6 billion kWh (provisional data at the stage of data collection) dropping by 6.4% compared to 2008, with a fairly variable, but always negative, monthly performance. The net domestic production allocated for consumption registered a 9.2% reduction. In particular, production from renewable sources increased: geothermal, wind and photovoltaic (+10,5%), as well as hydro sources (+9.5%). Thermoelectric production decreased by -13.7%.

LT – Lithuania

Summer and winter consumption is collected on transmission system level, not national.

LU – Luxembourg

The consumption in 2009 decreased of 7.73% compared to 2008. This is a second drop after the decrease of 1.5% in 2008.

PL – Poland

For all months (except for December) during the year 2009 there was observed the decrease of the consumption in comparison with year 2008 as the result of economic and financial world crisis. Between January and September the average decline amounted 6%, for October and November there was 0.5%. In December PSE Operator registered the 2.5% growth of consumption to result from strong winter 2009/1010.

PT – Portugal

In 2009 electricity demand had a negative increase rate for the first time since 1981: -1.4%(-1.8% corrected from temperature and working days effects).

SI – Slovenia

In 2009, distribution consumed 90% and direct industrial consumers 10% of all electricity on the transmission level. The index 2009/08 of electricity consumption on transmission network was 0.89. The direct industrial consumers dropped for 46%, distribution consumers dropped for 4%. The major reason for the drop in electricity consumption is the impact of the economic crises.

SK – Slovakia

The year 2009 was characteristic by huge decline of electricity consumption and production of Slovak Republic. The index 2009/2008 of consumption was about -8%, i.e. the consumption came back to the level of 1995.

2.2 GENERATION

2.2.1 ENTSO-E OVERVIEW

The total ENTSO-E generation in 2009 was lower than the generation in 2008. Total generation in 2008 was about 3 249 TWh and in 2009 it decreased down to 3 144 TWh, which makes a decrease of about 3% (see Table 2.1).

The share of the different fuel types in the total ENTSO-E generation mix is shown in the figure 2.2 below. Most of the energy was produced through fossil fuels (coal, oil, etc.), approximately 52%. Second most used fuel was Nuclear (about 26%) followed by renewable energy sources (19%). Non renewable Hydro power generation covered more than 3% of total generation. The rest is provided by a category covering not clearly identifiable energy sources (0.35%).

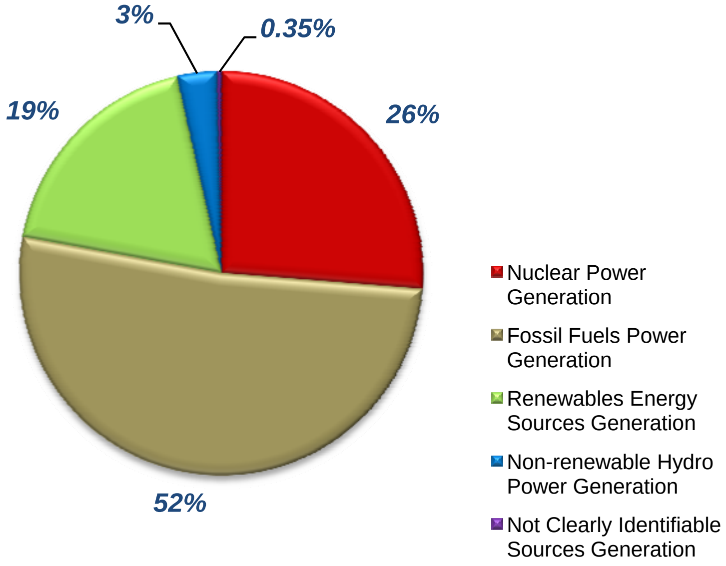
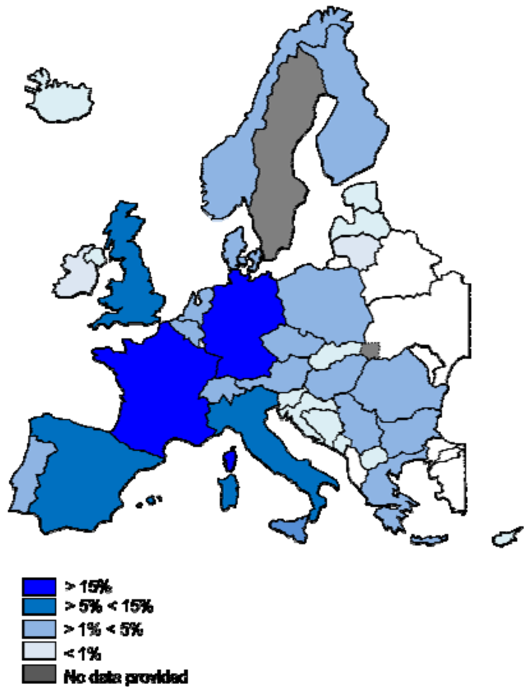


Figure 2.2: Total ENTSO-E generation mix in December 2009

The countries with the highest share of generation in total ENTSO-E generation are Germany and France (18% and 17% respectively) followed by Great Britain (10%), Italy (almost 9%) and Spain (8%). The rest of countries have a share of less than 5%, almost all of them have a share of less than 3%. This situation is illustrated by the Map 2.4 and Figures below (2.3, 2.4).



Map 2.4: Total ENTSO-E generation mix in December 2009

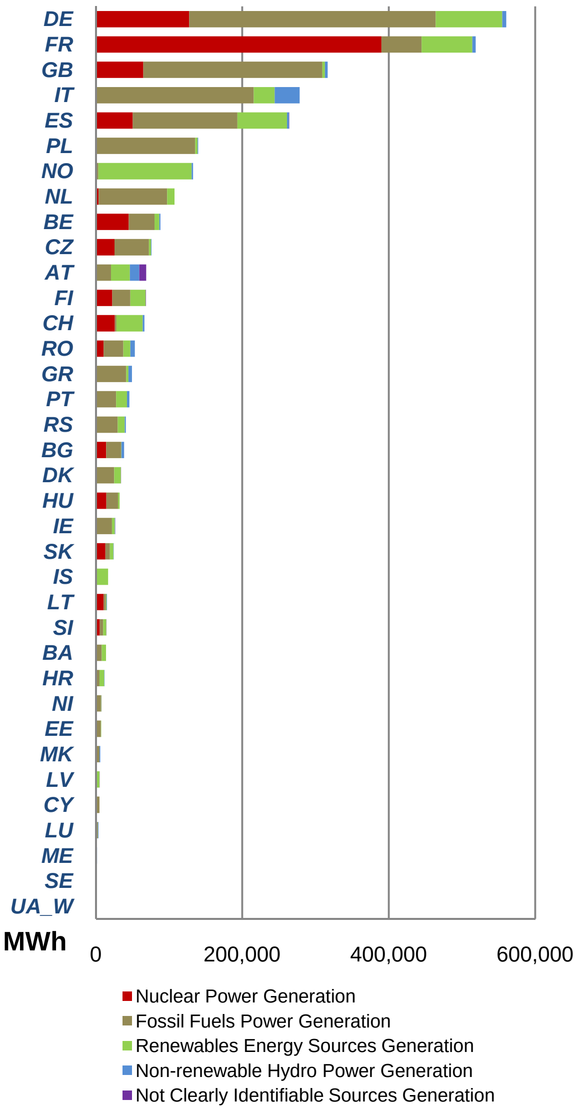


Figure 2.3: Generation mix in 2009 per country [MWh]

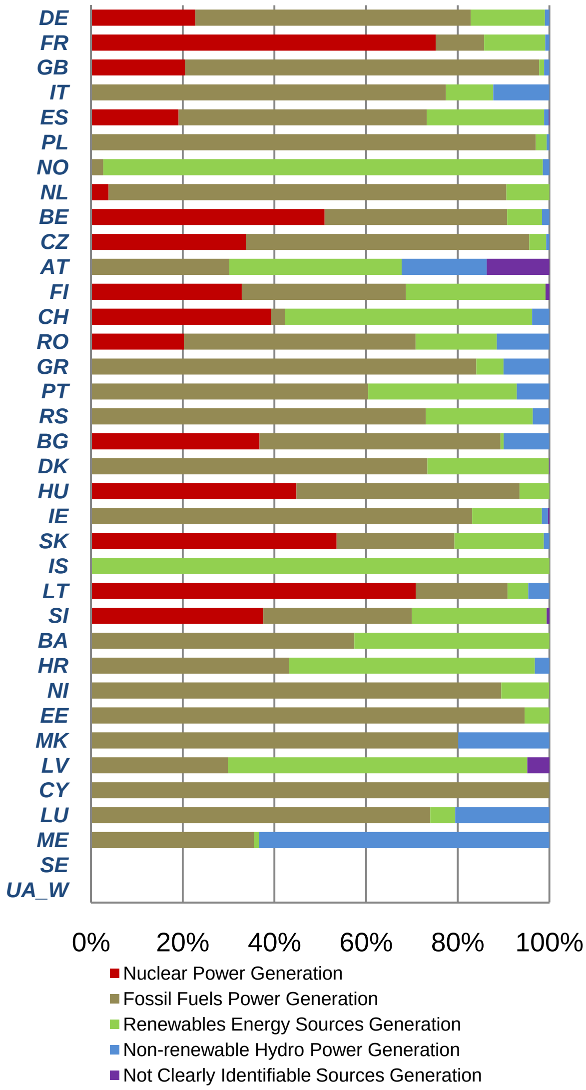


Figure 2.4: Generation mix in 2009 per country [%]

The fact that fossil fuels are the main fuel used for the generation of electricity within the ENTSO-E area is illustrated in figure 2.4. This figure shows the share of the different individual fuel types in the total generation of each country. It is clearly visible that the brown colour is dominant, which means that a lot of countries rely on fossil fuels for their electricity generation.

2.2.1.1 FOSSIL FUELS

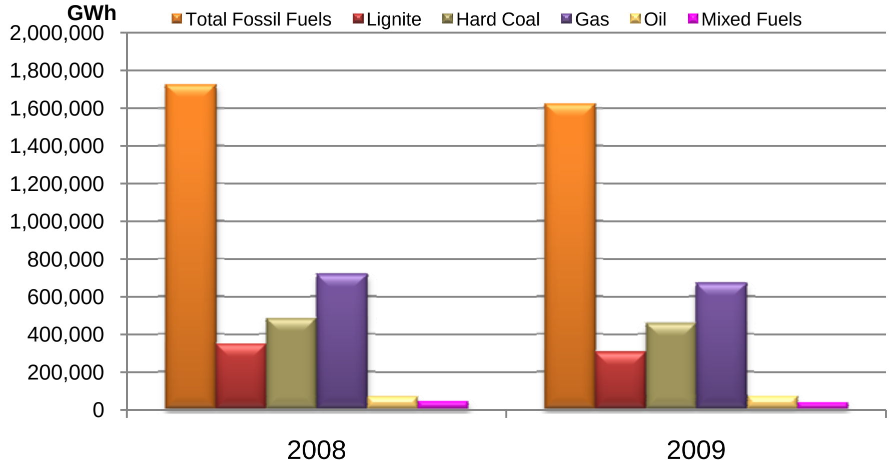


Figure 2.5: ENTSO-E fossil fuels Generation in 2008 and 2009

The fossil fuels generation decreased from 1 724 TWh in 2008 down to 1 623 TWh in 2009, which is about 101 TWh or 6%. This decrease can be noted for almost each fossil fuel type, with exception of the oil category were an increase of generation of 6% is visible (3.96 TWh) caused mainly by Germany (3 TWh), Spain (0.5 TWh) and Italy (2.1 TWh). This is clearly visible in the Table 2.3 below.

	Fossil Fuels	of which				
		Lignite	Hard Coal	Gas	Oil	Mixed Fuels
%	-6%	-13%	-5%	-6%	8%	-16%
Absolute value (TWh)	-96	-44	-25	-46	5	-7

Table 2.3: ENTSO-E Fossil Fuels generation increase/decrease from 2008 to 2009

The main contributors to the decrease are mainly Italy (33 TWh), Germany (24.9 TWh), Great Britain (25.2 TWh) and Spain (15 TWh) followed by Romania (5.7 TWh), Poland (5 TWh) and others. However in some countries there is visible increase of fossil fuel generation. The main increase is seen in Belgium (3.7 TWh) followed by Norway and the Netherlands (2.4 TWh). Percentage of increase/decrease of fossil fuel generation in each country is depicted in the map below (Map 2.5) together with the share of fossil fuel generation of each country compared to its total generation (Map 2.6).

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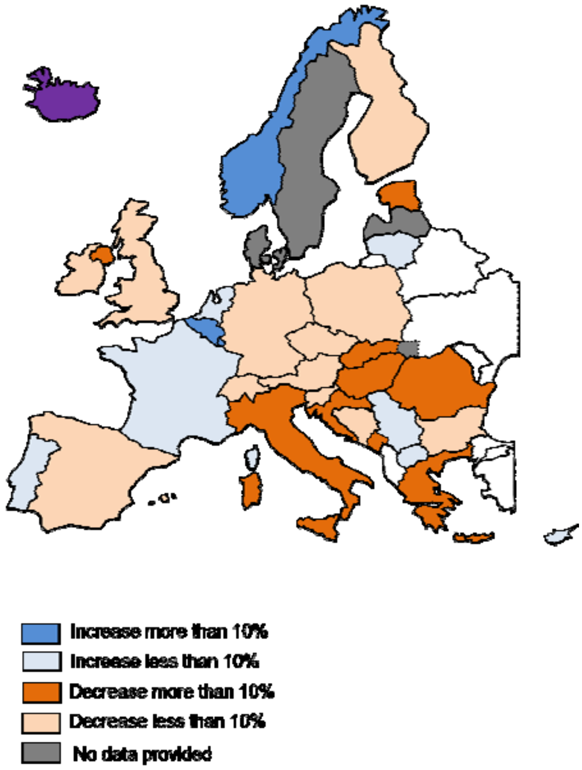
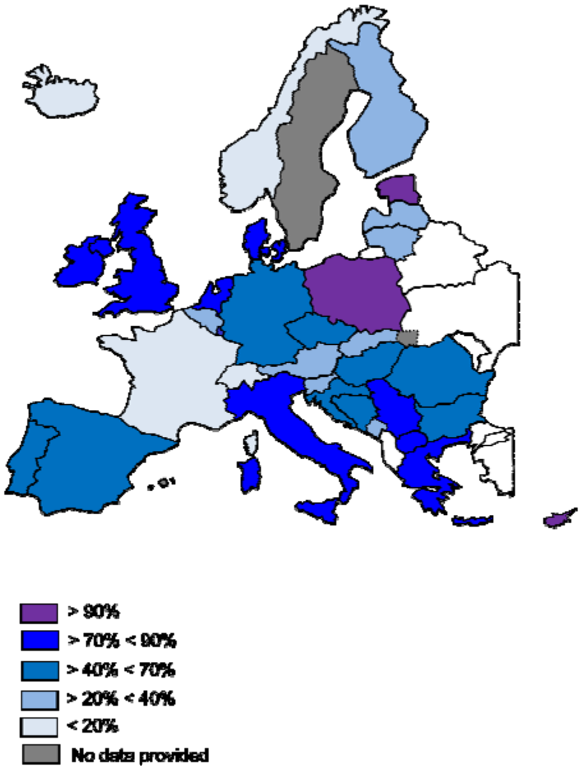


Map 2.5: Increase/decrease of fossil fuels generation in per country from 2008 to 2009



Map 2.6: Share of fossil fuels in the total generation of each ENTSO-E country in 2009

Countries with a very small share of fossil fuels compared to the total generation were Switzerland (3.1%), Norway (2.7%) and Iceland (0.02%). On the other hand in Cyprus, Poland and Estonia the share of fossil fuels compared to the total national generation was 100%, 97% and 95% respectively.

2.2.1.2 RENEWABLE ENERGY SOURCES

For some countries renewable energy sources (RES) values are not relevant because they included RES generation into Non-identifiable energy sources (example of Austria). There were also some countries that were not able to divide the category Hydro generation into the requested subcategories, namely renewable and non-renewable[6], which could cause some incorrectness in the final statements.

Figure 2.6 below shows the total RES generation. It is a comparison between 2008 and 2009.

[6] For these countries renewable hydro generation was considered to be zero.

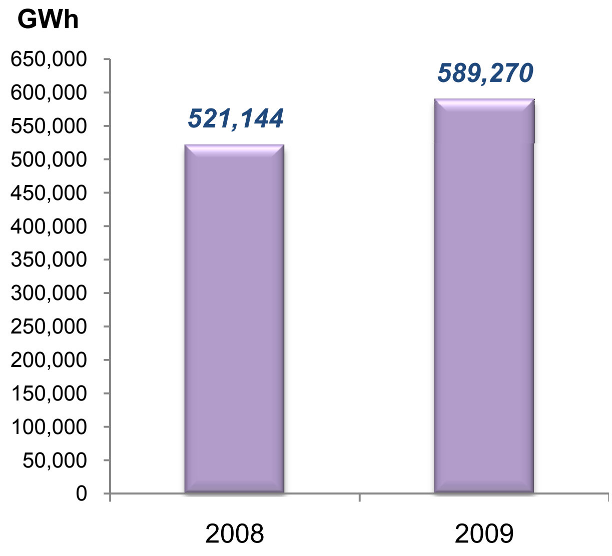


Figure 2.6: ENTSO-E renewable energy sources Generation in 2008 and 2009

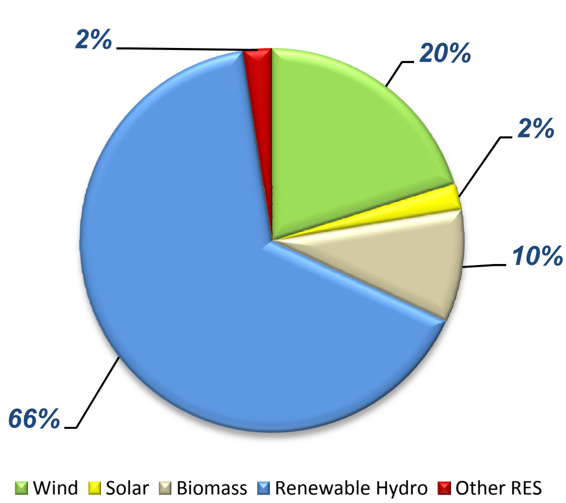


Figure 2.7: Share of each RES source in total RES generation in 2009

The generation resulting from almost all renewable energy sources increased except for the category of Other RES, it decreased by 5.8 TWh. Solar production increased by 6.2 TWh, or almost 91%; renewable hydro production augmented by almost 44 TWh (12%). The total renewable energy sources grew by 13% (see table 2.4).

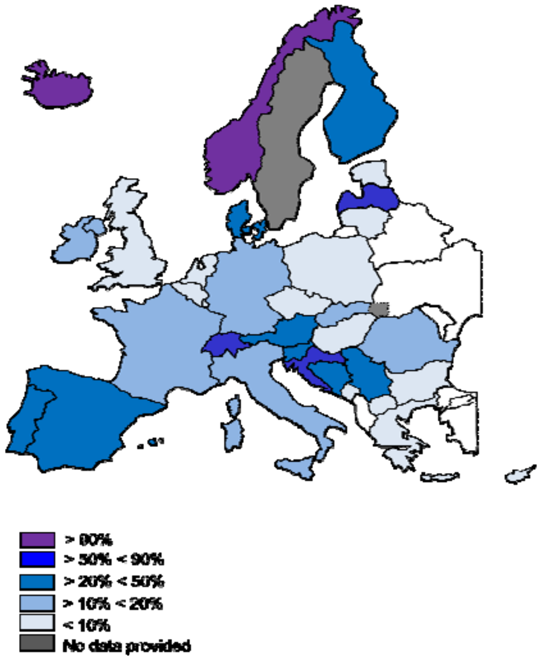
	Renewable Energy Sources	of which				
		Wind	Solar	Biomass	Renewable HPP	Other RES
%	**13,07%**	16,20%	91,09%	16,30%	12,60%	-29,26%
Absolute value (TWh)	**68,126**	16,440	6,209	7,764	43,523	-5,811

Table 2.4: Renewable energy sources generation increase/decrease from 2008 till 2009

The share of individual RES sources in the total RES generation in 2009 is depicted in the above figure 2.7. The situation in 2009 is very similar to 2008.

The highest share in RES production can be assigned to renewable hydro generation (main contributors are Norway, France, Switzerland, Austria) followed by wind generation (main contributors Germany, Spain, France, Portugal, Denmark) and biomass generation (main contributors Germany, Finland, the Netherlands and Belgium). Solar has a share of about 2% (main contributors Germany and Spain), however each country reporting this category observed the increase of generation from solar power plants. For more information see paragraph 2.3.2 National comments on Generation.

Following Map 2.7 shows the share of RES in the total generation of each country in 2009.



Map 2.7: Share of RES in the total generation of each ENTSO-E country in 2009

The highest share of RES can be found in Iceland and Norway (both more than 95%, Iceland even 99.98%). Latvia follows with 65% and Switzerland and Croatia with about 54%. Austria (considering only renewable hydro power plants) and Bosnia and Herzegovina have about 43%, Portugal, Slovenia, Finland, Spain and Denmark between 25% up to 30%. The whole ENTSO-E perimeter had a share of RES in the total generation of about 18% in 2009.

Figures 2.8 and 2.9 below show the RES generation mix in 2008 and 2009 excluding renewable Hydro Power Plants (HPP) from the RES category. The highest contribution in both years comes from wind and biomass, jointly about 85%. Generation from solar power plants almost doubled (from 4% up to 6%) and the reverse was true for generation from other RES that has been halved (from 11% down to 7%).

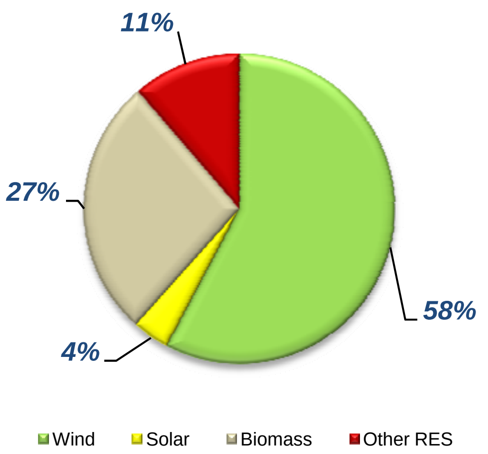


Figure 2.8: Share of each RES source (w/o renewable HPP) in the total RES generation in 2008

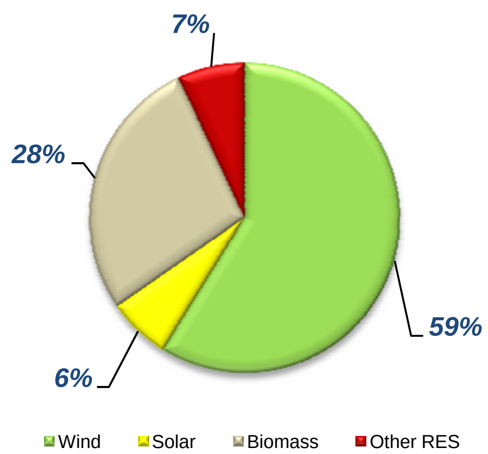


Figure 2.9: Share of each RES source (w/o renewable HPP) in the total RES generation in 2009

2.2.1.3 NUCLEAR POWER

The ENTSO-E nuclear generation (see Figure 2.10 below) decreased by 4% (31 TWh). The Map 2.8 below shows the share of nuclear generation of each country compared to its total generation in 2009.

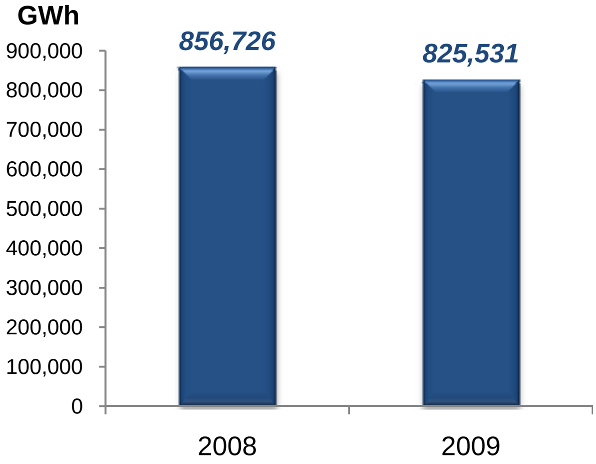
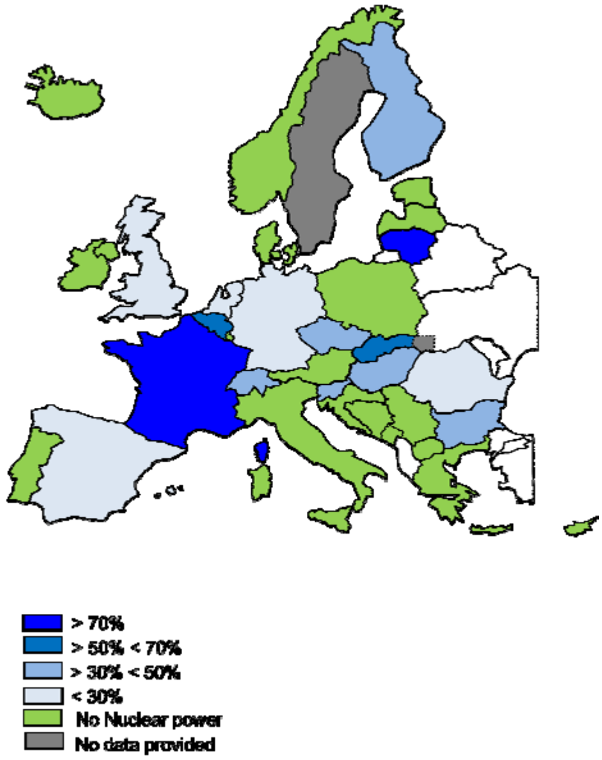


Figure 2.10: Comparison of ENTSO-E total nuclear generation



Map 2.8: Share of nuclear generation in the total generation of each country in 2009.

Highest share of nuclear generation are observed in France and Lithuania (75% and 70%) followed by Slovakia (53%) and Belgium (50%). Comparison with 2008 is shown on figure 2.11.

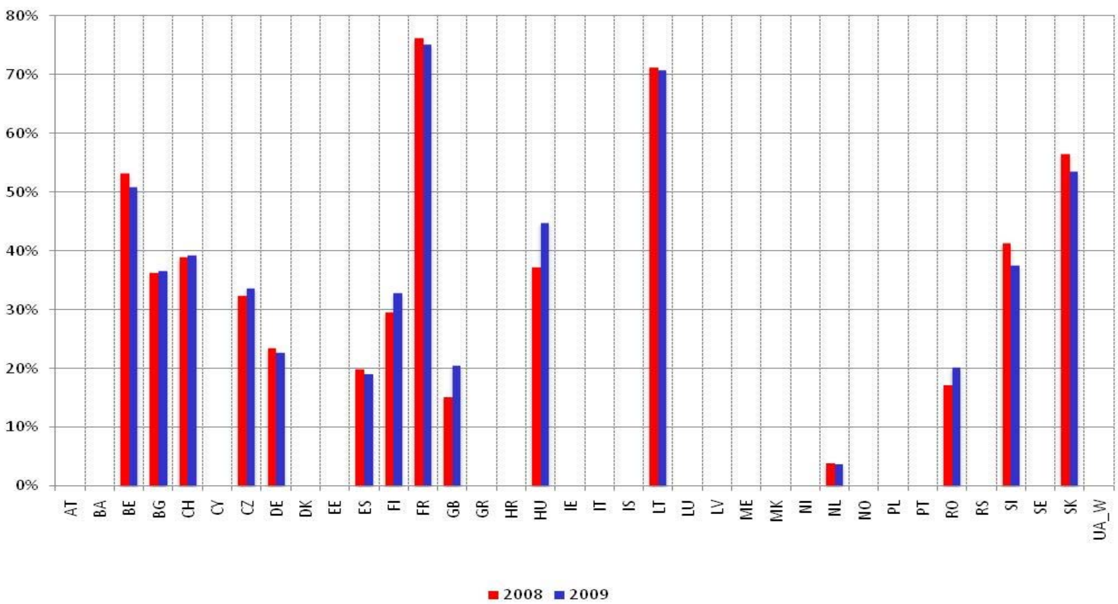


Figure 2.11: Comparison of the share of nuclear generation in the total generation of each country in 2008 and 2009

2.2.1.4 NON-RENEWABLE HYDRO POWER GENERATION[7]

This category includes only hydro power generation that cannot be considered as renewable (i.e. predominantly pure pumped storage hydro power plants). The renewable part of hydro power plants generation is included in the RES category (see chapter 1.1 on methodology and chapter 2.3.1.2 on renewable energy sources generation). However there were also some countries that were not able to divide the category hydro generation into the requested subcategories (partially or at all), namely renewable and non-renewable, or they were able to do it only for 2008 or 2009. This caused some incorrectness in final statements in this chapter.

For countries which did not provide the data for the non-renewable hydro generation at all, this category was considered as zero.

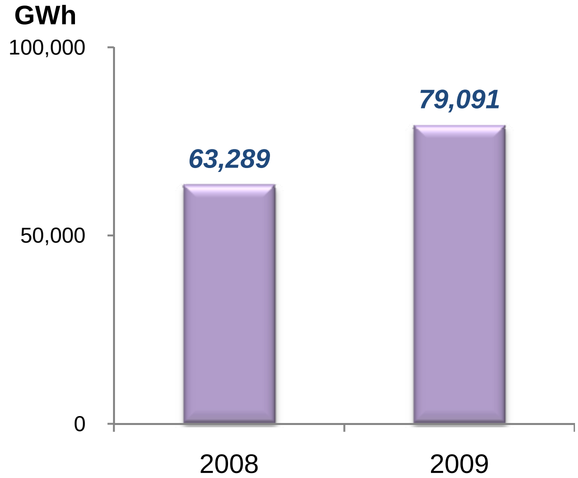


Figure 2.12: ENTSO-E non-renewable hydro power plants generation in 2008 and 2009

Generation in non-renewable hydro power plants was 16 TWh higher in 2009 than in 2008. It made increase 25% (see Figure 2.12). Non-renewable hydro generation increased e.g. in Greece (66.7%) or Portugal (29%). On the other hand for example in Romania and Great Britain this kind of generation decreased most significantly (35% and 10% respectively).

Comparison of total hydro generation in 2008 and 2009 is showed on the figure 2.13. The hydro generation was almost the same for both years; however the values for 2009 were slightly lower (decrease 0.3%).

[7] Results in this paragraph are highly influenced by the lack of data for this generation category for 2008.

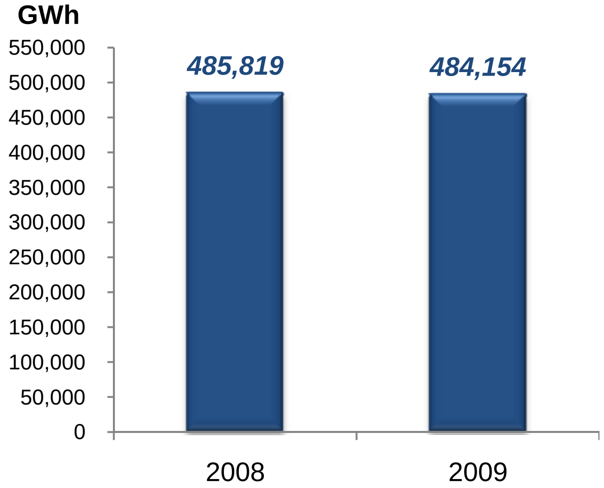


Figure 2.13: ENTSO-E Total Hydro Generation

2.2.2 NATIONAL COMMENTS ON GENERATION

BE – Belgium

The national net generation was 8.5% higher in 2009 as compared to 2008. The net generation level was even 3.7% higher than the observed output in 2007. This increase in net generation resulted from an increase in nuclear generation (3.7% compared to 2008) and fossil fuel generation (11.8% compared to 2008). These two fuel types count for almost 91% of the Belgian generation in 2009. Although, the output of wind mills grew with 57% and the output of solar panels with 281% compared to 2008, they account only for 1.3% of the Belgian generation in 2009. The renewable energy source (other than hydro) generation grew with the highest growth rate namely 33%. In 2009 the output of renewable energy sources (including run of river) covered 7.9% of the Belgian consumption (including losses).

DE – Germany

In conventional thermal power stations of general supply in Germany, generation from lignite as primary energy decreased by about 3% to 134.2 TWh as compared to the preceding year (share in total generation: 24%). The decrease in hard-coal-based generation by 12% (100.2 TWh) was even larger (share: 18%).

The generation of nuclear power stations amounting to 134.2 TWh decreased by more than 9%; their share in total generation in Germany was 23%.

Electricity generation from renewable energy sources (without water) increased from 70.6 TWh to 72.2 TWh, thus by 2%. Taking the renewable share of hydro generation into consideration, the share of renewables related to the total net electricity generation in Germany amounts to approximately 16%. 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 and 2008). The share of wind energy totals 42%, that of solar energy about 7%.

ES – Spain

On Sunday 11th November the historical maximum of wind production was achieved. At 3 p.m. the production was from 11 429 MW (40% of the net generation) and during the day the production was 252 GWh (39% of the net generation).

FR – France

Generation fell by 5.5% compared with 2008. Nuclear generation is less important than in 2008 (-6.8%). Hydro-electric generation fell by 9.2%. Fossil fuel power stations generation rose by 3.1%. Generation from renewable sources but hydro rose by 26% in 2009, it accounted for 12.2 TWh. The volume of wind generation rose by nearly 40% compared with 2008, and reached 7.8 TWh.

HR – Croatia

Run-of river power plants category includes also small HPP.

IE – Ireland

Gas generation constitutes more than 50% of total generation. 13.8% of generation was supplied from renewable sources.

IS – Iceland

Generation increased from 16.467 TWh to 16.835 TWh. The share of geothermal production increased from 24.5% up to 27% of total production. The share of hydro is now 73% of total production. There was no change in installed capacity between 2008 and 2009.

IT – Italy

The installed generating capacity rose by about 4.655 MW. Wind (+37,2%) and thermal (+3,7%) parks made a significant contribution to this increase for a total of over 3.900 MW of new capacity.

NO – Norway

Production from pumped storage HPP is estimated.

PL – Poland

No significant change in the generation structure in Poland. There was 33% increase of pure renewable production (other than hydro), however their level in Poland in 2009 reached only 0.9% of total production. Energy from co-firing (biomass combustion in lignite/hard coal power stations) is classified as energy from fossil fuels installations. Visible decrease of the generation was the result of consumption decrease.

PT – Portugal

The hydro generation had an increase rate of 20%, but remained below the average (23% of the average values).

About 15% of electricity demand in 2009 was supplied by wind.

SI – Slovenia

In 2009 we recorded high hydro production due to good hydrological conditions. The HPPs on Drava river produced 27% and on Sava river 20% more electricity than in 2008. TPPs on fossil fuels produced less than in 2008, index 2009/08 equals 0.97. NPP Krsko produced less than in 2008 due to planned overhaul in April 2009. The figures in tables considers 100% of generation in NPP 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.

SK – Slovakia

The total generation in Slovakia during 2009 was 24 442 GWh (brutto 26 074 GWh), which was a decrease about 11% and the production of electricity fall down to the level of 1998. 54% of total generation was produced in nuclear power plants, 28% thermal power plants and 18% in hydro power plants. Furthermore Slovakia was also in 2009 an importing country due to decommissioning of the second unit in nuclear power plant in Jaslovské Bohunice at the end 2008.

2.3 ENERGY FLOWS

2.3.1 ENTSO-E OVERVIEW

Exchanges are the physical import and export flows on every interconnection line of a power system. The Exchange Balance is the difference between physical import and export flows. Physical flows are metered at the exact border or at a virtual metering point estimated from the actual one. Some countries are isolated systems (Cyprus, Iceland) and some did not reported data for 2008, therefore their exchange balance is not considered here.

Exchange balance of the whole ENTSO-E system decreased from 9 227 GWh in 2008 down to 2 522 GWh in 2009, i.e. decrease of about 73%.

ENTSO-E was a net[8] importing system both in 2008 and in 2009. Imports were higher in 2008 than in 2009 (2%); for exports the situation was the opposite (decrease of only 0.03%). Next figures (Figure 2.14 and 2.15) display this situation.

Figure 2.14 ENTSO-E Imports/Exports summary

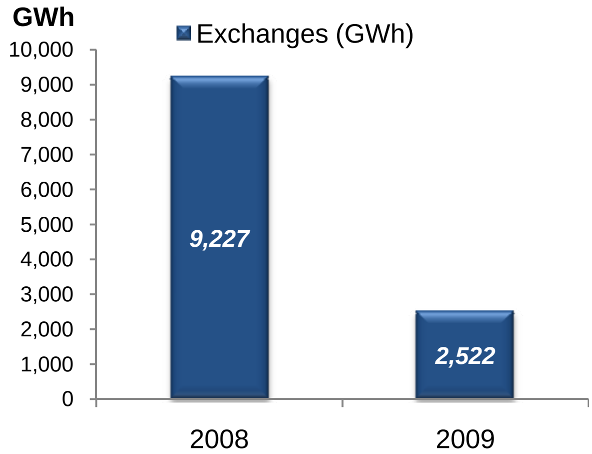


Figure 2.15 ENTSO-E Exchanges Balance summary

In 2009, the biggest net exporting countries were France (25.7 TWh), Germany (14.3 TWh), Czech Republic (13.6 TWh) and Norway (9 TWh). Other net exporters were Spain (7.6 TWh), Bulgaria (4.9 TWh), Slovenia (3 TWh), Bosnia and Herzegovina (2.9 TWh), Switzerland (1.16 TWh), Lithuania (2.9 TWh), Poland (2.19 TWh), Romania (2.47 TWh), Belgium (1.8 TWh) and Serbia (0.8 TWh).

The main net importers were Italy (44.8 TWh) and Finland (12 TWh) followed by Croatia (5.7 TWh), Hungary (5.5 TWh), the Netherlands (4.9 TWh), Portugal (4.6 TWh), Greece (4.4 TWh) and Luxemburg (3.6 TWh). The rest of countries show only insignificant net imports. The above described situation is visualised on Figure 2.16.

[8] „net export"/„net import" means that the difference between Imports and Exports was in favour of Export and Import respectively

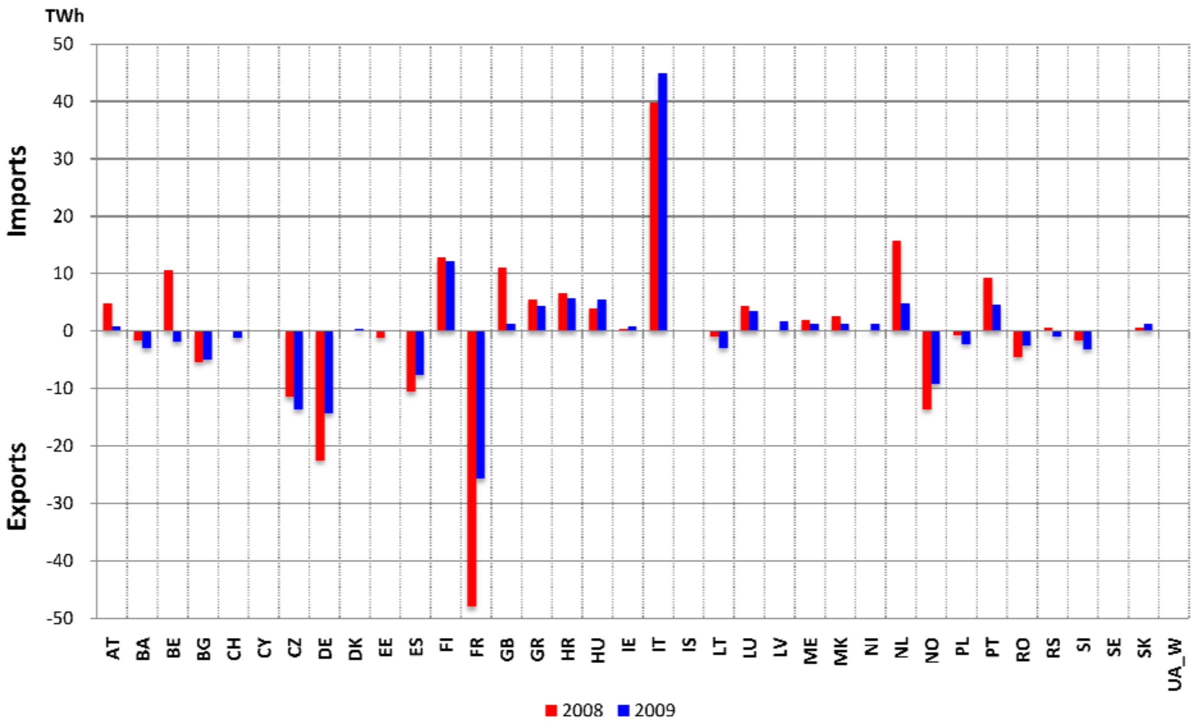
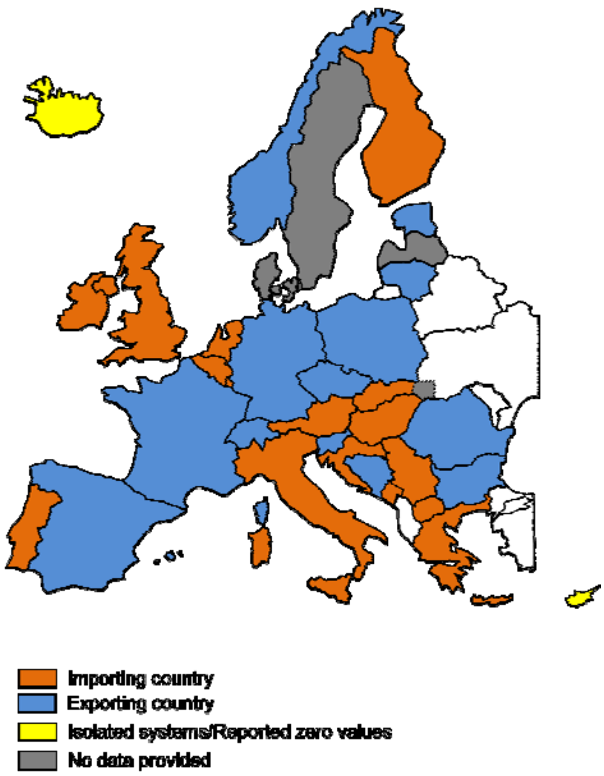
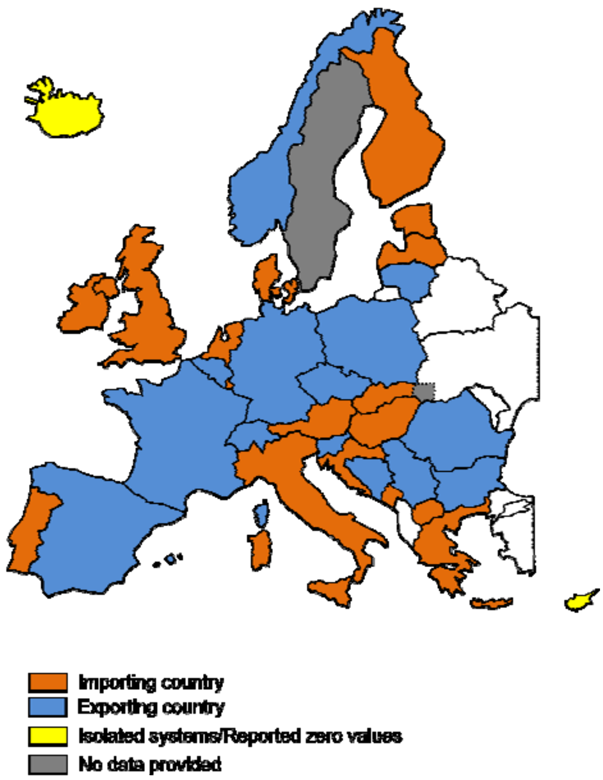


Figure 2.16: Comparison of exchanges balance for each country

The comparison of individual countries in 2008 and 2009 is given in the following maps (2.9 and 2.10). For more detailed information about each country see section with national comments (next Chapter 2.3.1).



Map 2.9: Net importing/exporting countries in 2008



Map 2.10: Net importing/exporting countries in 2009

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2.3.2 NATIONAL COMMENTS ON EXCHANGES

BE – Belgium

The physical imports decreased by 45% in 2009 compared to 2008 and the physical exports went up by 73%. The exchange balance (physical imports & exports) significantly decreased with 117% in 2009 compared to 2008. For the first time since 1991 Belgium became a net exporter in 2009.

The national physical exchanges given in energy include the exchanges with France that do not transit on ENTSO-E lines

CY – Cyprus

Cyprus is an isolated system.

DE – Germany

As compared to the preceding year, electrical energy imports from other countries amounting to 40.5 TWh have scarcely changed (previous year: 40.6 TWh). However, shifts of physical flows related to the different countries were established. While imports from the Netherlands increased by more than 300% (from 0.8 TWh to 3.5 TWh), imports from Sweden decreased by 61% (from 2.5 TWh to almost 1 TWh) and from Denmark by 32% (from 9.2 TWh to 6.2 TWh). Though physical imports from France totalling 10.6 TWh remained almost unchanged as compared to the preceding year, France still has the largest share (26%) in Germany's total imports. It is likely that these quantities comprised considerable transits flowing from France via Germany to Switzerland and Italy. The shares of the Czech Republic and Austria amounted to 21% and 17%, respectively.

As compared to the previous year, Germany's physical exports decreased by more than 12% from 62.7 TWh to 54.9 TWh. The largest decrease in absolute terms and in percent was recorded with regard to exports to the Netherlands (-10 TWh or -53%). Thus, a significant change of load flows regarding electricity exchanges with the Netherlands occurred in comparison with the previous year. This change in terms of electricity exchanges with the Netherlands was the main reason for the overall decrease in Germany's exports. Austria had the largest share (almost 15 TWh or 25%) in physical exports, followed by Switzerland with 13 TWh or 24%. The share of exports to the Netherlands reached only 16% (previous year 30%).

Germany's export surplus decreased from 22.4 TWh to 14.3 TWh corresponding to only somewhat more than 2% of the total German gross electricity generation (previous year 3%). The exchange volume (i.e. the sum of imports and exports) amounts to approximately 16% of the overall gross electricity generation in Germany.

FR – France

The annual balance of physical exchanges fell by 46.5%, mainly due to a drop in the exports and a rise in the imports, and reached its lowest level since 1986 with 25.7 TWh. For the first time since winter 1982-1983, the monthly balance of physical exchanges has resulted in an import balance in October.

IE – Ireland

Ireland remains a net importer of electricity with 2.9% of electricity demand met by imports.

IS – Iceland

Iceland is an isolated system.

LU – Luxembourg

The physical imports decreased by 13.15% and the physical exports increased by 5.1%, due to a shorter overhaul period of the major thermal plant, than in 2008. The exchange balance decreased by 26.9%.

PL – Poland

In 2009 Poland was still the exporting country; the balance was 1.5 TWh higher than in 2008. Net export was in general at the same level as in 2008. There was only small decrease of import observed.

PT – Portugal

The net imports were the lowest verified since 2003, representing about 10% of the national demand.

SI – Slovenia

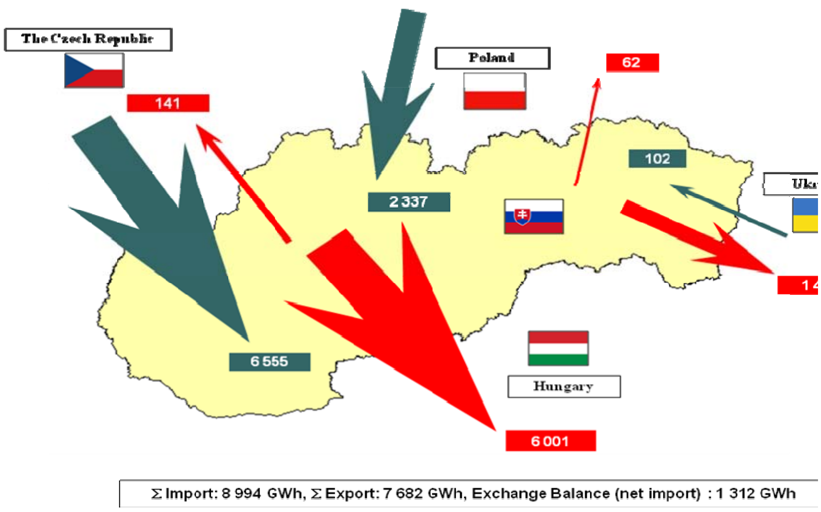
In 2009 the imports increased for 25% and exports for 38% compared to year 2008. Due to higher production and drop of consumption, annual energy balance on transmission level was positive (half of the production from NPP Krsko is considered).

SK – Slovakia

Slovakia was during most of the year 2009 importer of electricity. Import secured 4.79% of yearly consumption.

After shutting down of the first unit in nuclear power plant Jaslovské Bohunice at the end of 2006 the power system of Slovakia imported electricity, i.e. the third year Sloavkia is in a position of importer. In 2009 the import (1.3 TWh) was three times higher than in 2008 (0.5 TWh) and it was at the level of 2007 (1.7 TWh). The second unit in nuclear power plant Jaslovské Bohunice (440 MW) was shut down at the end of 2008 and it influenced the imports to the country in 2009. Nevertheless the total electricity cross-border exchanges were lower (-8.9%) than in 2008.

Export and import flows are shown in following figure:



3. POWER BALANCE

Unless stated otherwise, all graphs and tables in this chapter refer to the month of December of the respective year.

For more detailed information about commissioning of new power plants see Appendix 2.

3.1 ENTSO-E POWER BALANCE DATA SUMMARY

	2008	2009	Difference between 2009 and 2008	
			Absolute value (MW)	%
Net Generating Capacity	799 771	839 233	39 461	5%
Reliable Available Capacity	592 275	610 772	18 497	3%
Load	402 027	428 097	26 070	6%
Exchanges Balance Capacity	344	2 083	1 739	506%

Table 3.1: ENTSO-E Power Data Summary for December (MW)

3.2 LOAD

3.2.1 ENTSO-E OVERVIEW

The evolution of the load in 2008 and 2009 is depicted in the Figure 3.1 below. The load of 2009 follows more or less the curve of 2008. The deviations between 2008 and 2009 tend towards positive values in winter months - December (+6.5 %) and October (+4.7 %), January (+0.01 %) and February (+1 %). Only exception in the winter period was November when a decrease of the load between 2009 and 2008 of 1.9 % was recorded and March with decrease of 5.7 %. A decrease or a minimal increase of the load in November 2009 is visible in majority of ENTSO-E countries, e.g. France, the Netherlands, Poland, Belgium, Finland, Austria, the Czech Republic, Slovakia, etc. Decrease of load in March is characteristic for all ENTSO-E countries (except for Luxemburg). It could be caused e.g. by the temperature fluctuations in these countries during mentioned months (for example the case of Belgium) and/or due to the more significant influence of economical crisis.

During summer months, especially during April and May the Load was lower compared to 2008. More data is visualized in the Table 3.2.

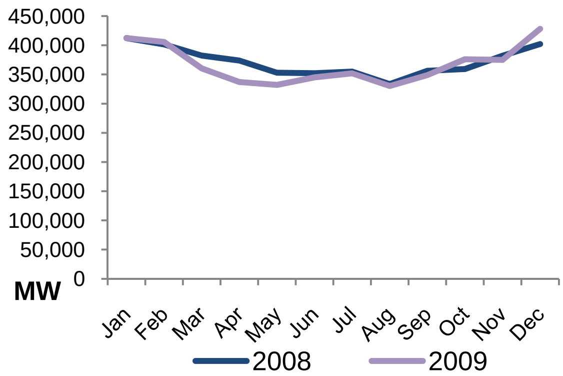


Figure 3.1: Load comparison between 2008 and 2009

ENTSO-E Load Summary (MW)		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2008		412 277	401 652	382 282	374 007	353 003	352 303	355 064	333 447	356 437	359 346	382 216	402 027
2009		412 314	405 588	360 426	337 142	332 248	345 043	351 782	330 206	348 856	376 155	374 905	428 097
Difference between 2009 and 2008	Absolute value	37	3 936	-21 856	-36 865	-20 755	-7 260	-3 282	-3 241	-7 581	16 809	-7 311	26 070
	%	0,01 %	1 %	-6 %	-10 %	-9 %	-2 %	-1 %	-1 %	-2 %	5 %	-2 %	6 %

Table 3.2: Comparison of Load between 2009 and 2008

The Load evolution seems to copy the recovery after the financial and economic crisis. I.e. in first half of 2009 the load was lower (impact of the financial and economic crisis)[9] and in second half of year it started to increase as individual economies started to recover.

[9] except for January and February when load was higher possibly due to more severe winter temperatures in these months

3.2.2 NATIONAL PEAK LOADS

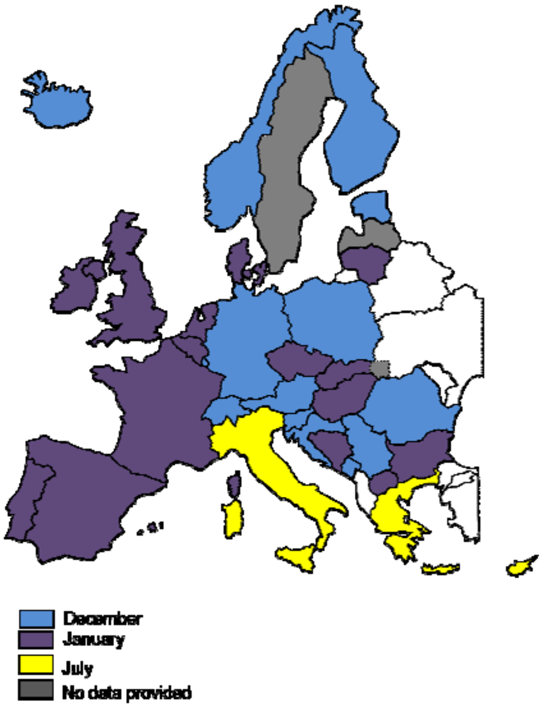
The peak load is not an hourly average value traditionally used in this report but the actual maximum metered value.

An overview for 2009 is in the table below (Table 3.3). Austria, Switzerland, France, Croatia, Cyprus, Iceland, Great Britain and Portugal recorded a new absolute historical Peak Load value in 2009.

Country	Weekday	Calendar day	Month	Time	Daily Average (°C)	Deviation to Normal (°C)	Peak Load (MW)	Compare to last year %	Day historic peak load	Year	Deviation to Normal (°C)	Historic Peak Load (MW)
AT	Wednesday	16	12	17:00			**10 821**	4.70	Wed 16 Dec	2009		**10 821**
BA	Monday	5	1	18:00	0.00	0.00	**2 033**	-4.00	Wed 31 Dec	2008	0.00	**2 117**
BE	Thursday	8	1	18:00	-3.70	-7.50	**13 933**	1.50	Mon 17 Dec	2007	-5.70	**14 234**
BG	Tuesday	13	1	18:00	-6.50	-5.00	**7 188**	2.20	Wed 11 Jan	1989	-6.00	**8 332**
CH	Wednesday	16	12	12:00	-4.00	-7.00	**10 261**	4.13	Wed 16 Dec	2009	-7.00	**10 261**
CY	Tuesday	28	7	13:15	41.00	3.50	**1 103**	8.00	Thu 28 Jul	2009	3.50	**1 103**
CZ	Wednesday	14	1	17:00	-6.60	-6.50	**10 266**	2.50	Wed 25 Jan	2006	-9.10	**10 485**
DE	Wednesday	2	12	18:00	3.00	1.00	**73 000**	-4.90	Tue 10 Dec	2002	-8.10	**79 700**
DK	Monday	5	1	0.71	n.a.	n.a.	**6 287**	-1.89	Tue 24 Jan	2006	n.a.	**6 422**
EE	Friday	18	12	15:30	-16.00		**1 513**	-0.78	Fri 20 Jan	2006		**1 555**
ES	Tuesday	13	1	20:00	5.50	-3.20	**44 440**	3.40	Mon 17 Dec	2007	-2.20	**44 876**
FI	Thursday	17	12	8:00			**14 077**	2.30	Thu 8 Feb	2007		**14 995**
FR	Wednesday	7	1	19:00	-3.00	-7.80	**92 400**	9.50	Wed 7 Jan	2009	-7.80	**92 400**
GB	Tuesday	6	1	18:30	-0.80	-6.00	**58 561**	1.60	Thu 6 Jan	2009	-6.00	**58 561**
GR	Friday	24	7	13:00	32.00	9.00	**9 762**	-4.46	Mon 23 Jul	2007	5.00	**10 414**
HR	Monday	21	12	18:00	-5.00	-8.00	**3 120**	3.70	Mon 21 Dec	2009	-8.00	**3 120**
HU	Tuesday	13	1	17:00	-6.70	-4.80	**5 997**	0.29	Thu 29 Nov	2007	-5.70	**6 180**
IE	Wednesday	7	1	18:45			**4 890**	0.25	Tue 18 Dec	2007		**4 906**
IT	Friday	17	7	12:00	27.10	1.00	**51 873**	-5.70	Tue 18 Dec	2007	2.50	**56 822**
IS	Wednesday	23	12	13:00	-9.90		**2 072**	0.50	Wed 23 Dec	2009		**2 072**
LT	Monday	5	1	17:00	-1.90	3.20	**1 713**	-7.60	Mon 7 Jan	2008	5.00	**1 843**
LU	Wednesday	2	12	19:00	3.50	2.30	**1 037**	-1.64	Mon 10 Dec	2007	3.20	**1 061**
LV	No data provided											
ME	Wednesday	16	12	20:00			**578**	-24.94	Sun 17 Feb	2008		**770**
MK	Sunday	4	1	18:00	-7.00		**1 512**	-6.55	Sun 6 Jan	2008		**1 618**
NI	Wednesday	7	1	19:00	2.00	-7.00	**1 643**	-0.66	Mon 17 Dec	2007	-6.00	**1 714**
NL	Tuesday	6	1	17:30	-5.90	8.50	**17 557**	-5.00	Tue 15 Jan	2008	5.70	**18 465**
NO	Wednesday	18	12	10:00	-11.90	-8.50	**21 953**	2.00	Thu 5 Feb	2001	-16.70	**23 054**
PL	Monday	21	12	17:00	-8.31	-7.38	**22 852**	-2.00	Fri 4 Jan	2008	-0.70	**23 328**
PT	Monday	12	1	19:45	8.00	-2.90	**9 217**	2.70	Mon 12 Jan	2009	-2.90	**9 217**
RO	Thursday	17	12	17:00	-5.20	-5.10	**8 247**	-4.15	Thu 23 Nov	1989		**10 248**
RS	Monday	21	12	18:00	-4.20	6.40	**7 448**	-0.75	Wed 31 Dec	2008	8.20	**7 504**
SI	Thursday	17	12	18:00	-4.00	-4.00	**1 935**	-2.76	Thu 26 Jan	2006	1.00	**2 110**
SE	No data provided											
SK	Wednesday	28	1	17:00	2.70	-0.60	**4 131**	-4.86	Tue 12 Dec	1989		**4 471**
UA_W	No data provided											

Table 3.3: National peak loads overview

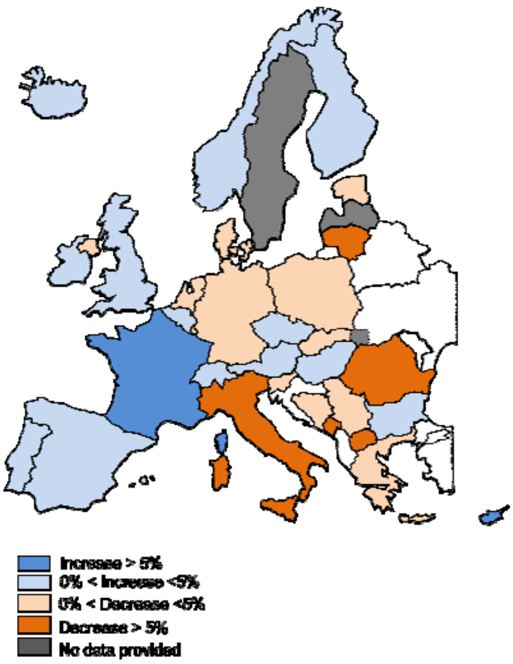
The distribution of peak load according to the month of measurement of the peak load is depicted in the following map (Map 3.1).



Map 3.1: Month of Peak Load

In most of the countries with a peak load in December it happened in the second half of the month (Austria, Switzerland, Estonia, Finland, Croatia, Iceland, Poland, Romania, Serbia and Slovenia). If the peak load occurred in January it was mostly in its first half (except for Slovakia where it was 28 January). In majority of countries the peak load in 2009 was higher than the one measured in 2008. The highest increase was recorded in France (about 9.5 %) and Cyprus (about 8 %).

On the contrary, the highest decreases were recorded in Lithuania (7 %), Italy (6 %) and Former Yugoslavian Republic of Macedonia (7 %). See the Map 3.2 below.



Map 3.2: Increase/decrease of Peak Load in 2009 compared to 2008

3.2.3 NATIONAL COMMENTS ON LOAD

AT – Austria

Peak load is not available. Therefore peak load at 3rd Wednesdays was taken.

BE – Belgium

Although the mean temperature in January, February and December 2009 was below the average decennial temperature (2000-2009), the maximum Belgian peak load measured in January for 2009 remained below the maximum historic peak level measured the 17th of December 2007. The impact of the financial and economic crisis had a significant impact on the loads measured in 2009.

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 ENTSO-E webpage.

Several load-shedding contracts with industrial customers are in force. The estimated contribution for 2009 is 261 MW. These contracts are part of the system services reserve and were in 2009 activated four times, namely 07/01/2009, 17/04/2009, 08/09/2009 and 19/12/2009.

DE – Germany

As a result of the financial and economic crisis, peak load decreased by approximately 5%.

FR – France

The demand record of year 2009 was set at 7pm on Wednesday, the 7th of January 2009, with a peak of 92 400 MW. Three new historical peaks (90 200 MW; 91 500 MW; 92 400 MW) were successively recorded around 7pm on the 5th, the 6th and the 7th of January 2009. The previous historical record of 88 960 MW dated from December 2007.

GR – Greece

There was recorded a reduction up to 200 MW to the annual peak load.

HR – Croatia

The absolute historical peak load is mainly a result of extremely cold weather conditions in second half of December 2009.

HU – Hungary

Peak load is reported as a net value.

IE – Ireland

Peak demand of 4 890 MW occurred at 7 p.m. on Wednesday 7th January 2009. This was slightly higher than 2008 but still lower than the all-time peak demand of 4 906 MW in 2007.

IS – Iceland

The peak load on 23 December 2009 at 1 p.m. about 2 072 MW was a national record, combined with power intensive load increasing between 2008 and 2009 due to power intensive industry plant still increasing load up to full consumption in 2009 and a cold weather in the dark period of the winter which together created a new peak load.

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IT – Italy

Electricity balance between imports and exports with foreign countries which increased by 11.0% compared to 2008. In particular electricity imports from foreign countries registered an increase equal to 7,2%, while exports dropped significantly (-37,6%).

PL – Poland

Maximum peak load visible in the table above was a momentary peak load registered in the Polish power system with the 15 minutes measuring step. Maximum average hourly peak load for the year 2009 which can be found in monthly statistics accounted 22 588 MW, and it took place on the same day, between 17:00 – 18:00 hrs.

PT – Portugal

On 12th January 2009 peak load has registered as a new maximum of 9 217 MW. The previous record was 100 MW lower and goes back to 2007. However, in 2009 electricity demand had a negative increase rate (-1.4%) for the first time since 1981.

RS – Republic of Serbia

Value for peak load is hourly average value in 18th hour. Referent point for observation temperature deviation is average temperature for December for time interval of 20 years.

SI – Slovenia

Peak load in 2009 was recorded in December and it was lower than in 2008 which occurred in January. Peak load dropped mainly due to the impact of the economic crisis.

SK – Slovakia

The load in 2009 was significantly lower than in 2008. The highest decline of the load was in April and May, from 400 to 600 MW (-12% to -16%). In the rest of the year the load decline was from 200 to 300 MW (-3% to -9%).

The yearly peak load was 4 131 MW, which means decrease about 211 MW comparing to the year 2008. The yearly minimum value was lower by 336 MW and it achieved the value from 2001.

3.3 GENERATING CAPACITY

3.3.1 ENTSO-E OVERVIEW

The Net Generating Capacity (NGC) of ENTSO-E in 2009 was higher than in 2008 in each month.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
NGC in 2008	781 346	782 391	783 586	785 374	786 713	787 697	790 448	791 871	795 032	794 851	796 779	799 771
NGC in 2009	821 317	822 349	823 551	824 555	826 525	829 786	833 127	834 070	834 204	835 145	836 295	839 233
Change in % between 2009 and 2008	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Change in absolute value between 2009 and 2008	38 971	39 958	39 965	39 180	39 812	42 089	42 679	42 199	39 172	40 294	39 516	39 461

Table 3.4: Increase/decrease of NGC in whole ENTSO-E from 2009 to 2008 per month (MW)

The NGC increased during almost the whole year 2009 (see Table 3.4). It is visible also on following Figure 3.2. The average growth of NGC in each month of 2009 comparing to 2008 was 5%.

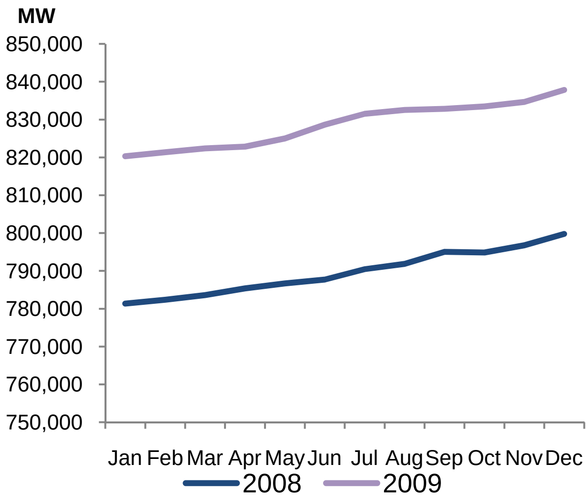

Figure 3.2: The evolution of the ENTSO-E NGC in 2008 and 2009

The share of each individual primary source type as percentage of the NGC in 2009 is showed in the following figures (Figure 3.3 and 3.4). Crucial for the ENTSO-E generating capacity mix in 2009 were the fossil fuels with more than 51% followed by renewable energy sources (23% including renewable hydro power plants), nuclear power (15%) and hydro power plants considered as non renewable energy source (more than 9%).

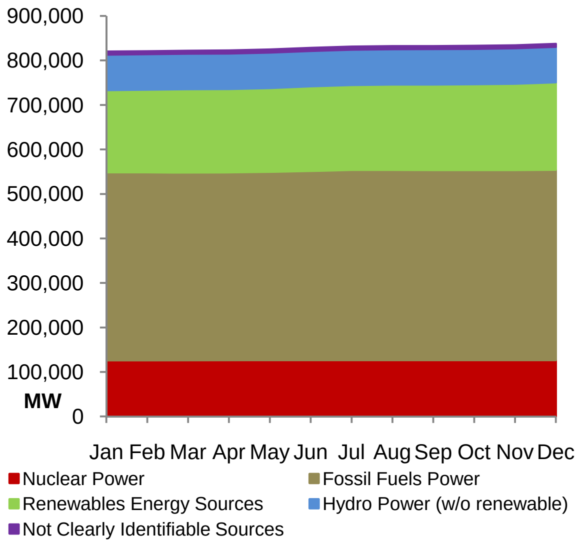

Figure 3.3: ENTSO-E generating capacity mix in 2009 in MW

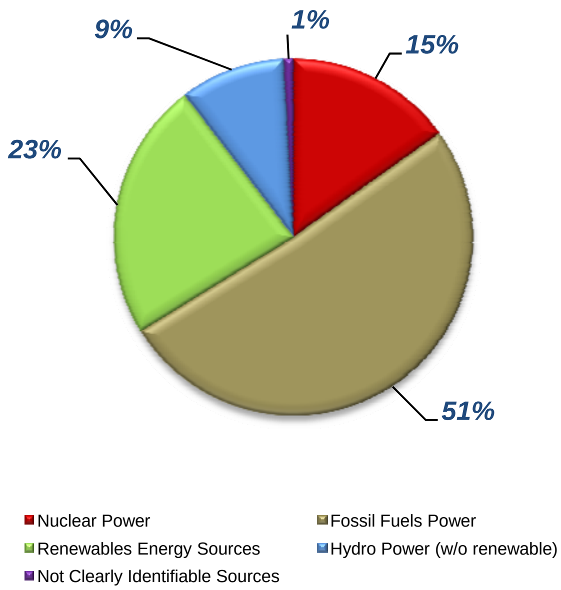

Figure 3.4: ENTSO-E generating capacity mix in December 2009 in %

3.3.1.1 FOSSIL FUELS

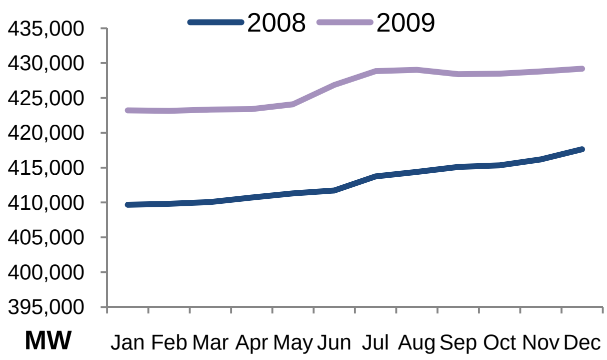

Figure 3.5: ENTSO-E Fossil Fuels generating capacity

At the beginning of the year the fossil fuels generating capacity was very slightly decreasing (till April) and after that it started to increase. The increase in June is caused by several countries (e.g. Great Britain, Austria, Spain) where some new generating units (mainly gas firing power plants) were put into operation during May 2009. Total share of Fossil Fuels in NGC in 2009 was almost 50%.

In 2009 the generating capacity of fossil fuels in ENTSO-E was on average 3% higher than in 2008 (considering increase of fossil fuels month by month). In December 2009 the generating capacity of fossil fuels in ENTSO-E was 2.5% higher than in December 2008 This increase in fossil fuel generating capacity was also reported by the majority of countries (e.g. Cyprus +30%, Hungary +15%, Austria +15%, Portugal 15% and Switzerland +11%). But there were also countries for which the amount of fossil fuels generating capacity in December 2009 was lower than in December 2008 (for example in Romania -7%, Serbia -7%, Bosnia and Herzegovina -16%).

The two most important categories of fossil fuels power plants are gas fired units with 38% and hard coal units with 27% (see figure 3.6 and table 3.5 below).

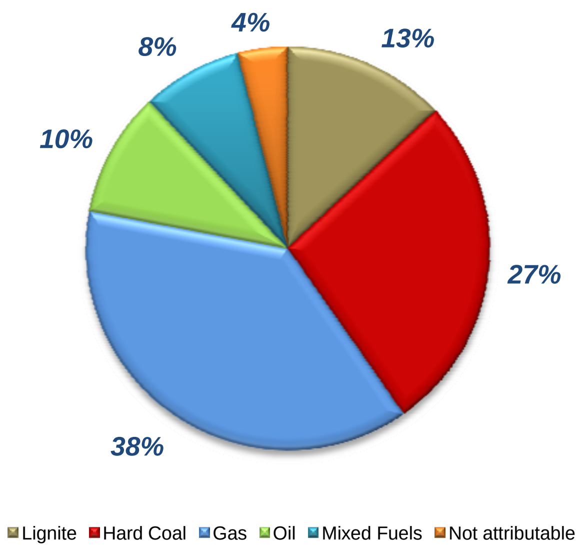

Figure 3.6: The share of the different fossil fuels in the generating fossil fuel capacity mix in December 2009

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The generating capacity of lignite and mixed-fuels units decreased (-8% and -14% respectively); on the other hand coal, gas fired and oil units increased. The highest increase is recorded for oil units (9% e.g. in Cyprus, Italy, Northern Ireland, Germany, etc.) and gas fired units (9% as well caused mainly by an increase in Austria, Portugal, France, Croatia, Italy, etc.).

	December 2008	December 2009	Difference between 2009 to 2008	
			Absolute value (MW)	%
Fossil Fuels	417 624	429 177	11 552	3%
Lignite	60 948	56 044	-4 904	-8%
Hard Coal	111 307	116 849	5 541	5%
Gas	148 157	161 727	13 570	9%
Oil	39 308	42 888	3 580	9%
Mixed Fuels	40 253	34 573	-5 680	-14%
Not attributable Fossil Fuels	17 651	17 096	-555	-3%

Tab. 3.5: Overview of Fossil Fuels generating capacity mix in December 2008 and 2009 (MW)

3.3.1.2 RENEWABLE ENERGY SOURCES

This category includes also run-of-river hydro power plants and other types of hydro power plants (HPP) which could be considered as renewable energy source and for the first time as a separate category also biomass power plants. For more details see chapter 1.3 System Adequacy Retrospect Data.

The total share of RES as percentage of the NGC was 23% for the whole ENTSO-E. The highest increase was recorded for solar (67%) and wind (21%). The reported increase of biomass (655%) cannot be considered as representative (see explanation above). Table 3.6 and Figure 3.7 below show this situation.

More than 50% of the RES generating capacity consists of HPP. Other contributions are wind 36%, solar 7% and biomass 5%.

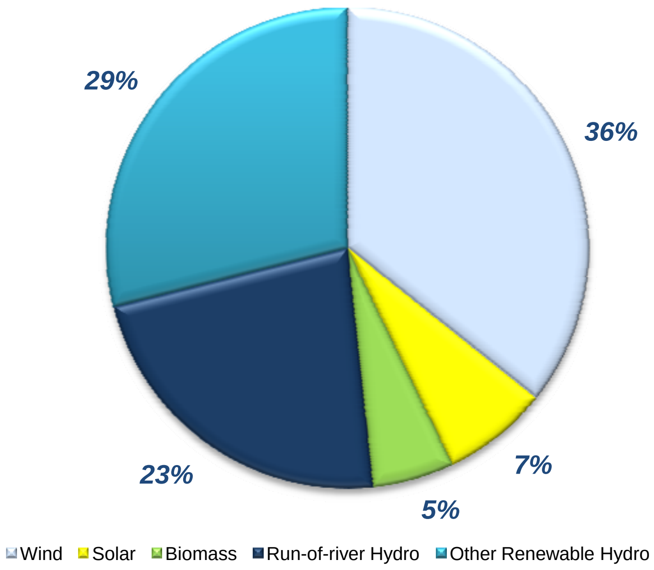


Figure 3.7: The share of the different RES categories in the generating RES generation capacity mix in December 2009

	December 2008	December 2009	Difference 2009 to 2008	
			Absolute value	%
Renewable Energy Sources	161 967	196 517	34 551	21%
Wind	56 398	68 329	11 930	21%
Solar	8 150	13 587	5 437	67%
Biomass	1 383	10 440	9 057	655%
Run-of-river PowerPlants	40 648	43 546	2 898	7%
Other Renewable Hydro Power Plants	44 220	55 346	11 126	25%

Tab. 3.6: Overview of RES generating capacity mix in December 2008 and 2009 (MW)

Considering only wind, solar and biomass as RES, the comparison between 2008 and 2009 would be the following (see figures 3.8 and 3.9 below). The share of wind capacity as part of the total RES capacity in both years is significant and is between 73% in 2008 and 70% in 2009. The sum of the categories other RES and biomass in 2008 result in the same share as part of the total RES capacity as the sum in 2009, namely about 16%. In 2008 these categories were considered as one category (other RES only). In 2009 the share of installed wind capacity as part of the total RES capacity decreased by 3% and the share of installed solar capacity as part of the total RES capacity increased with the same rate, i.e. 3%. It indicates that solar technology is starting to become more popular among investors in RES capacity.

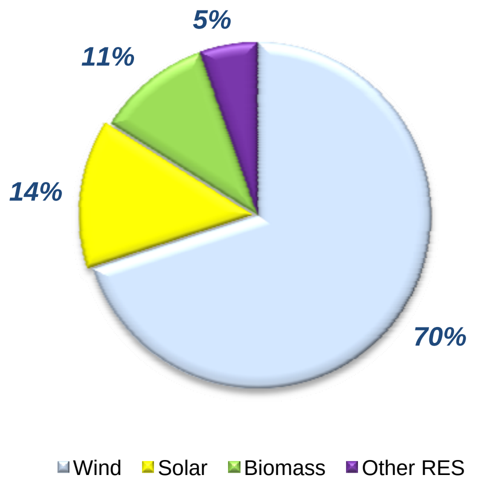


Figure 3.8: ENTSO-E RES generating capacity mix in December 2008

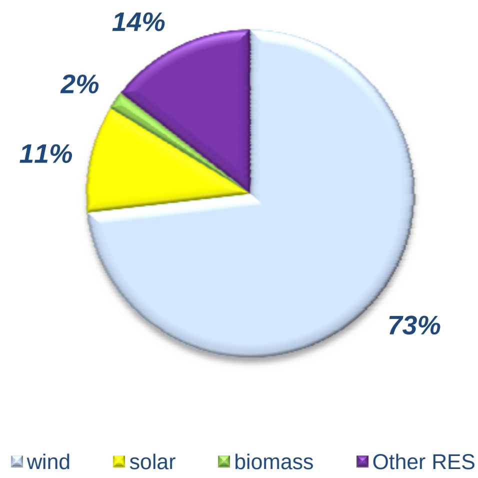


Figure 3.9: ENTSO-E RES generating capacity mix in December 2009

3.3.1.3 NUCLEAR POWER

From April 2009 on the nuclear generating capacity slightly increased in some ENTSO-E countries thanks to minor modifications (Belgium with an annual growth of 0.1%, Czech Republic 0.2%, the Netherlands 0.4% and Slovakia 0.3%).The evolution of the nuclear generating capacity in 2008 and 2009 is shown in Figure 3.10 below. The drop in December 2008 and drop between December 2008 and January 2009 is caused by Slovakia (for more information see chapter 3.3.2).

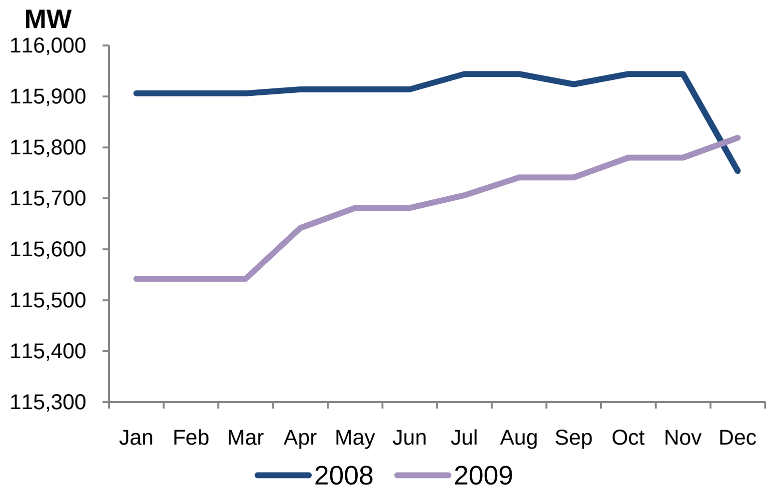


Figure 3.10: ENTSO-E Nuclear generating capacity in 2008 and 2009

The share of the nuclear generating capacity in some individual ENTSO-E countries as a part of the total installed nuclear capacity in ENTSO-E in 2009 is shown in the figure below (Figure 3.11; category others means countries with a share of less than 3.5%). France (50%) together with Germany (16%) made up 66% of total ENTSO-E nuclear generating capacity. A similar situation was reported in 2008 with almost the same numbers.

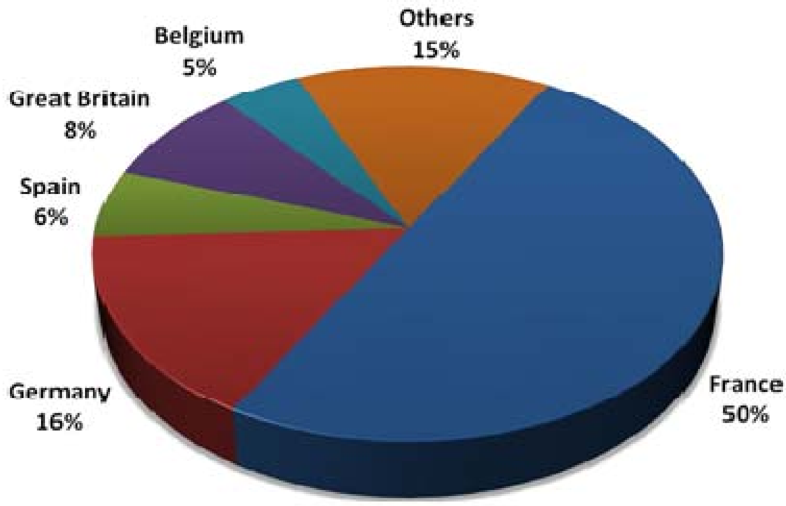


Figure 3.11: The share of nuclear generating capacity in the individual ENTSO-E countries as part of the total installed nuclear capacity in ENTSO-E in 2009

3.3.1.4 NON-RENEWABLE HYDRO POWER

Unless stated otherwise, hydro power plants (HPP) generating capacity in this chapter is considered as a capacity without the part of HPP to be considered as renewable energy source (for more details see Chapter 1.3).

The evolution of the generating capacity of this kind of power plants is shown below (Figure 3.12). It is clearly visible, that during both years no significant changes or fluctuations were recorded.

The notable drop between 2008 and 2009 (about 25 GW) is caused mainly by the lack of data for this category for 2008. Some countries were not able to provide proper data according to the request and some of countries did not provide data for 2008 at all. For more information see also chapters 2.3.1.4 and 1.3.

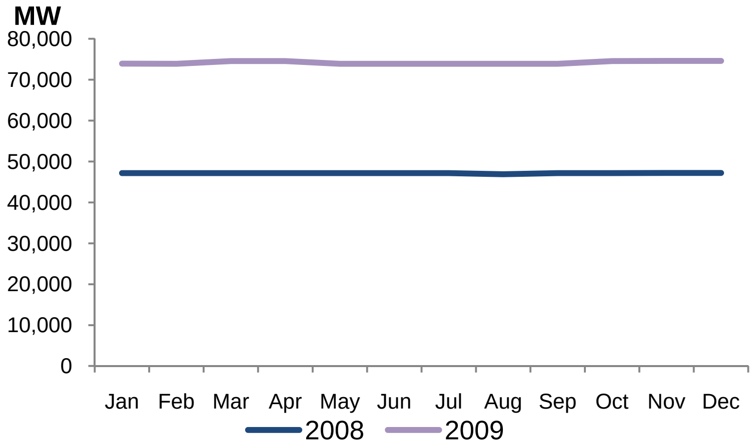


Figure 3.12: Non-renewable Hydro power plants generating capacity in 2008 and 2009

Adding the renewable HPP to the non-renewable HPP generating capacity influenced the evolution as shown in Figure 3.13.

Some changes are recorded for e.g. in Spain (an increase of about 128 MW in February as a sum a number of smaller hydro power plants) and in Norway (an increase of about 297 MW in December) in 2009.

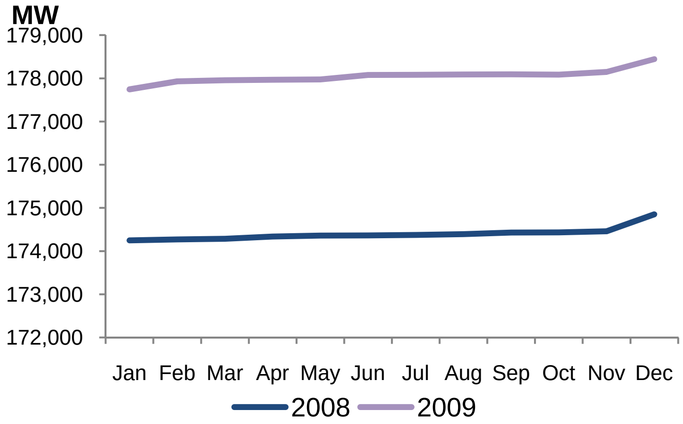


Figure 3.13: Total Hydro Power Plants generating capacity in 2008 and 2009

3.3.2 NATIONAL COMMENTS ON GENERATING CAPACITY

AT – Austria

567 MW of total Austrian fossil fuels power plants is considered as not attributable fossil fuels power plants.

BE – Belgium

In 2009 724 MW of new installed capacity directly connected to the Elia grid was commissioned, namely one major CCGT (460 MW), 91 MW of onshore wind, 25 MW of offshore wind, 90 MW of biomass/waste and 58 MW of CHP-gas. A total of 66 MW of installed capacity connected to the Elia grid was decommissioned, of which one unit of 20 MW that was decommissioned at the end of 2008.

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 2009, the installed generation capacity of this type of units totalled 1654 MW. An application of the allocation rule explained above resulted in the following split-up: 1387 MW of fossil fuel power stations and 267 MW of installed generating capacity of renewable energy sources.

The Elia grid is limited to a voltage level of 30 kV or higher. Fossil-fuel power stations connected to a voltage below 30 kV are classified as non-attributable fossil-fuel power stations.

FR – France

The production capacity on both transmission and distribution networks has increased of 2610 MW in 2009 (+2.2%).

The nuclear production capacity has decreased of 130 MW in the end of December (out of service of the nuclear reactor of research Phénix).

The production capacity connected to the transmission network has increased of about 1330 MW due particularly to the connection of:

- two combined cycle gas units at 400 kV with a production capacity of 2446 MW, in the east of France;
- a combined cycle gas unit at 225 kV with a production capacity of 405 MW, in the north of France;
- a combustion turbine at 225 kV with a production capacity of 187 MW, in the east of Paris.

On the distribution networks, further important development of wind generation with an increase of about 1070 MW of installed capacity and increase of photovoltaic generation which reaches about 185 MW of installed capacity.

HR – Croatia

Small HPP are included in run-of river power plants. In July 2009 the new combined cycle systems were commissioned, namely block L in TE-TO Zagreb (110 MW) started test operation. In August 2009 the new wind power farm Vrataruša (42 MW) started test operation.

HU – Hungary

Biomass includes equivalent capacity of biomass co-firing.

IE – Ireland

233 MW of renewable wind generation was added to the Irish power system in 2009. A small 27 MW steam turbine, part of a gas-fired CCGT, was decommissioned in September 2009.

IS – Iceland

There were no new generating units connected to the transmission network in 2009, but the demand should be met at all the time with installed generating capacity 2 577 MW and peak load 2 072 MW.

NI – Northern Ireland

Nine generating units (1 805 MW) are capable of running on mixed fuels - the data has identified which fuel type these have been run on and been added into the appropriate fuel type.

Renewable energy sources include Land Fill Gas as well. Hydro power plants includes also tidal power plants.

PL – Poland

NGC in Poland during the year 2009 was stable; some decommissioned units at the beginning of the year were replaced by the new conventional thermal unit in Lagisza power plant commissioned in August (synchronous work since 14 February). Wind capacity growth amounted 50%, however it was only 2% of total NGC in Poland (0.9% for production).

PT – Portugal

In 2009 a new large combined cycle with 870 MW was commissioned. New wind power stations, totalizing about 700 MW, were the other main responsible for the increase in NGC.

The renewable generating capacity maintained high increasing rates. In Portugal, about 15% of electricity demand in 2009 was supplied by wind.

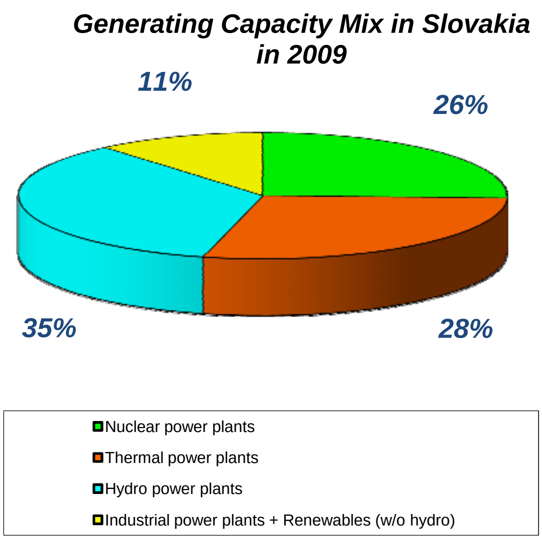
In 2009 the hydro generation supplied about 14% of the electricity demand.

SI – Slovenia

No commission or decommission in 2009. In December 2009 pump-storage HPP Avce started test operation.

SK – Slovakia

Compared to 2008, the net generating capacity was lower due to decommissioning of the second unit of nuclear power plant in Jaslovské Bohunice (440 MW) at the end of 2008. In the second half of 2009 small increase of capacities of two units of nuclear power plant in Jaslovské Bohunice (74 MW in total) was recorded. No other significant unit was put into operation in 2009.



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3.4 UNAVAILABLE CAPACITY

3.4.1 ENTSO-E OVERVIEW

The Unavailable Capacity is the part of the Net Generating Capacity that is not reliably available to power plant operators due to limitations of the output of power plants. It consists of the Non-Usable Capacity, System Services Reserve, Maintenance and Overhauls and Outages. For more details see chapter 1.2 Definitions.

Unavailable Capacity (MW)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2008	200 417	216 804	219 321	237 751	252 117	255 342	252 003	259 712	263 992	250 012	223 332	207 496
2009	210 697	216 674	232 967	260 722	276 758	272 793	271 201	284 881	279 334	273 526	256 095	228 461

Tab. 3.7: ENTSO-E Unavailable Capacity overview

The structure of the Unavailable capacity and the comparison between 2008 and 2009 are showed on the figures 3.14 and 3.15 below.

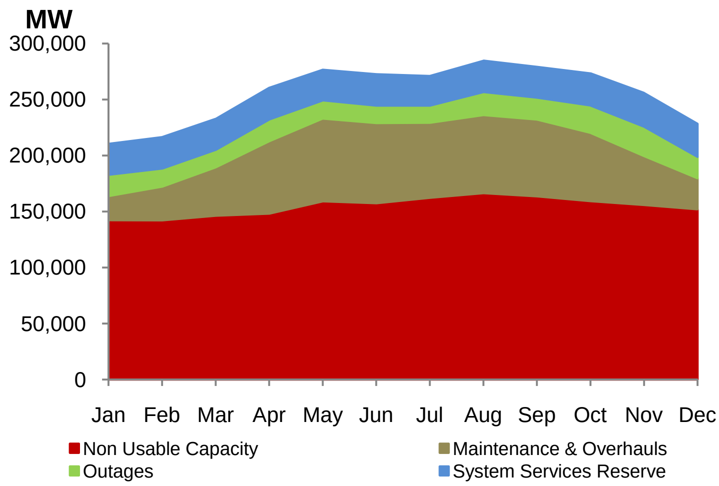

Figure 3.14: Unavailable capacity overview for 2009

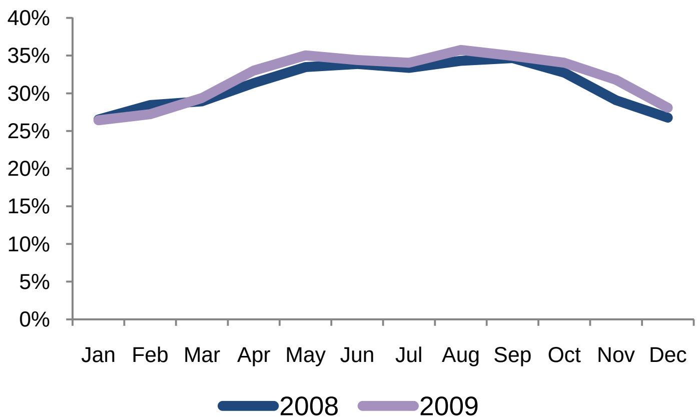

Figure 3.15: Comparison of Unavailable Capacity as a part of NGC in 2008 and 2009

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3.4.1.1 NON-USABLE CAPACITY

This capacity represents aggregated reductions of the NGC due to the following causes:

- Limitation due to intentional decision by the power plant operators (e.g. power stations in mothball which may be re-commissioned if necessary or power stations bound by local authorities which are not available for interconnected operation)
- Unintentional temporary limitation (e.g. power stations which output power cannot be fully injected due to transmission constraints)
- Limitation due to fuel constraints management
- Limitation reflecting the average availability of the primary energy source (e.g. hydro power stations)
- Limitation due to other external constraints (e.g. power stations with output power limitation due to environmental constraints)

For more details see Methodology document[10].

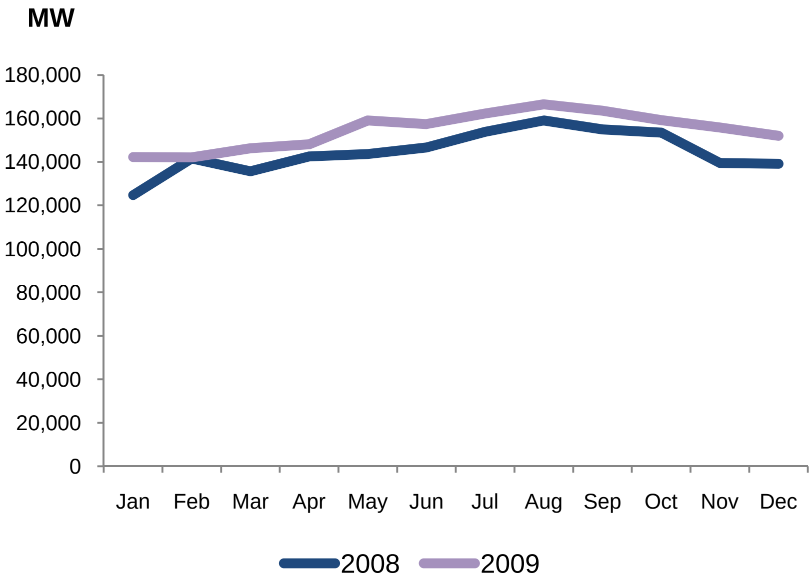

Figure 3.16: Comparison of Non-Usable Capacity in 2008 and 2009

On the above Figure 3.16 the Non-usable Capacity in 2008 and 2009 is shown. The evolution of both lines is almost identical however values in 2009 are higher than 2008 for each month. Non-usable Capacity in 2009 was continually increasing till August (except for a small decrease in June) and after this month it began to decrease. The Figure 3.17 below shows the Non-usable Capacity as a part of NGC in 2008 and in 2009.

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[10] http://www.entsoe.eu/fileadmin/user_upload/_library/publications/ce/UCTE_System_Adequacy_Methodology.pdf

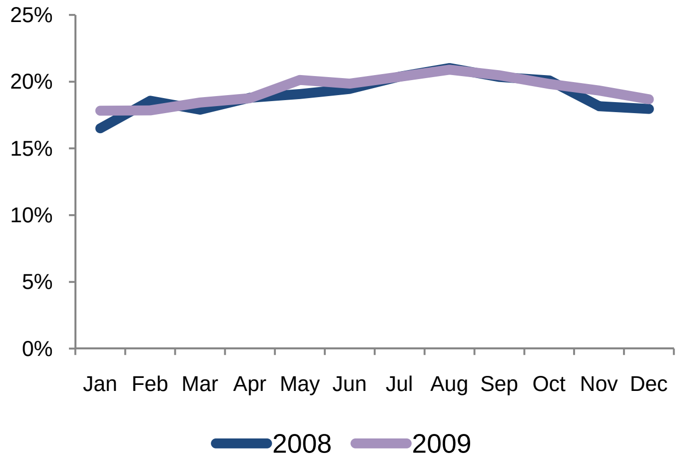

Figure 3.17: Non-Usable Capacity as a part of NGC in 2008 and 2009

One can see that there were no significant differences between 2008 and 2009 and the evolution of the non-usable capacity is almost the same as in 2008.

3.4.1.2 SYSTEM SERVICES RESERVE

System Services Reserve is a part of the NGC required to compensate for real-time unbalances or to control the voltage, the frequency, etc. (Primary Control Reserve, Secondary Control Reserve and the amount of Tertiary Reserve, which can be activated within one hour, and which is required by the TSO according to its operating rules). System Services Reserve does not include longer-term reserve prior to one hour.

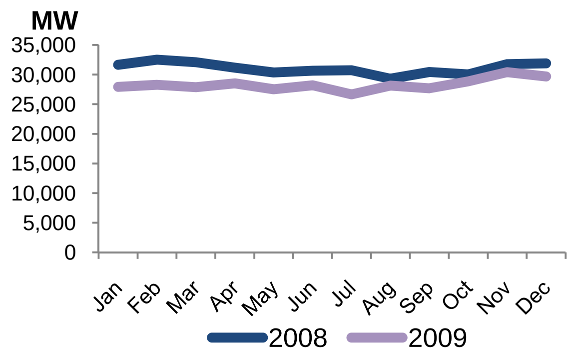

Figure 3.18: Amount of System Services Reserve in 2008 and 2009

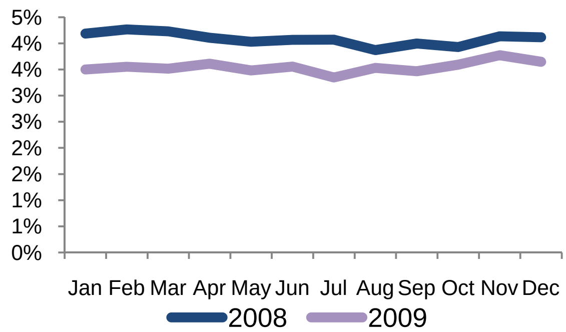

Figure 3.19: System Services Reserve as a part of NGC in 2008 and 2009

3.4.1.3 MAINTENANCE AND OVERHAULS

This category represents scheduled and organised unavailability of generating capacity for regular inspection and maintenance, including recharging of fuel elements in nuclear power plants.

In the Figure 3.20 below the evolution of this category as percentage of NGC throughout the year is given for 2008 and 2009. This figure illustrates the typical behaviour of this kind of unavailable capacity. I.e. during summer months this capacity is on its highest levels whereas during winter this capacity must be available to cover traditional higher loads. This rule can be applied for almost all countries except for those with peak loads during summer months.

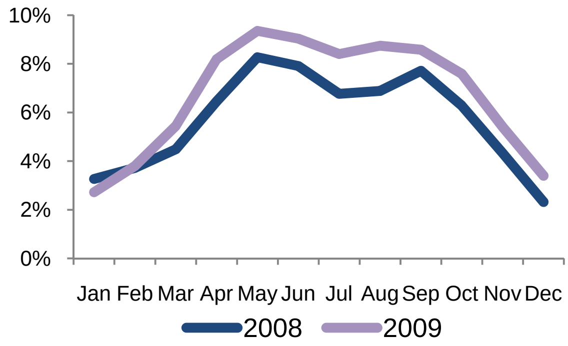

Figure 3.20: Maintenance and overhauls as a part of NGC in 2008 and 2009

3.4.1.4 OUTAGES

Forced unavailability of generating capacity, i.e. not scheduled and not included in Maintenance and Overhauls is considered as an Outage.

The evolution of Outages in 2008 and 2009 is depicted below. Both curves are quite similar with more significant increase compared to 2008 in October (mainly in Germany, France and Poland) and November (mainly in Belgium where a 1 GW nuclear unit was unexpected unavailable at the reference time in November, and in Germany).

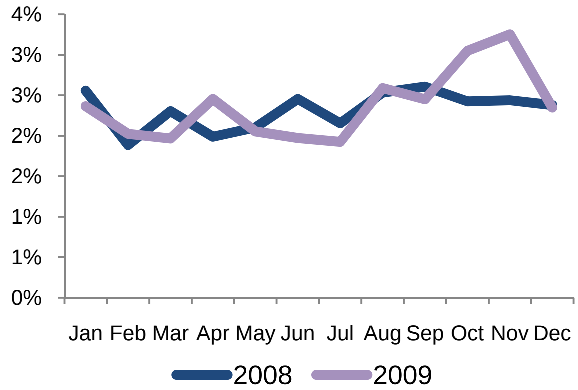

Figure 3.21: Outages as a part of NGC in 2008 and 2009

3.5 RELIABLY AVAILABLE CAPACITY

Reliably Available Capacity (RAC) of a power system is the difference between Net Generating Capacity and Unavailable Capacity. RAC is the part of the NGC actually available to cover the load at a reference point.

Figure 3.22 shows the RAC as a part of the NGC in absolute values for 2009. Minimum values are reported during summer months (May and August), when Unavailable Capacity is at the highest level. Figure 3.23 shows on the other hand the share of RAC as percentage of NGC in 2008 and 2009. Although in absolute values the RAC in each month of 2009 was higher than in

2008 its share in NGC was lower. Probably this is caused by the fact that the Unavailable Capacity was higher as well, especially its part related to maintenance and overhauls.

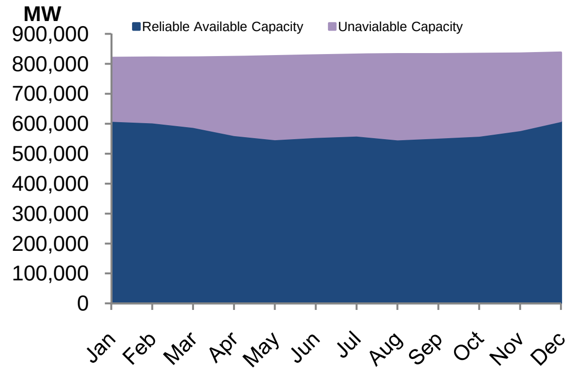

Figure 3.22: RAC as a part of NGC in absolute values for 2009

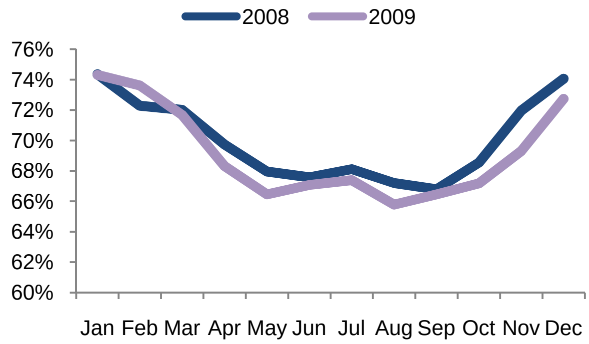

Figure 3.23: RAC as a part of NGC

3.6 GENERATION ADEQUACY

3.6.1 REMAINING CAPACITY

Remaining Capacity (RC) is the part of the Net Generating Capacity (NGC) 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.

3.6.1.1 ENTSO-E OVERVIEW

Remaining Capacity (MW)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2008	168 652	163 935	181 983	173 616	181 593	180 052	183 381	198 712	174 603	185 493	191 231	190 248
2009	198 306	200 087	230 158	226 691	217 519	211 950	210 144	218 983	206 014	185 464	205 295	182 675

Tab. 3.8: ENTSO-E Remaining Capacity overview

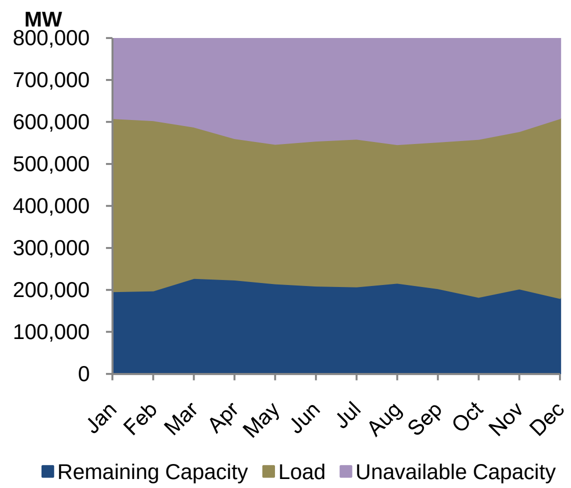

Figure 3.24: Remainig Capacity as a part of NGC in absolute values for 2009

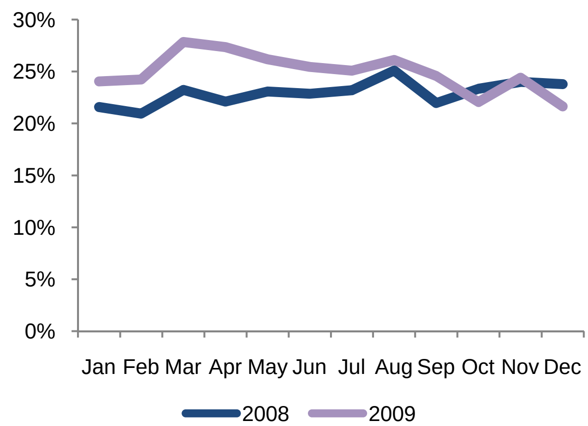

Figure 3.25: Remainig Capacity as a part of NGC in 2008 and 2009

Remaining capacity (RC) was during the whole year 2009 higher than in 2008 (see figure 3.25 above) except for October and December when it was lower. It was probably caused by the higher load in these two months comparing to 2008 and by the lower RAC in the whole year 2009. The unexpected growth of RC in November was caused by the fact that load in November 2009 was almost the same as in October 2009 whereas the RAC in 2009 was constantly increasing.

3.6.1.2 NATIONAL REMAINING CAPACITY

In the majority of ENTSO-E countries the RC was during whole year positive (even when not considering exchanges). This situation is showed on following Map 3.3 where the numbers of reference points with a negative RC are highlighted. The RC including exchanges is shown on Map 3.4. In this case almost every country had positive values for the RC for each month of the year. In Serbia one reference point showed a negative RC including exchange balance (namely in August) due to the exporting character of the country at the assessed reference points.

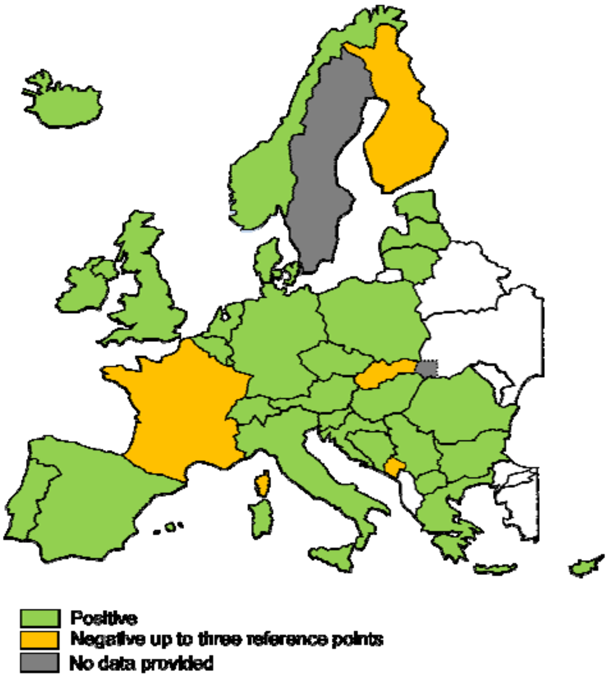

Figure 3.3: Reference points with negative RC in 2009 (w/o exchanges)

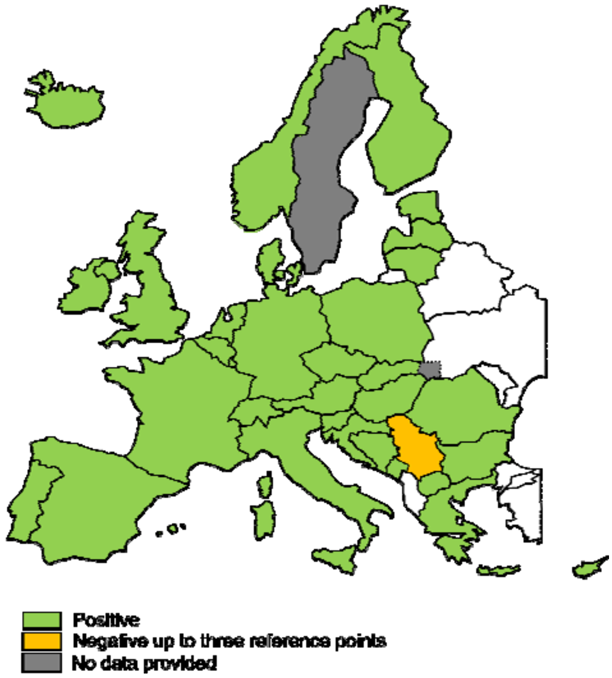

Figure 3.4: Reference points with negative RC in 2009 (incl. exchanges)

3.6.1.3 NATIONAL COMMENTS ON REMAINING CAPACITY

BE – Belgium

In 2009 the remaining capacity without exchanges at the reference time was sufficient to reach an adequacy between generation and consumption in Belgium without having to rely on import. The relatively high level of remaining capacity in 2009 is partially correlated with the impact of the financial and economic crisis on the load. The remaining capacity without exchanges at the reference time was only lower than 5 % of the net generation capacity in December 2009.

The system services reserve consists of 97 MW primary reserves, 798 MW minutes reserve and 252 MW other reserves. Only 537 MW (137 MW secondary reserves and 400 MW tertiary reserves) of the minutes reserve is considered. The remaining 261 MW of the minutes reserve are load shedding contracts with industrial customers. This type of reserve is not included in the ENTSO-E definition of system services.

The 252 MW 'Other reserves' is contractually imposed by Elia on the generator with the biggest unit, but is not 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 ENTSO-E rules.

DE – Germany

During all the months, the remaining capacity without exchanges totalled more than 5 % of the generating capacity.

GR – Greece

For Wind and Solar units, the usage rate is estimated i.e. the produced energy divided by the maximum energy that could be produced based on the installed capacity. This ratio (%) refers to the Usable Capacity, while the remaining ratio multiplied by the Installed Capacity is considered as Non-Usable Capacity.

IE – Ireland

There was adequate generating capacity available to meet demand and system reserve requirements at all times in 2009.

IS – Iceland

Iceland is an islanded system, and therefore there shall always be a remaining production capacity for the demand at all the time. That has to be taken into account when planning maintenance in the system.

PL – Poland

No special comments on remaining capacity. The level of RC was high, especially in first half of the year 2009 due to lower demand as the result of economic and financial world crisis.

SK – Slovakia

Remaining capacity in Slovakia was during whole 2009 positive with only three exceptions in January, August and October. It was caused mainly by higher load together with higher amount of non-usable capacity and maintenance. These three parameters were the worst in October, when Remaining capacity is the lowest (-346 MW).

3.6.2 REMAINING MARGIN

3.6.2.1 ENTSO-E 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.

2009	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Remaining Capacity	197 305	199 100	228 975	224 981	215 992	210 811	208 555	217 470	204 654	183 803	203 646	181 274
Margin Against Monthly Peak Load	43 499	31 239	41 666	37 380	30 330	21 166	18 751	29 668	27 259	18 829	42 786	25 885
Remaining Margin	153 806	167 861	187 309	187 601	185 662	189 645	189 167	187 802	177 395	164 974	160 860	155 389

Tab. 3.9: ENTSO-E Remaining Margin overview (MW)

From March till August 2009 the amount of remaining margin was almost stable. The whole year 2009 this value was positive and higher than 5 % of NGC. This means that the ENTSO-E system as such did not rely on imports of electricity from third countries and had enough generating capacity to cover its demand at any time during the year. Figure 3.5 shows this based on the aggregated values of the different countries. Figure 3.6 shows the Margin against Monthly Peak load as a part of Remaining capacity.

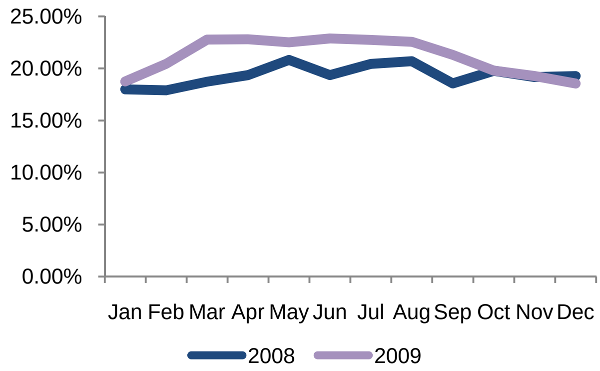

Figure 3.5: Remaining Margin as a part of NGC in 2008 and 2009

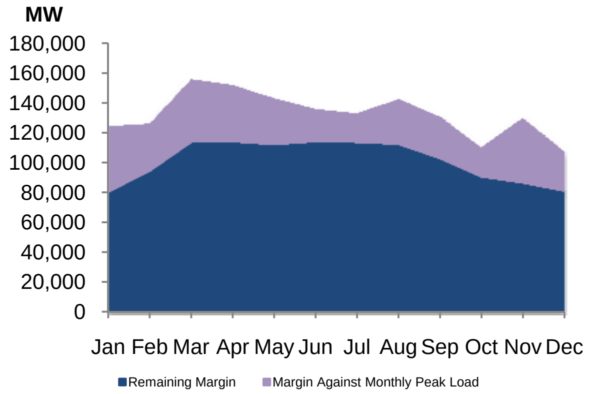

Figure 3.6: Remaining Margin plus Margin Against Monthly Peak Load in absolute values for 2009

Appendix 1 - Data Representativeness

Table of countries with data representativeness index different 100%.

Representativity index	2008		2009	
	Power	Generation	Power	Generation
ES	98%	98%	98%	98%
IS	98%	100%	98%	100%
LT	98%	98%	98%	98%
PT	97%	97%	97%	97%
SI	93%	93%	95%	95%

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

Appendix 2 - Power units commissioning/decommissioning

Capacity is reported in MW. Unless stated otherwise, all below reported information refer only to commissioning.

AT – AUSTRIA

Year	Month	Name	Capacity	Type	Comment
2009	5	Simmering 1	800	Fossil fuels - gas	800 MW after repowering
2009	6	Timelkam	405	Fossil fuels - gas	
2009	9	Kraftwerk Hintermuhr	104	Hydro power	Before repowering: 36.2 MW; after repowering 104 MW
2009	7	Pumpspeicherkraftwerk Feldsee 1	70	Hydro power	
2009	3	Werfen/Pfarrwerfen	17	Hydro power	

BE – BELGIUM

Year	Month	Name	Capacity	Type	Comment
2009	2	C-Power (additional five turbines of first construction stage of 6 turbines)	25	Renewable energy sources - wind	
2009	7	Electrawinds Biomassa Oostende	17	Renewable energy sources - other	
2009	7	Windvision Windfarm Estinnes	66	Renewable energy sources - wind	
2009	6	Biostoom Oostende	18	Renewable energy sources - other	
2009	5	Intradel Herstal	30	Renewable energy sources - other	
2009	5	Lanxess Rubber	58	Fossil fuels - gas	
2009	3	Biowanze	25	Renewable energy sources - other	
2009	3	Amercoeur 1R	460	Fossil fuels - gas	

2009	2	Greenwind - Froidchappelle	25	Renewable energy sources - wind	
2008	12	C-Power	5	Renewable energy sources - wind	
2008	4	Ham32	52	Fossil fuels - gas	
2008	12	Exxon Mobil	140	Fossil fuels - gas	
2008	5	Ham31	52	Fossil fuels - gas	
2009	12	Schaarbeek TJ	20	Fossil fuels - oil	Decommissioned
2009	8	Ham Diesel 3	23	Fossil fuels - oil	Decommissioned
2009	10	Langerbrugge 20	23	Fossil fuels - gas	Decommissioned
2008	1	Mol 11	124	Fossil fuels - mixed fuels	Decommissioned
2008	3	Esso	39	Fossil fuels - gas	Decommissioned

BG – BULGARIA

Year	Month	Name	Capacity	Type	Comment
2009	12	Sveti Nikola Wind Park	156	Renewable energy sources - wind	
2008	4	Kaliakra wind power	35	Renewable energy sources - wind	Mitsubishi - BG joint venture

CH – SWITZERLAND

Year	Month	Name	Capacity	Type	Comment
2009			135	Hydro power	
2009			4	Not clearly identifiable	
2009			34	Fossil fuels	
2008			24		11 MW fossil fuels +3 MW hydro +10 non identifiable

CY – CYPRUS

Year	Month	Name	Capacity	Type	Comment
2009	6	INTERNAL COMBUSTION ENGINE PLANT (ICE)	52	Fossil fuels - oil	
2009	11	COMBINED CYCLE POWER PLANT (CCPP)	220	Fossil fuels - oil	Operating as open cycle GT1&GT2 (72.5 MW*2) were commisioned in 2008. at 11/11/2009 commisioned as combined cycle.

ES – SPAIN

Year	Month	Name	Capacity	Type	Comment
2009			1 851	Renewable energy sources - wind	
2009			216	Renewable energy sources – other	
2009	5	MALAGA	433	Fossil fuels - gas	
2008	4	SOTO DE LA RIBERA 4	418	Fossil fuels - gas	
2009	10	Cristobal Colón 3	155	Fossil fuels - oil	Decommissioned
2009	8	Aceca 2	314	Fossil fuels - mixed fuels	Decommissioned
2008	1	SAN ADRIAN 2	325	Fossil fuels - oil	Decommissioned

FI – FINLAND

Year	Month	Name	Capacity	Type	Comment
2009		Suomenoja 3	234	Fossil fuels - gas	This district heating CHP (Combined Heat and Power) unit was the only major plant commissioned in 2009. In addition some smaller district heating and industrial CHP plants were commissioned. Renovation increased a little the output of some hydro power stations. One industrial CHP plant was decommissioned.

FR – FRANCE

Year	Month	Name	Capacity	Type	Comment
2009	11	Emile-Huchet	446	Fossil fuels - gas	
2009	10	Vaires-sur-Marne	187	Fossil fuels - oil	
2009	11	Emile-Huchet	446	Fossil fuels - gas	
2009	1	La Lombardie	15	Fossil fuels - mixed fuels	
2009	4	Quartes	405	Fossil fuels - gas	
2009	8	Richier	63	Fossil fuels - gas	
2008	12	Richier	451	Fossil fuels - gas	
2008	11	Vaires-sur-Marne	374	Fossil fuels - oil	
2008	3	Espiers	52	Renewable energy sources - wind	
2008	9	Salles-Curan	87	Renewable energy sources - wind	
2008	3	Villeseque-des-Corbieres	51	Renewable energy sources - wind	
2009	12	Phenix	130	Nuclear power	Decommissioned
2008	1	Various (15 installations)	112	Fossil fuels - total	Decommissioned

GB – GREAT BRITAIN

Year	Month	Name	Capacity	Type	Comment
2009	5	Marchwood	840	Fossil fuels - gas	Stable full load running started 10 December 2009
2009	9	Langage	905	Fossil fuels - gas	
2009	8	Humber (Immingham CHP)	480	Fossil fuels - gas	New GT and ST extension to existing plant

GR – GREECE

Year	Month	Name	Capacity	Type	Comment
2008	5	MEGALOPOLI H/Z	60	Fossil fuels - total	New commissionings concerned mainly renewable power plants. 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

Year	Month	Name	Capacity	Type	Comment
2009	12	Power farm VE Orlice (10 MW) started in test operation.	10	Renewable energy sources - wind	New units icluded in Non-Usable Capacity
2009	8	Power farm VE Vrataruša (42 MW) started in test operation.	42	Renewable energy sources - wind	New units icluded in Non-Usable Capacity
2009	7	In July 2009 the new combined cycle systems: block L in TE-TO Zagreb (110 MW) started in test operation.	110	Fossil fuels - gas	New units icluded in Non-Usable Capacity

HU – HUNGARY

Year	Month	Name	Capacity	Type	Comment
2009		Dél-Nyírségi Bioenergia Művek	21	Renewable energy sources - other	Fuel: biomass
2009		Tiszaújvárosi CTK	10	Fossil fuels - gas	Fuel: exhaust gas of technology
2009		Kisigmánd	48	Renewable energy sources - wind	
2009		Bőnyi Szélerőműpark	25	Renewable energy sources - wind	
2008	10	Hungrana	27	Fossil fuels - total	
2008	12	Salgotarjan	9	Fossil fuels - gas	
2008	1	Paks NPP	23	Nuclear power	Repowering
2008	4	Nagylozs Wind	20	Renewable energy sources - wind	
2009		Dunapack Power Station	18	Fossil fuels - gas	Decommissioned
2009		Kelenföld Power Station	36	Fossil fuels - gas	Steam turbine unit - Decommissioned
2009		Kőbánya Power Station	20	Fossil fuels - gas	Decommissioned
2008	8	Szolnoki Cukorgyar	11	Fossil fuels - gas	Decommissioned

IE – IRELAND

Year	Month	Name	Capacity	Type	Comment
2009	3	Various	18	Renewable energy sources - wind	
2009	5	Knockstanna and Coomagearlahy 3	36	Renewable energy sources - wind	
2009	6	Sorne Hill extension	7	Renewable energy sources - wind	
2009	8	Coomacheo	18	Renewable energy sources - wind	
2009	8	Lisheen	55	Renewable energy sources - wind	
2009	9	Marina	27	Fossil fuel – gas	Decommissioned
2009	10	Meentycat2	14	Renewable energy sources - wind	
2009	12	Dromada	28	Renewable energy sources – wind	

2009	12	Boggeragh	57	Renewable energy sources - wind	

IT – ITALY

Year	Month	Name	Capacity	Type	Comment
2009		Renewable Wind	620	Renewable energy sources - wind	
2009		Renewable energy sources	824	Renewable energy sources - total	
2009	12	Thermal generation	1362	Fossil fuels - total	
2008		Thermal generation	4500	Fossil fuels - total	
2008		Renewable	550	Renewable energy sources - wind	

LT – LITHUANIA

Year	Month	Name	Capacity	Type	Comment
2009		Kreivenai	20	Renewable energy sources - wind	
2009		Sudenai	14	Renewable energy sources - wind	
2009		Vilniaus E-2	16	Renewable energy sources - biomass	
2009	12	Ignalinos NPP	1300	Nuclear Power	Decommissioned

NI – NORTHERN IRELAND

Year	Month	Name	Capacity	Type	Comment
2009	11	Tappaghan 2 Extension Wind Farm	9	Renewable energy sources - wind	
2009	1	Gruig Wind Farm	25	Renewable energy sources - wind	
2009	1	Garves Wind Farm	15	Renewable energy sources - wind	
2009	1	Slieve Divena Wind Farm	30	Renewable energy sources - wind	
2009	4	Kilroot (GT4)	42	Fossil fuels - oil	(GT4)
2009	4	Kilroot (GT3)	42	Fossil fuels - oil	GT3
2009	12	Contour Global	12	Non clearly identifiable	Four 3 MW Units
2008	6	Slieve Rushen 2	27	Renewable energy sources - wind	
2008	8	Owenreagh 2 Wind Farm	5	Renewable energy sources - wind	
2008	4	Bessy Bell 2 Wind Farm	9	Renewable energy sources - wind	

NL – NETHERLANDS

Year	Month	Name	Capacity	Type	Comment
2008	5	Q7	120	Renewable energy sources - wind	
2008		BMC M	34	Fossil fuels - gas	
2008		AVR BEC	20	Fossil fuels - gas	
2008		GEVUDO	25	Fossil fuels - gas	
2008		Pergen	240	Fossil fuels - gas	

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2009	7	CC-B	600	Fossil fuels - gas	Decommissioned

NO – Norway

Year	Month	Name	Capacity	Type	Comment
2009		Borregaard	20	Hydro power	
2009		Other changes	117	Hydro power	
2008		Other new production	155	Hydro power	
2008		Bessakerfjellet	28	Renewable energy sources - wind	
2008		Hundhammerfjellet	17	Renewable energy sources - wind	
2008		Sønnå	211	Hydro power	
2008		Leirfossene	49	Hydro power	
2008		Hunsfoss	15	Hydro power	
2008			23	Hydro power	Decommissioned

PL – Poland

Year	Month	Name	Capacity	Type	Comment
2009	3	Lagisza, unit no. 4	100	Fossil fuels - hard coal	Decommissioned
2009	3	Siersza, unit no. 4	110	Fossil fuels - hard coal	Decommissioned
2009	1-12	Sum of wind farms during the year 2009	218	Renewable energy sources - wind	
2009	8	Lagisza, unit no. 10	432	Fossil fuels - hard coal	First synchronisation - 14 February 2009
2008	8	Patnow 2, unit no. 9	430	Fossil fuels - lignite	
2008	2	Skawina 1, unit 1	82	Fossil fuels - hard coal	NGC decreasing for this unit. - Decommissioned
2008	1	Konin, unit no. 8, 9	223	Fossil fuels - lignite	Decommissioned

PT – Portugal

Year	Month	Name	Capacity	Type	Comment
2009	11	CC Barreiro	30	Fossil fuels - gas	
2009	7	CC SPCG	81	Fossil fuels - gas	
2009		Lares	870	Fossil fuels - gas	
2009	3	PE Penamacor	25	Renewable energy sources - wind	
2009	12	PE AltoArgani	36	Renewable energy sources - wind	
2009	4	PE Se.Alvão	40	Renewable energy sources - wind	
2009	6	PE Lousã 2	40	Renewable energy sources - wind	
2009	2	PE Arada-Mont	40	Renewable energy sources - wind	
2009	9	PE Bornes	60	Renewable energy sources - wind	
2009	10	PE BarãoSJoão	50	Renewable energy sources - wind	
2009	6	PE Toutiço	90	Renewable energy sources - wind	
2009	8	PE ChãoFalcão	41	Renewable energy sources - wind	
2008	3	PE Trancoso	28	Renewable energy sources - wind	

2008	8	CC Sinecogera	90	Non clearly identifiable	
2008	11	PE LagoaDJoo	31	Renewable energy sources - wind	
2008	12	CF Moura	35	Renewable energy sources - other	
2008	9	PE Gardunha	44	Renewable energy sources - wind	
2008	12	PE Arada-Mont	72	Renewable energy sources - wind	
2008	12	PE AltoMinho1	218	Renewable energy sources - wind	

RO – ROMANIA

Year	Month	Name	Capacity	Type	Comment
2009	11	Movileni	30	Hydro power	
2009	2	Raul Alb	18	Hydro power	
2008	11	Raul Alb	2017	Hydro power	
2008	11	UATAA Motru	5	Fossil fuels - lignite	
2008	11	Chimcomplex Borzesti	75	Fossil fuels - gas	
2008	9	Bucuresti Vest	161	Fossil fuels - mixed fuels	
2009	10	Paroseni	75	Fossil fuels - hard coal	Decommissioned

SI – SLOVENIA

Year	Month	Name	Capacity	Type	Comment
2008	4	TE Sostanj PE1	42	Fossil fuels - gas	
2008	9	TE Sostanj PE2	42	Fossil fuels - gas	
2008	10	TE Sostanj blok 2	25	Fossil fuels - lignite	Decommissioned

SK – SLOVAKIA

Year	Month	Name	Capacity	Type	Comment
2008	12	JAVYS B2	440	Nuclear power	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. - Decommissioned

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