UCTE

2 / 2003

Half-yearly Report

union for the co-ordination of transmission of electricity

What is the UCTE ?

The Union for the Co-ordination of Transmission of Electricity (UCTE) co-ordinates the interests of transmission system operators in 22 European countries. Their common objective is to maintain the security of operation of the interconnected power system.
50 years of joint activities laid the basis for a leading position in the world which the UCTE holds in terms of the quality of synchronous operation of interconnected power systems. Through the networks of the UCTE, 450 million people are supplied with electric energy; annual electricity consumption totals approx. 2300 TWh.

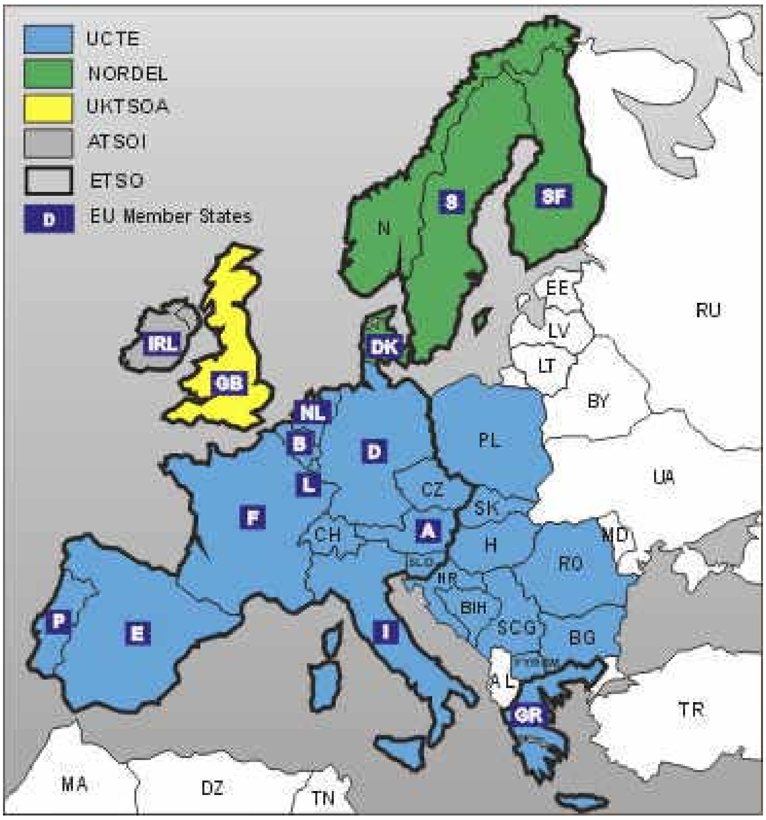
As of June 2003, the member companies of the UCTE come from the following countries :

Belgium (B)
Germany (D)
Spain (E)
France (F)
Greece (GR)
Italy (I)
Slovenia (SLO)
Croatia (HR)
Bosnia-Herzegovina (BiH)
Former Yugoslav Republic of Macedonia (FYROM)
Serbia and Montenegro (SCG)

Luxembourg (L)
The Netherlands (NL)
Austria (A)
Portugal (P)
Switzerland (CH)
Czech Republic (CZ)
Hungary (H)
Poland (PL)
Slovak Republic (SK)
Romania*
Bulgaria*

*Bulgaria and Romania are UCTE members since 8th May 2003, but statistically taken into account since January 2003.

With regard to the other members of ETSO (European Transmission System Operators, 36 Transmission System Operators in 22 countries), the geographical extension of UCTE is represented in the picture below :



Optimal Co-operation requires joint action

Close co-operation of member companies is imperative to make the best possible use of benefits offered by interconnected operation. For this reason, the UCTE has developed a number of rules and recommendations that constitute the basis for the smooth operation of the power system.Only the consistent maintenance of the high demands on quality will permit to set standards in terms of security and reliability in the future as well as in the past.

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

From the very outset of liberalisation in the European electricity markets, the UCTE has intensively pursued the development of schemes for the promotion of competition in the electricity sector. The aim is to support the electricity market without accepting restrictions in the security of supply. The liberalisation of electricity markets cannot be implemented without a transparent and non-discriminatory opening up of electric networks. The UCTE sets the prerequisites that enable a compromise to be ensured between competition and security of supply.

HALF-YEARLY REPORT II - 2003

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Chapter I -VI are based on values from the UCTE database from 3 March 2004

Electricity supply situation in UCTE countries in the summer period 2003

1.1 Introduction

This half-yearly report deals with the electricity supply situation, exchanges and load curves during the summer period 2003, i.e. from 1 April 2003 to 30 September, 2003.
The electricity consumption values in this report are gross values unadjusted for climatic factors and seasonal variations.

1.2 Electricity supply situation and peak load

The consumption of electricity on the UCTE interconnected system amounted to **1094.4 TWh** during this summer period. The increase of 3.2 % in comparison with the same period in 2002 is mainly due to new UCTE members in RO and BG. The highest consumption increase in the period of report was registered in August with 6.4 %, the lowest was registered in May with 1.5 %.
The peak load from all UCTE countries in the period of report amounted to 311.6 GW in June, this was 5.9% above value of June 2002 due to the new UCTE areas in RO and BG. Without RO and BG the inctrease was 2.6%.
The highest utilisation factor of maximum load was reported in August with 85.3%, while it reached 83.2% May 2002.

1.3 Generation and hydraulicity

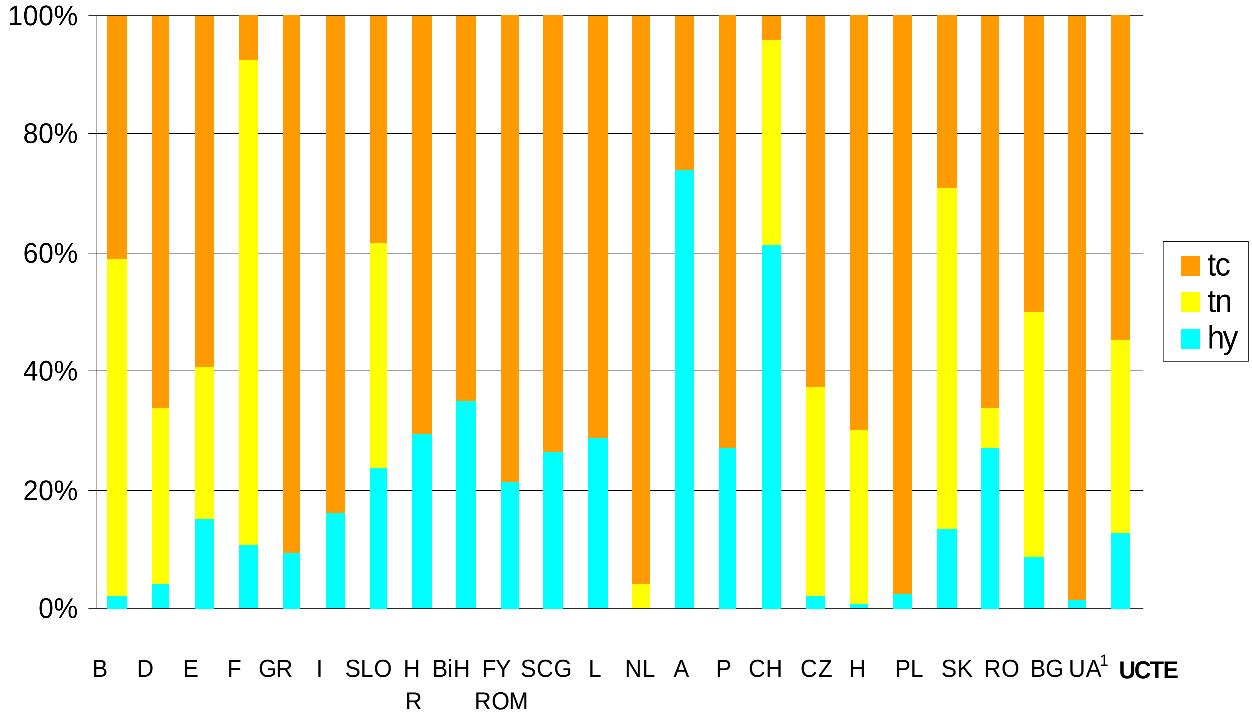
Total generation within UCTE in the period of report amounted to 1119.0 TWh (+7.2) and was made up by 12.6% generation from hydro power, 54.8% non-nuclear thermal generation and 32.6% nuclear generation. Considering the same area in 2002 and 2003 (without RO and BG), the increase amouded to only 3.3%.

G1 Generation within UCTE in the summer period — Results in TWh

	Hydro power	Nuclear power	Conventional power production	National
B	0.6	21.6	15.7	37.9
D	9.9	72.9	159.4	242.2
E	16.6	28.8	65.6	111.0
F	25.1	192.7	17.7	235.5
GR	2.2	0	22.4	24.6
I	22.6	0	117.3	139.9
SLO	1.3	2.1	2.1	5.6
HR	1.5	0	3.4	5.0
BiH	1.7	0	3.1	4.8
FYROM	0.6	0	2.1	2.7
SCG	4.1	0	11.6	15.8
L	0.5	0	1.1	1.6
NL	0	1.8	42.7	44.5
A	16.2	0	5.8	22.0
P	5.2	0	13.9	19.2
CH	21.1	11.9	1.4	34.3
CZ	0.7	12.5	22.2	35.4
H	0.1	4.3	10.2	14.6
PL	1.5	0	66.2	67.8
SK	1.7	7.3	3.7	12.7
RO	6.5	1.7	15.9	24.0
BG	1.6	7.5	9.0	18.1
UCTE	**141.2**	**365.1**	**612.6**	**1119.0**
BI-UA[1]	0.1	0	3.2	3.3

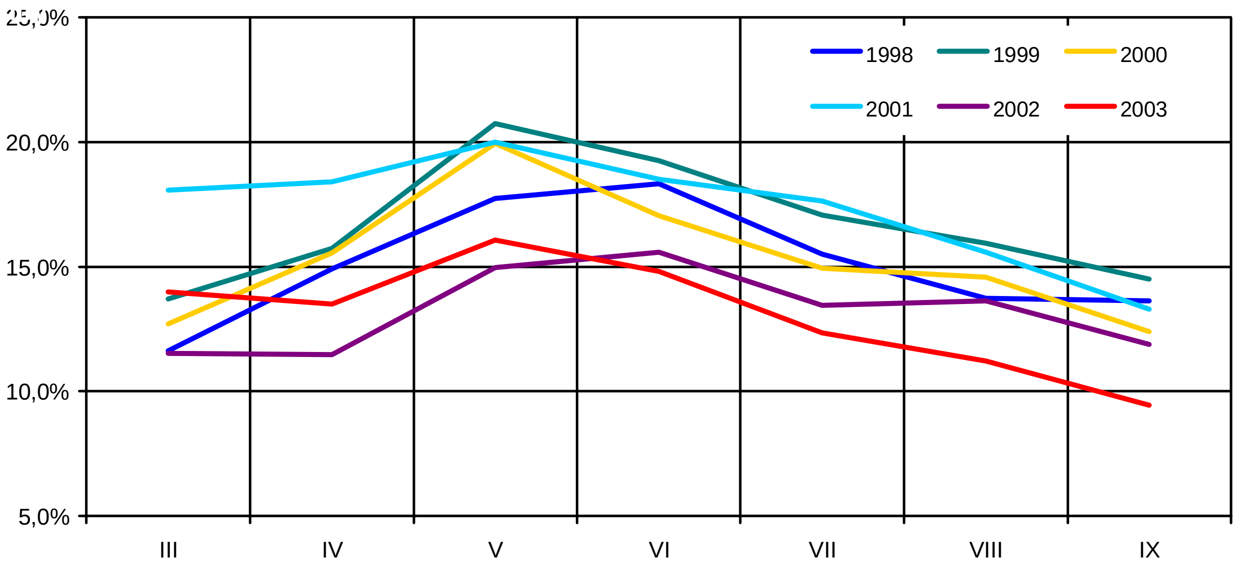
[1] Burshtyn Island part of Ukraina

G2 | Structure of generation within UCTE in the summer period



[1] Burshtyn Island part of Ukraina (BI-UA)

G3 | Percentage of hydropower generation in the aggregate consumption of all countries



1.4 Electricity exchanges

The total of electricity exchanges, including third countries, was 143251 GWh, corresponding to an increase of 5.1% as compared to the summer period 2002.

France continues to remain the main exporting country with 33.53 TWh where as the highest imports in the period of report were recorded in Italy with 25.01TWh.

T1 Balance[1] of exchanges within UCTE summer period — Results in GWh

Country	Import	Export	Balance
B	6752	4690	**2062**
D	22905	23772	**- 867**
E	5273	4124	**1149**
F	3750	33530	**- 29780**
GR	2475	1230	**1245**
I	25016	313	**24703**
SLO	3270	2951	**319**
HR	4276	2104	**2172**
BiH	1025	1266	**- 241**
FYROM	923	579	**344**
SCG	2385	1774	**611**
L	3177	1278	**1899**
NL	9689	1481	**8208**
A	9132	6118	**3014**
P	3173	1503	**1670**
CH	11685	16339	**- 4654**
CZ	4312	13199	**- 8887**
H	6921	3163	**3758**
PL	2395	6441	**- 4046**
SK	4495	5343	**- 848**
RO	472	1325	**- 853**
BG	511	3180	**- 2669**
III [2]	7548	9239	
UCTE	**134012**	**135703**	**- 1691**

[1] Balance = Import - Export

[2] Third countries : Albania, Belarus, Denmark (Jutland), Great Britain, Morocco, Republic of Moldavia, Sweden, Burshtyn Island part of Ukraina and Republic of Turkey

T3 Electricity supply situation in summer

Total consumption[1]			04/02-09/02	04/03-09/03	04/03	05/03	06/03	07/03	08/03	09/03
Volume [2]	A	**TWh**	1022,3	1094,0	185,7	180,8	180,2	188,8	177,4	181,2
Increase		**%**		3,2	1,6	1,5	3,5	4,4	6,2	2,4
Peak load [3]	B	**GW**	294,4	311,6	303,9	298,9	311,6	306,0	279,6	297,8
Increase		**%**		2,6	0,0	4,3	2,6	4,1	3,6	1,5
Utilisation factor of maximum load	$C^4 = \frac{A}{h \times B}$	**%**	79,1	79,9	84,9	81,3	80,3	82,9	85,3	84,5
Total Generation[1]										
Volume [2]		**TWh**	1043,6	1119,0	190,3	185,1	184,3	192,1	183,5	183,6
Increase		**%**		3,2	6,0	4,8	7,1	8,1	11,3	5,3
Hydroelectric generation [2]	D	**TWh**	137,8	141,2	25,1	29,1	26,7	23,3	19,9	17,1
Increase		**%**		2,5	24,7	12,9	2,0	-0,5	-9,2	-15,8
Thermal generation [5]	T	**TWh**	905,8	977,7	165,2	156,0	157,6	168,8	163,6	166,5
Increase		**%**		7,9	3,8	3,6	8,2	9,6	14,7	8,3
Non nuclear [2]	Tc	**TWh**	549,8	612,6	101,3	95,4	98,4	106,9	103,8	106,8
Increase		**%**		11,4	3,6	5,6	12,2	15,0	21,0	12,1
Nuclear [2]	Tn	**GWh**	356,0	365,2	64,0	60,6	59,2	61,9	59,8	59,7
Increase		**%**		2,6	4,3	0,5	2,1	1,5	5,1	2,0

T3 Electricity supply situation in summer

Electricity exchanges [2]			04/02-09/02	04/03-09/03	04/03	05/03	06/03	07/03	08/03	09/03
Volume total	Y	**TWh**	136,4	143,3	25,1	24,1	23,8	24,2	22,4	23,7
Increase		**%**		5,1	8,3	5,6	11,1	1,6	3,9	0,4
Volume of UCTE countries		**TWh**	119,4	126,5	22,1	21,1	21,0	21,6	19,4	21,2
Increase		**%**		5,9	7,3	6,4	12,3	4,0	3,3	2,5
Share in consumption	$L = \frac{Y}{A}$	**%**	13,34	13,09	13,52	13,34	13,22	12,82	12,60	13,06
Maximum parallel power [3]	M	**GW**	306,1	321,2	317,4	311,2	321,2	314,1	282,7	306,0
Load flow **day** [6]	N	**MW**	30842	30312	30312	28782	29858	24481	27272	28309
last year		**MW**		30842	27802	30842	28256	28594	26327	27135
Load flow **night** [6]	N	**MW**	28568	32284	32284	28740	28777	26136	27822	29042
last year		**MW**		28568	26783	24740	23801	25572	24742	28568

[1] Percentage as referred to total values (%)

	B	D	E	F	GR	I	SLO	HR	BiH	FY ROM	SCG	L	NL	A	P	CH	CZ	H	PL	SK	RO	BG	BI-UA
Consumption	99	94	94	97	93	100	95	100	99	100	96	99	100	90	91	100	100	100	100	100	100	100	100
Load	100	91	94	97	93	100	95	100	100	100	96	99	90	82	91	100	100	100	100	100	100	100	100
Production	99	94	94	97	93	100	95	100	99	100	96	98	100	84	91	100	100	100	100	100	100	100	100

[2] The UCTE values of 2003 comprise also the areas of the new member companies in Romania and Bulgarian.

[3] on the 3rd Wednesday

[4] h = number of hours in the considered period

[5] including deliveries from industriesof UCTE countries

[6] sum of exchange balances on all frontiers within the terriotory of UCTE on the 3rd Wednesday

Electricity supply situation in summer April 2003 - September 2003

T1 Electricity supply situation in summer April 2003 - September 2003

Country	Consumption[1] GWh	Increase[2] %	Load[1] max MW	Increase[2] %
B	39317	0.1	11137	-2.2
D	237297	1.1	70500	1.0
E	109747	6.1	33459	8.3
F	201205	2.4	56582	-6.2
GR	25388	4.2	8414	-6.3
I	159592	4.4	51820	2.5
SLO	5892	2.2	1749	3.9
HR	7076	4.5	2151	3.2
BiH	5391	n.a.	1396	n.a.
FYROM	2715	n.a.	950	n.a.
SCG	16200	n.a.	5123	n.a.
L	2922	1.0	830	12.4
NL	52695	0.8	12990	2.3
A	22910	0.2	7690	-0.7
P	20620	5.6	6453	0.6
CH	27850	3.1	8350	-1.8
CZ	26250	2.0	8687	12.2
H	18330	3.9	5296	0.9
PL	62629	4.1	18510	1.0
SK	11717	-0.5	3456	-1.3
RO	23042	n.a.	6228	n.a.
BG	15258	n.a.	4718	n.a.
UCTE	**1094043**	**3.2**	**311633**	**2.6**
BI-UA[3]	1627	n.a.	731	n.a.

[1] Percentage as referred to total values (%)
[2] Variation as compared to corresponding period of the previous year
[3] Burshtyn Island part of Ukraina

	B	D	E	F	GR	I	SLO	HR	BiH	FYROM	SCG	L	NL	A	P	CH	CZ	H	PL	SK	RO	BG	BI-UA[3]
consumption	99	94	94	97	93	100	95	100	99	100	96	99	100	90	91	100	100	100	100	100	100	100	100
load	100	91	94	97	93	100	95	100	100	100	96	99	90	82	91	100	100	100	100	100	100	100	100

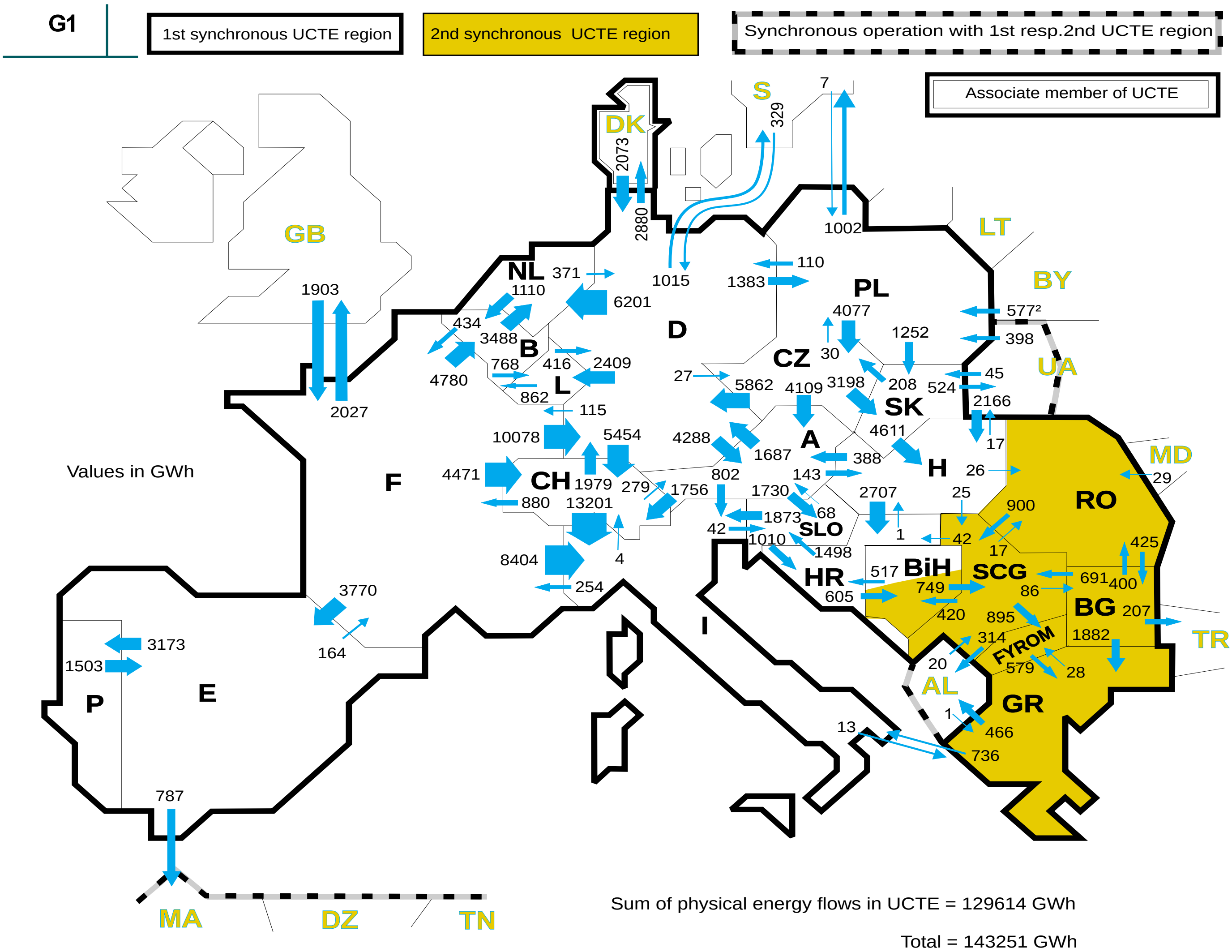
The annual peak load on the third Wednesday was registered by the various countries in the following months:

B	D	E	F	GR	I	SLO	HR	BiH	FYROM	SCG	L	NL	A	P	CH	CZ	H	PL	SK	RO	BG	BI-UA[3]	UCTE
V	IV	VI	IV	VII	VII	VI	VIII	IV	IV	IV	IV	IX	VI	VI	V	IV	VII	IV	IV	VI	IV	IV	VI

The fact that the maximum peak load occured in different months in the individual countries is due the different climatic and economic conditions as well as to particular national and contractual measures.

Physical energy flows — April 2003 - September 2003

G1



Sum of physical energy flows in UCTE = 129614 GWh

Total = 143251 GWh

T1 — Importing countries (columns) / Exporting Countries (rows)

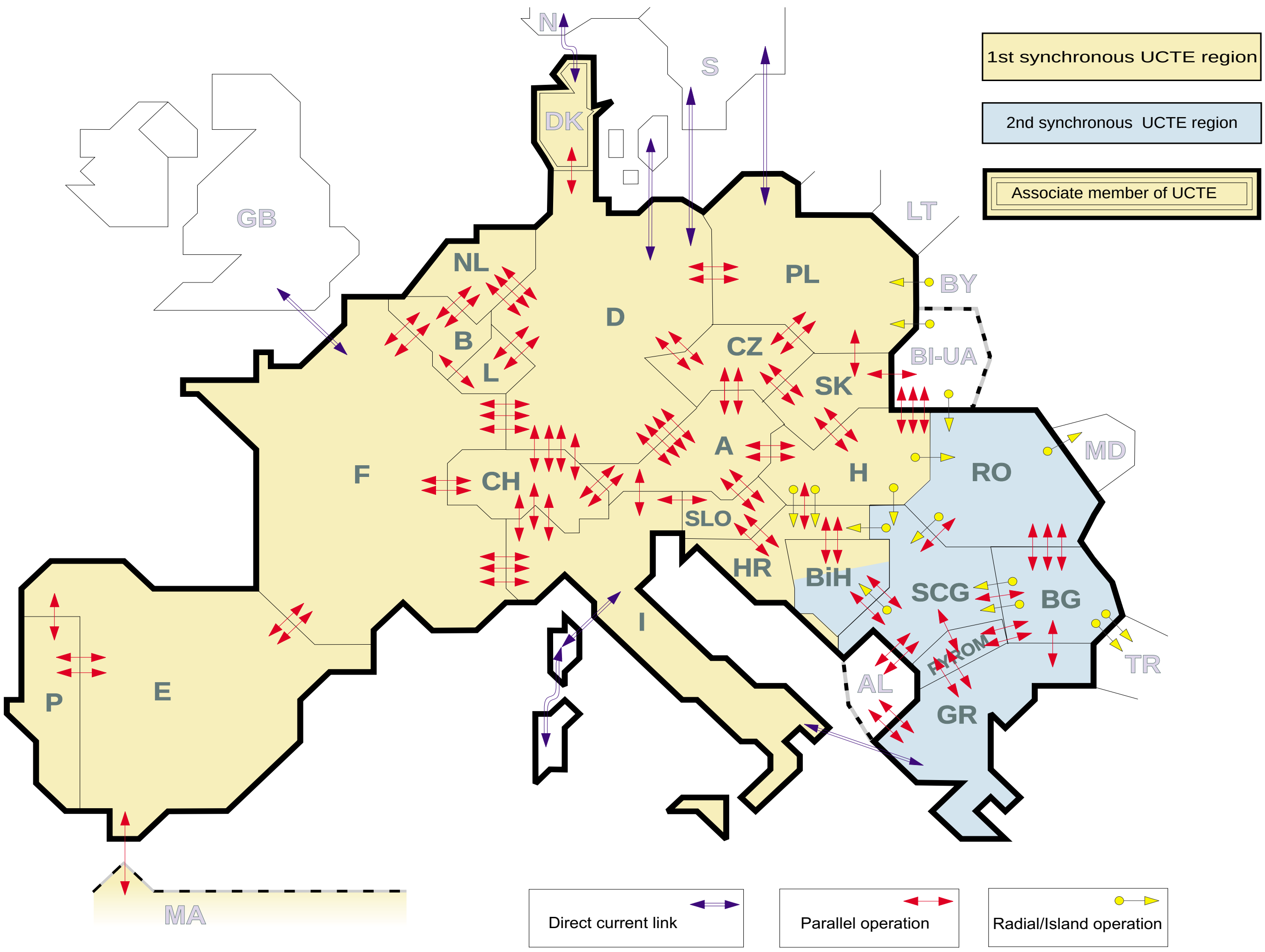
	B	D	E	F	GR	I	SLO	HR	BiH	FYROM	SCG	L	NL	A	P	CH	CZ	H	PL[1]	SK	RO	BG	III[2]
B	-	-	-	434	-	-	-	-	-	-	-	768	3488	-	-	-	-	-		-	-	-	-
D	-	-	-	115	-	-	-	-	-	-	-	2409	6201	4288	-	5454	27	-	1383	-	-	-	3895
E	-	-	-	164	-	-	-	-	-	-	-	-	-	-	3173	-	-	-	-	-	-	-	787
F	4780	10078	3770	-	-	8404	-	-	-	-	-	-	-	-	-	4471	-	-	-	-	-	-	2027
GR	-	-	-	-	-	736	-	-	-	28	-	-	-		-	-	-	-	-	-	-	-	466
I	-	-	-	254	13	-	42	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-
SLO	-	-	-	-	-	1873	-	1010	-	-	-	-	-	68	-	-	-	-	-	-	-	-	-
HR	-	-	-	-	-	-	1498	-	605	-	-	-	-	-	-	-	-	1	-	-	-	-	-
BiH	-	-	-	-	-	-	-	517	-	-	749	-	-	-	-	-	-	-	-	-	-	-	-
FYROM	-	-	-	-	579	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-
SCG	-	-	-	-	-	-	-	42	420	895	-	-	-	-	-	-	-	-	-	-	17	86	314
L	862	416	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NL	1110	371	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A	-	1687	-	-	-	802	1730	-	-	-	-	-	-	-	-	1756	0	143	-	-	-	-	-
P	-	-	1503	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CH	-	1979	-	880	-	13201	-	-	-	-	-	-	-	279	-	-	-	-	-	-	-	-	-
CZ	-	5862	-	-	-	-	-	-	-	-	-	-	-	4109	-	-	-	-	30	3198	-	-	-
H	-	-	-	-	-	-	-	2707	-	-	25	-	-	388	-	-	-	-		0	26	-	17
PL	-	110	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4077	-	-	1252	-	-	1002
SK	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	208	4611	0	-	-	-	524
RO	-	-	-	-	-	-	-	-	-	-	900	-	-	-	-	-	-	0	-	-	-	425	0
BG	-	-	-	-	1882	-	-	-	-	-	691	-	-	-	-	-	-	-	-	-	400	-	207
III[2]	-	2402	0	1903	1	-	-	-	-	-	20	-	-	-	-	-	-	2166	982	45	29	0	-

[1] Corresponds to the supply of a passive island in Poland with Belarus

[2] Third countries: Albania, Belarus, Denmark (Jutland), Great Britain, Morocco, Republic of Moldava, Sweden, Burshtyn Island part of Ukraina and Republic of Turkey

Regions in parallel operation

16.07.2003, 11:00 a.m. (CET*)



* CET Central European Time

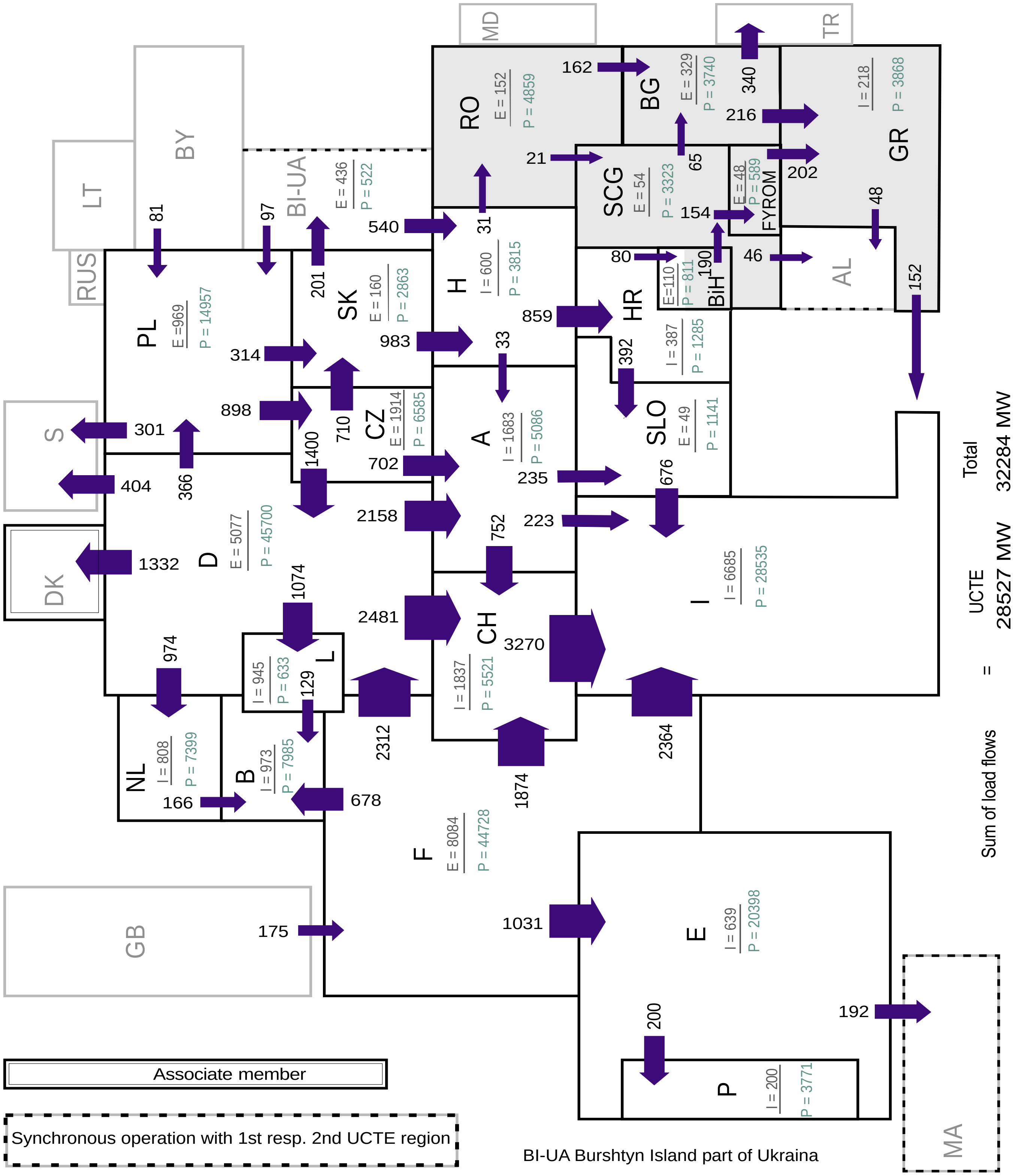
T1 Power produced in parallel operation at 11:00 a.m.(CET) (including autoproduction) in MW

Day	B	D	E	F	GR	I	SLO	HR	BiH	FYROM	SCG	L	NL	A	P	CH	CZ	H	PL	SK	RO	BG	BI-UA	DK
16.04.03	9717	77000	28098	66044	5648	38698	1713	2049	1521	797	4687	801	9816	6403	4999	9991	9777	4143	19326	3367	5859	4634	975	2355
17.05.03	9427	72100	29625	63936	6548	40139	1117	1765	1525	670	4152	743	9657	6199	5110	11740	9410	3901	18011	3687	5836	3573	888	2310
18.06.03	10035	74700	31741	63208	7275	44065	1710	1439	1136	570	3929	779	10018	7130	6008	11280	9407	4094	17313	3380	6027	3879	859	2050
16.07.03	9915	68800	30857	60038	7718	45148	1643	880	1252	655	3657	823	10906	7923	5567	11495	9318	4145	17844	3039	5802	4275	912	2440
20.08.03	10283	64500	27556	53714	7263	32878	1277	1483	1053	639	3581	659	9655	7233	4064	10280	8587	3198	18548	3363	5679	4600	958	2580
17.09.03	9866	70600	29396	60637	6261	39289	1633	1507	969	668	3643	728	10555	7402	5233	9933	9256	3751	18670	3246	5512	4633	949	2650

Load flows

P = Load

G1 16.04.2003 - 03:00 a.m. (CET) (in MW)



Associate member

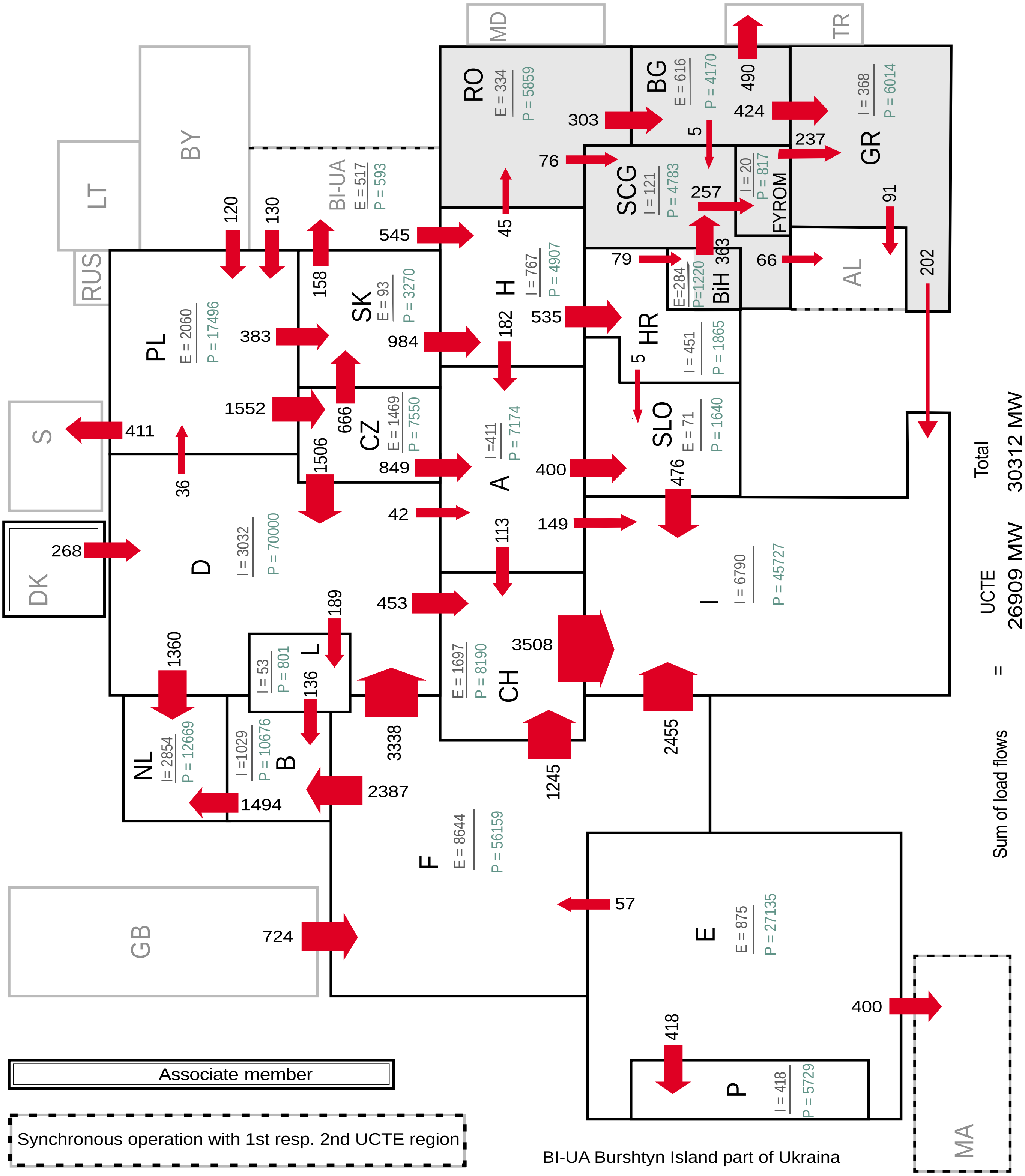
Synchronous operation with 1st resp. 2nd UCTE region

2nd synchronous UCTE region

BI-UA Burshtyn Island part of Ukraina
CET Central European Time
I = Import balance
E = Export balance

P = Load

G2 16.04.2003 - 11:00 a.m. (CET) (in MW)



Associate member

Synchronous operation with 1st resp. 2nd UCTE region

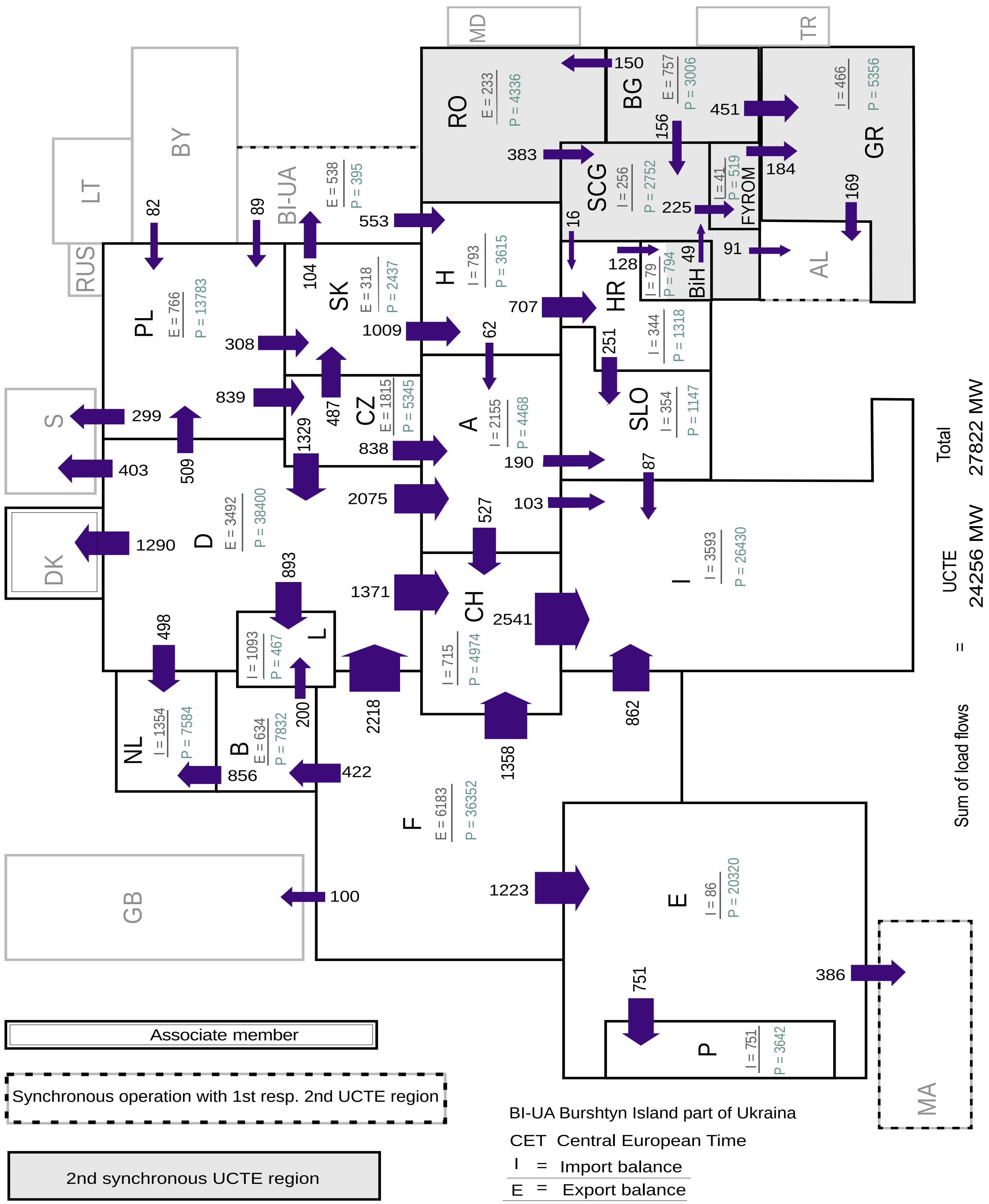
2nd synchronous UCTE region

BI-UA Burshtyn Island part of Ukraina
CET Central European Time
I = Import balance
E = Export balance

Load flows

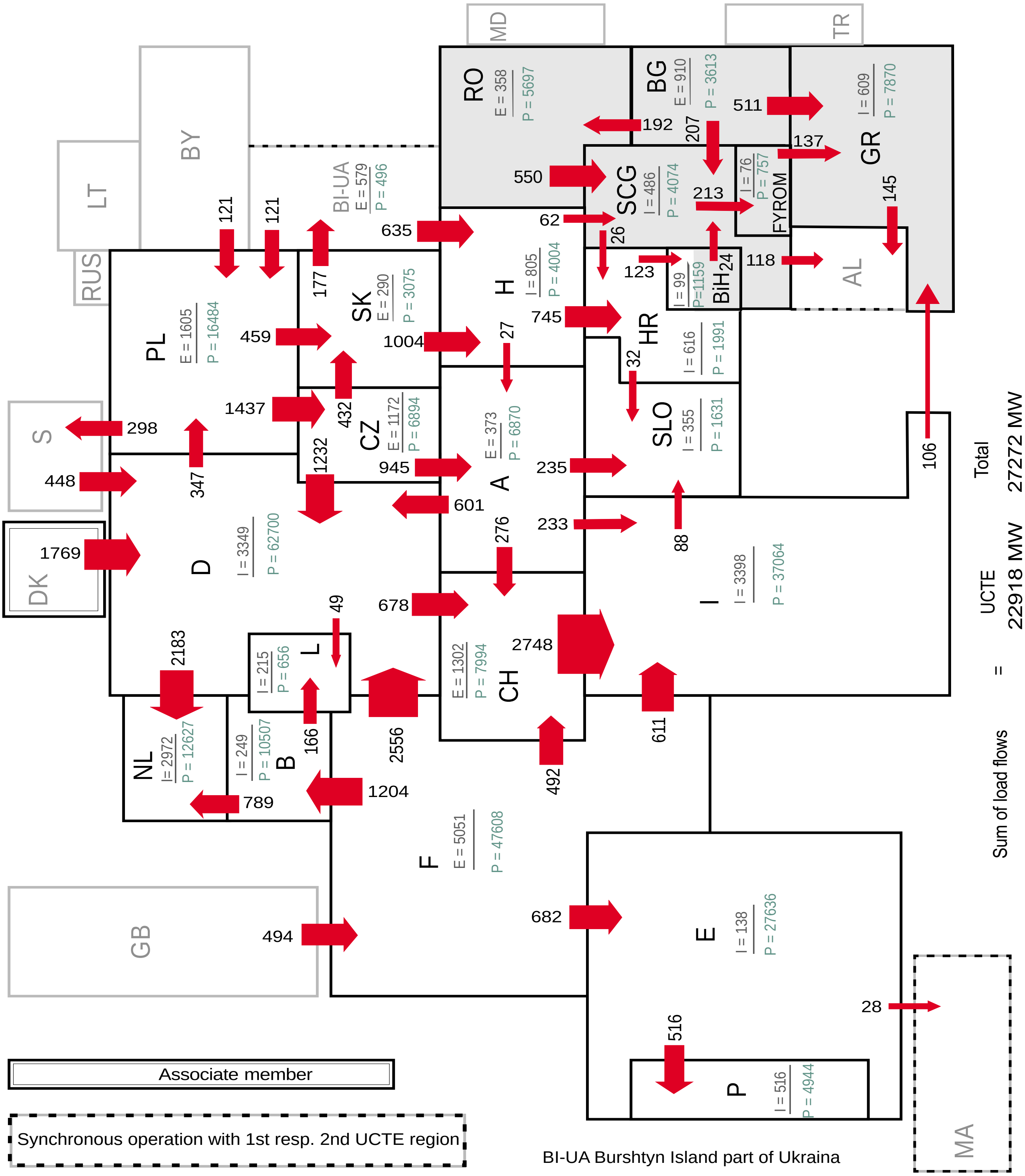
P = Load

G3 20.08.2003 - 03:00 a.m. (CET) (in MW)



P = Load

G4 20.08.2003 - 11:00 a.m. (CET) (in MW)



Associate member

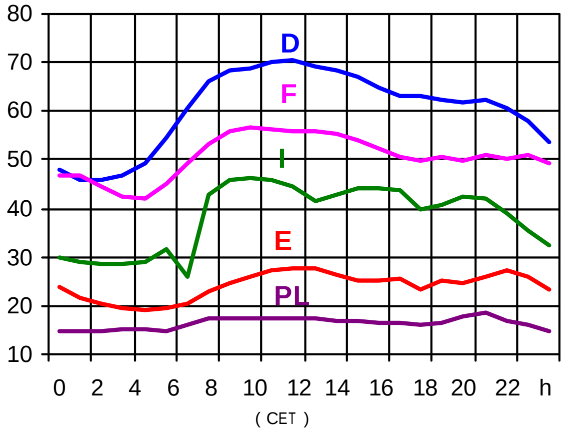
Synchronous operation with 1st resp. 2nd UCTE region

2nd synchronous UCTE region

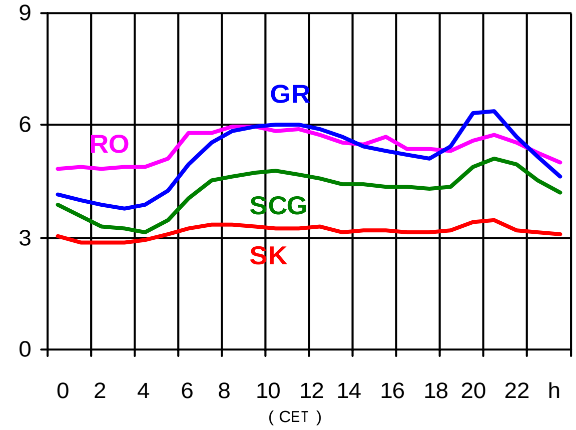
BI-UA Burshtyn Island part of Ukraina
CET Central European Time
I = Import balance
E = Export balance

B Load diagrams [1]

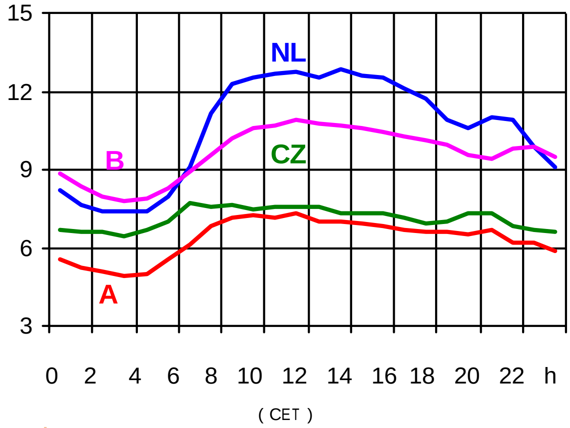
G1 16.04.2003 (in GW)



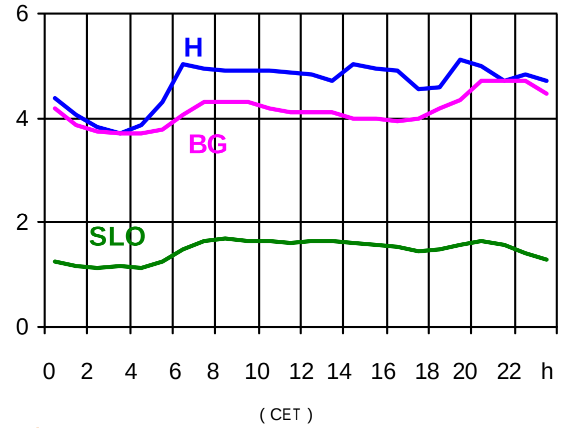
G4 16.04.2003 (in GW)



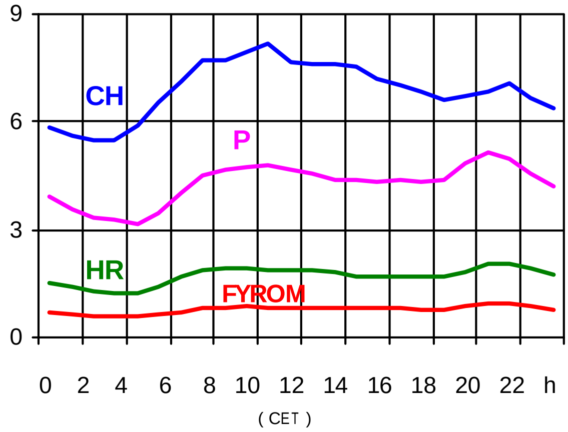
G2 16.04.2003 (in GW)



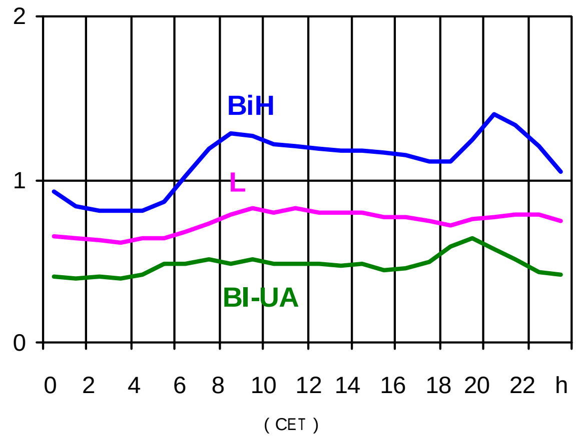
G5 16.04.2003 (in GW)



G3 16.04.2003 (in GW)



G6 16.04.2003 (in GW)

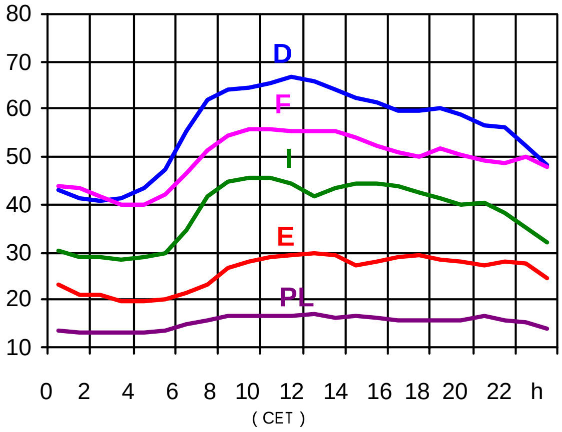


[1] Percentage as referred to total values (%)

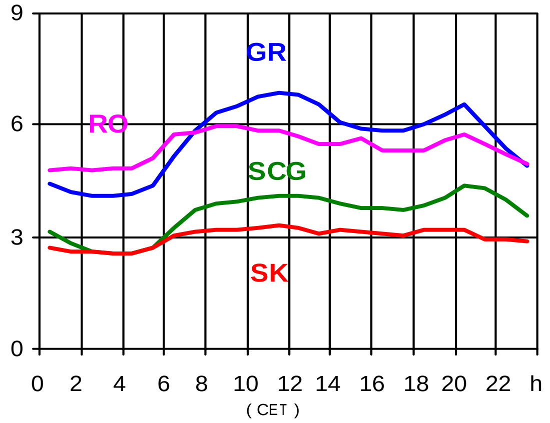
B	D	E	F	GR	I	SLO	HR	BiH	FY ROM	SCG	L	NL	A	P	CH	CZ	H	PL	SK	RO	BG	BI-UA
100	91	94	97	93	100	95	100	100	100	96	99	90	82	91	100	100	100	100	100	100	100	100

Load diagrams [1]

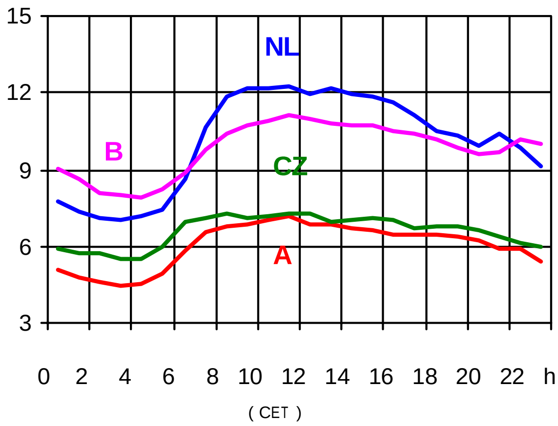
G7 | 17.05.2003 | (in GW)



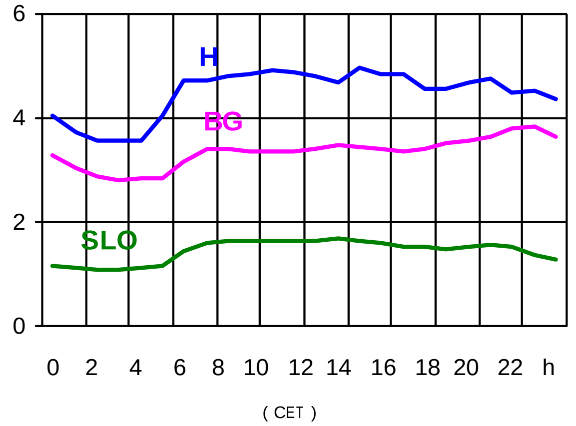
G10 | 17.05.2003 | (in GW)



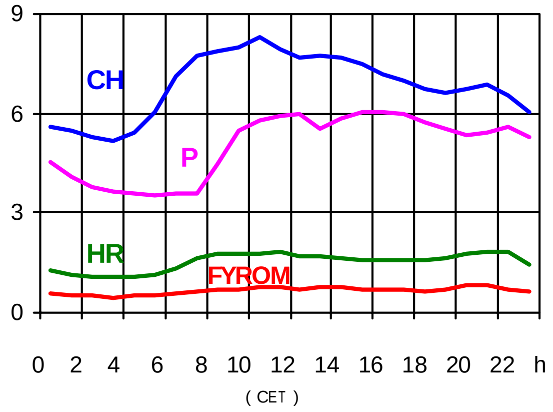
G8 | 17.05.2003 | (in GW)



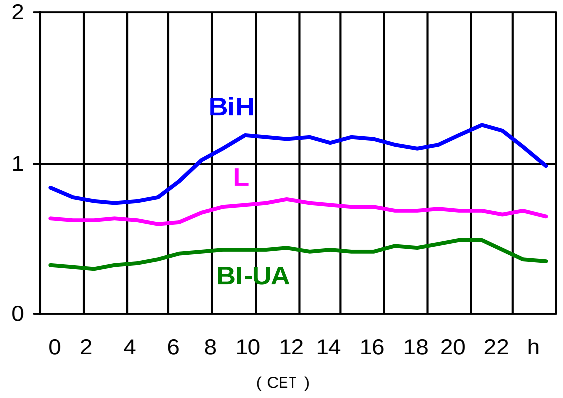
G11 | 17.05.2003 | (in GW)



G9 | 17.05.2003 | (in GW)



G12 | 17.05.2003 | (in GW)

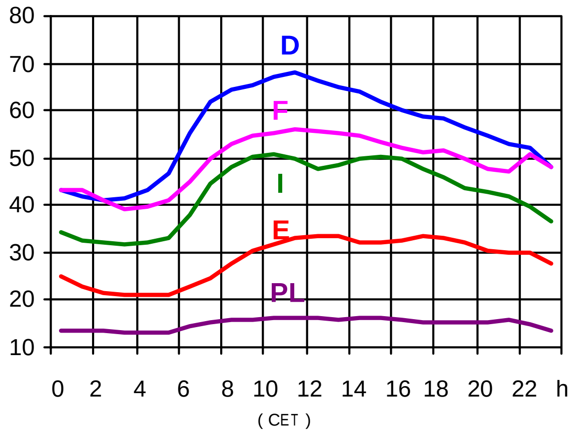


[1]Percentage as referred to total values (%)

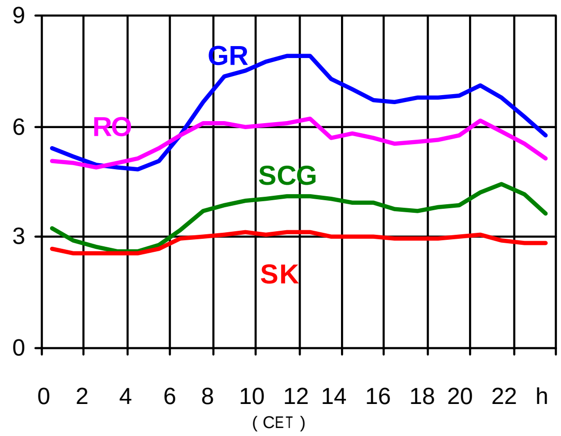
B	D	E	F	GR	I	SLO	HR	BiH	FY ROM	SCG	L	NL	A	P	CH	CZ	H	PL	SK	RO	BG	BI-UA
100	91	94	97	93	100	95	100	100	100	96	99	90	82	91	100	100	100	100	100	100	100	100

Load diagrams [1]

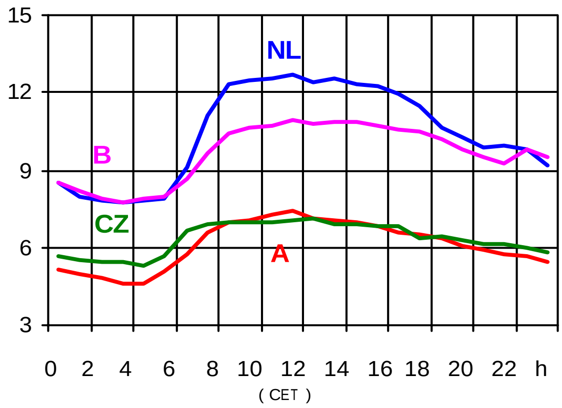
G13 18.06.2003 (in GW)



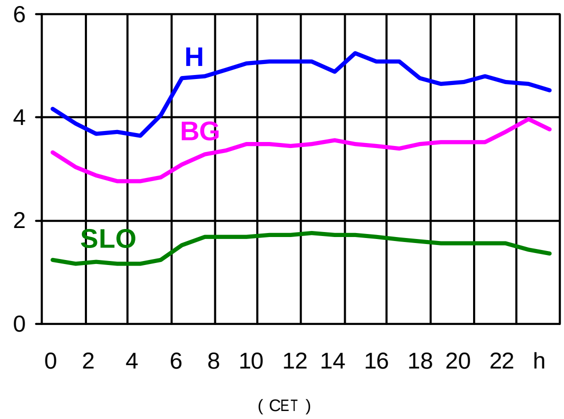
G16 18.06.2003 (in GW)



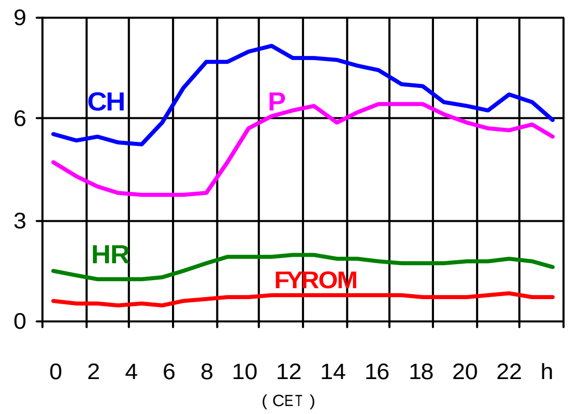
G14 18.06.2003 (in GW)



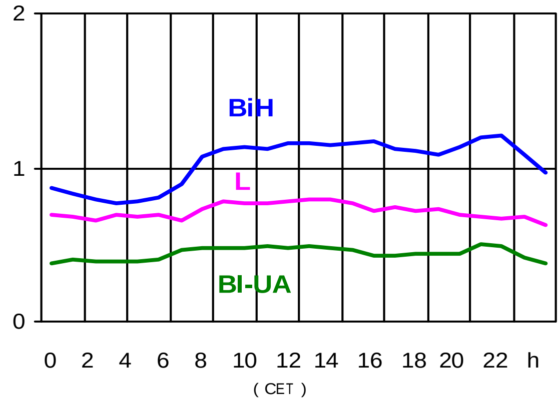
G17 18.06.2003 (in GW)



G15 18.06.2003 (in GW)



G18 18.06.2003 (in GW)

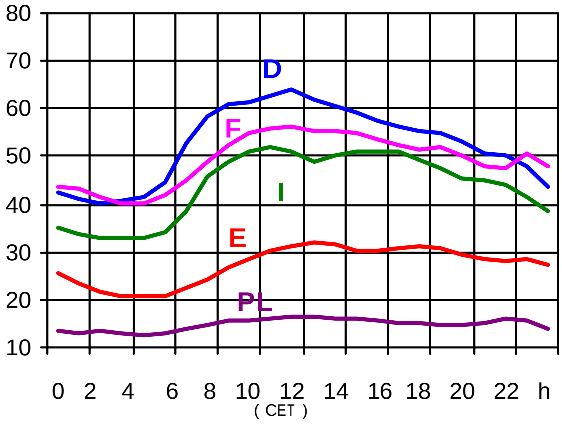


[1] Percentage as referred to total values (%)

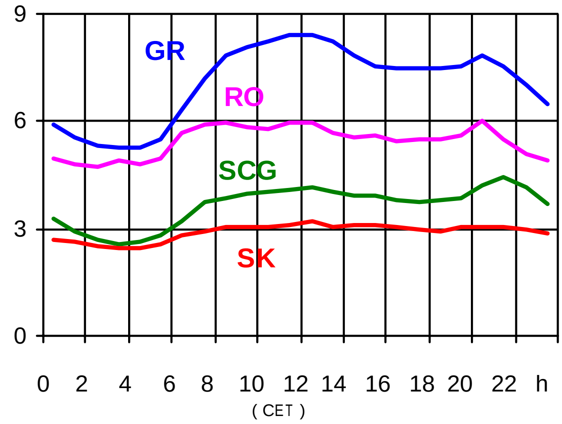
B	D	E	F	GR	I	SLO	HR	BiH	FY ROM	SCG	L	NL	A	P	CH	CZ	H	PL	SK	RO	BG	BI-UA
100	91	94	97	93	100	95	100	100	100	96	99	90	82	91	100	100	100	100	100	100	100	100

Load diagrams [1]

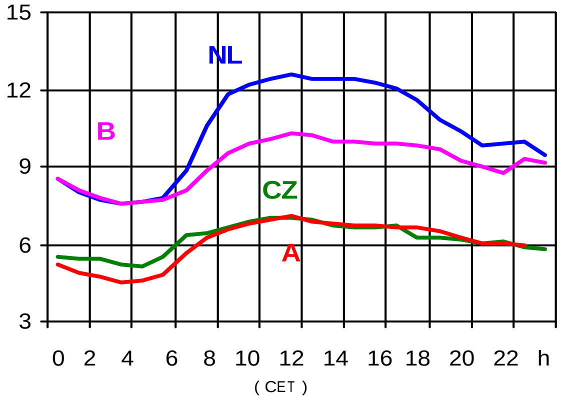
G19 16.07.2003 (in GW)



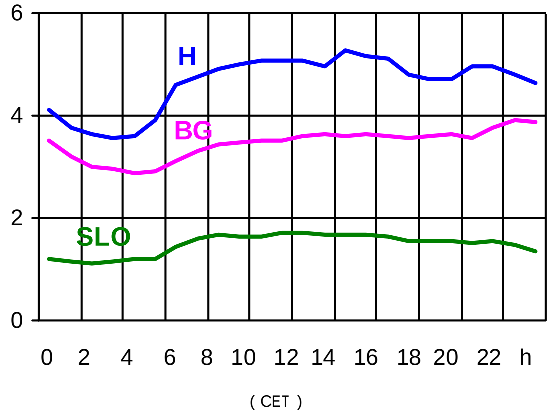
G22 16.07.2003 (in GW)



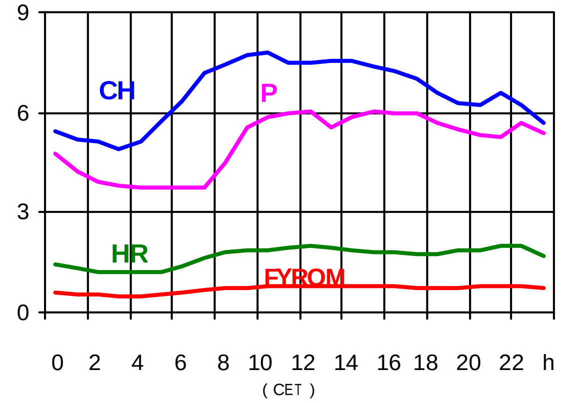
G20 16.07.2003 (in GW)



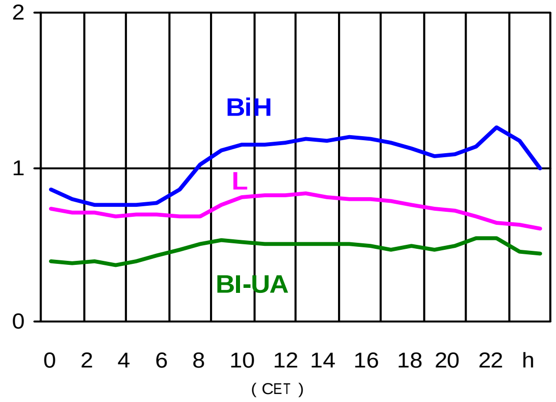
G23 16.07.2003 (in GW)



G21 16.07.2003 (in GW)



G24 16.07.2003 (in GW)

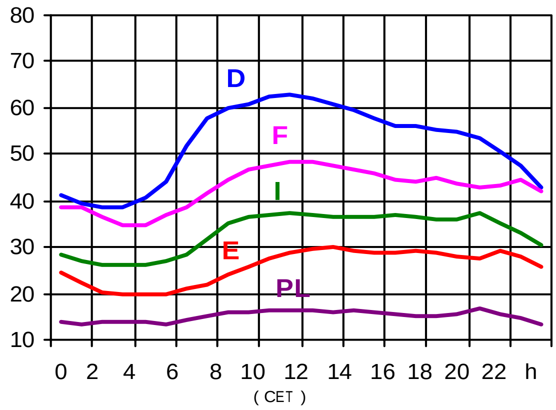


[1]Percentage as referred to total values (%)

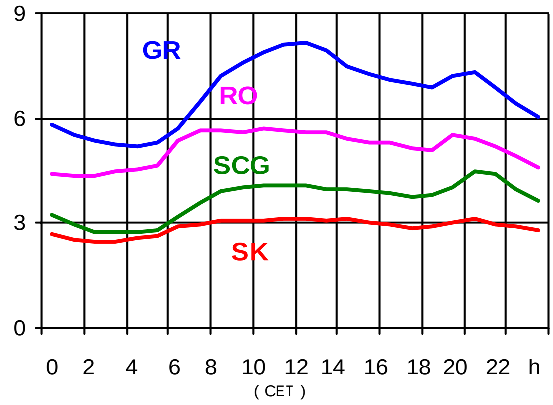
B	D	E	F	GR	I	SLO	HR	BiH	FY ROM	SCG	L	NL	A	P	CH	CZ	H	PL	SK	RO	BG	BI-UA
100	91	94	97	93	100	95	100	100	100	96	99	90	82	91	100	100	100	100	100	100	100	100

Load diagrams [1]

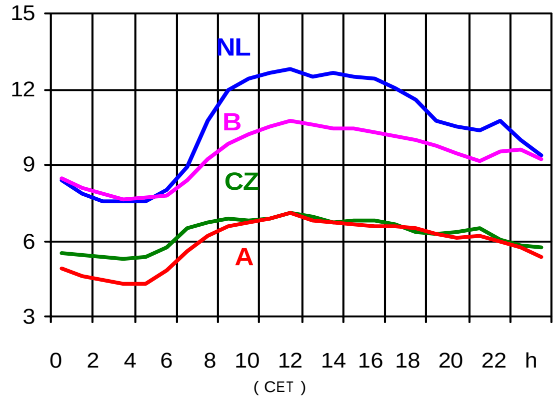
G25 20.08.2003 (in GW)



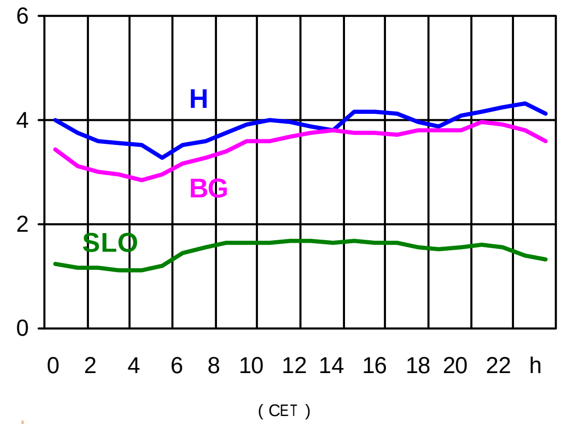
G28 20.08.2003 (in GW)



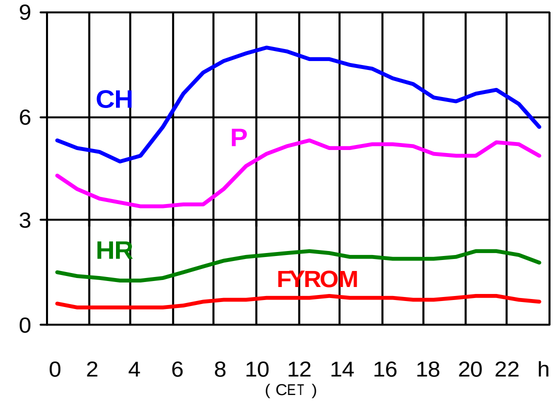
G26 20.08.2003 (in GW)



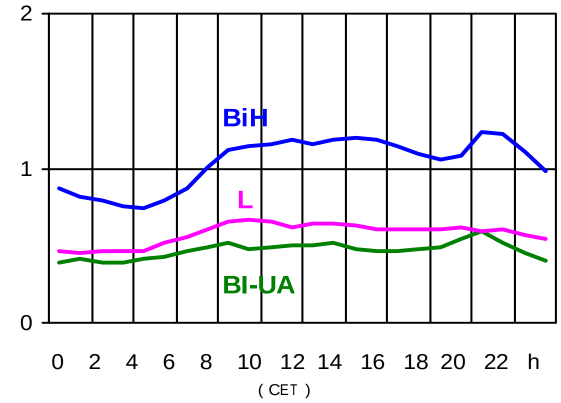
G29 20.08.2003 (in GW)



G27 20.08.2003 (in GW)



G30 20.08.2003 (in GW)

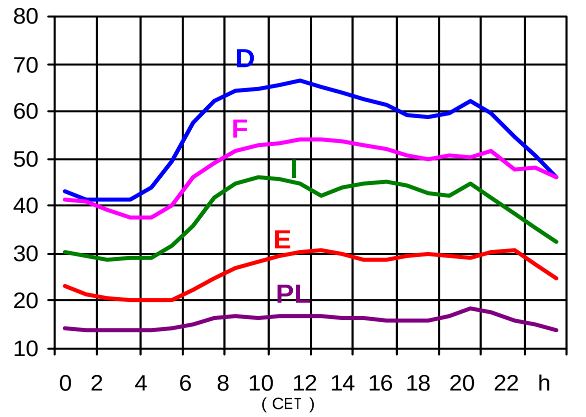


[1]Percentage as referred to total values (%)

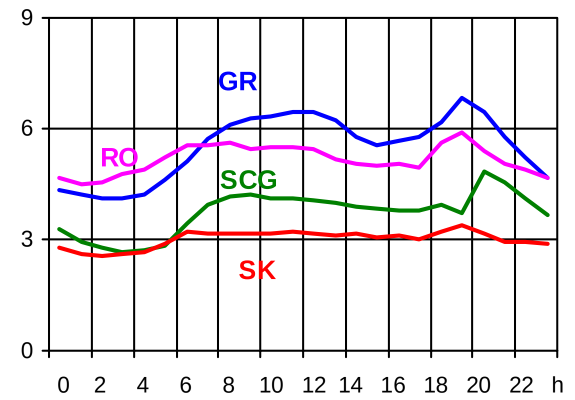
B	D	E	F	GR	I	SLO	HR	BiH	FY ROM	SCG	L	NL	A	P	CH	CZ	H	PL	SK	RO	BG	BI-UA
100	91	94	97	93	100	95	100	100	100	96	99	90	82	91	100	100	100	100	100	100	100	100

Load diagrams [1]

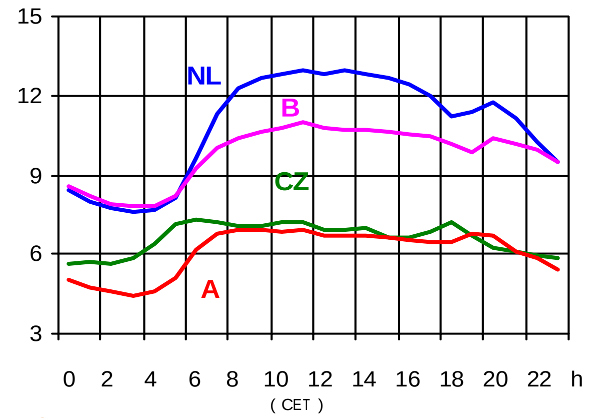
G31 17.09.2003 (in GW)



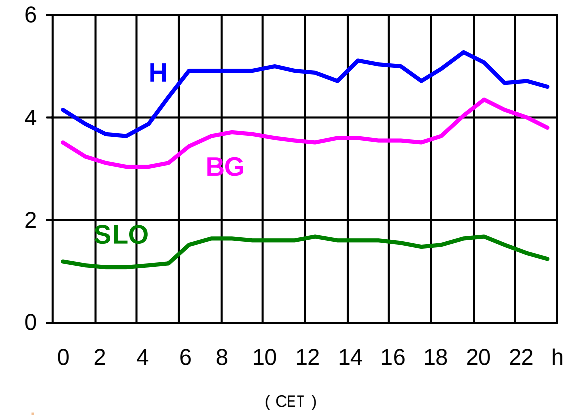
G34 17.09.2003 (in GW)



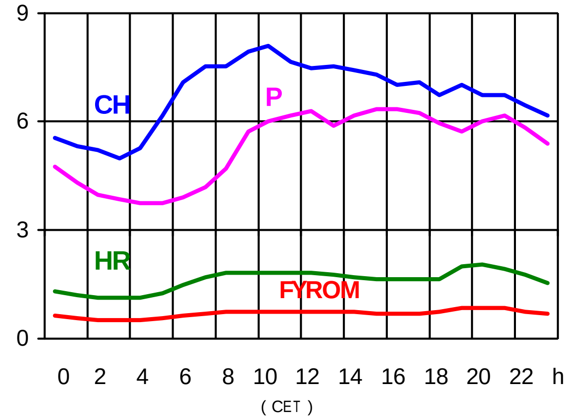
G32 17.09.2003 (in GW)



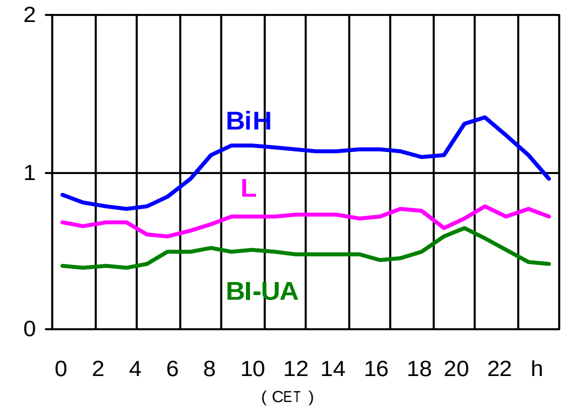
G35 17.09.2003 (in GW)



G33 17.09.2003 (in GW)



G36 17.09.2003 (in GW)



[1]Percentage as referred to total values (%)

B	D	E	F	GR	I	SLO	HR	BiH	FY ROM	SCG	L	NL	A	P	CH	CZ	H	PL	SK	RO	BG	BI-UA
100	91	94	97	93	100	95	100	100	100	96	99	90	82	91	100	100	100	100	100	100	100	100

UCTE System Adequacy Forecast 2004 - 2010

Executive summary

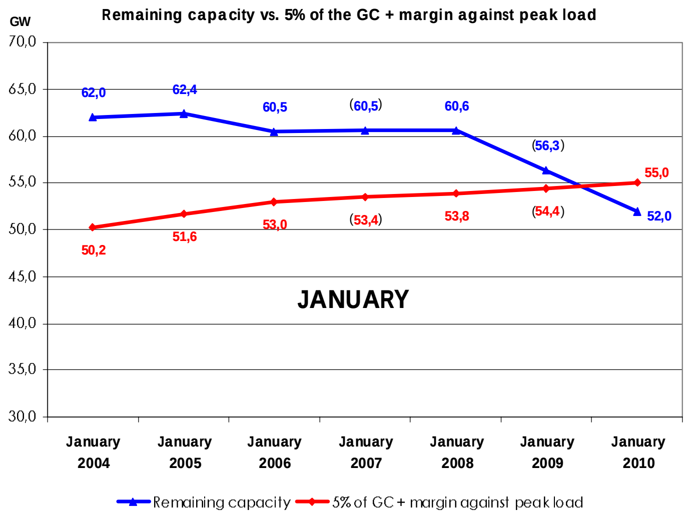
The growing awareness of the importance of the power system reliability issues under competitive market conditions among the decision makers and general public, still emphasised by the events which occurred in EUROPE and in North America during the year 2003, has made UCTE to extend the time horizon of its forecasts. For the first time in the history of UCTE the system adequacy reports (formerly power balance reports) includes forecast data up to seven years ahead, four years more than it used to be in the past. This is the first step towards extending the time horizon of UCTE forecasts up to ten years ahead in the future.

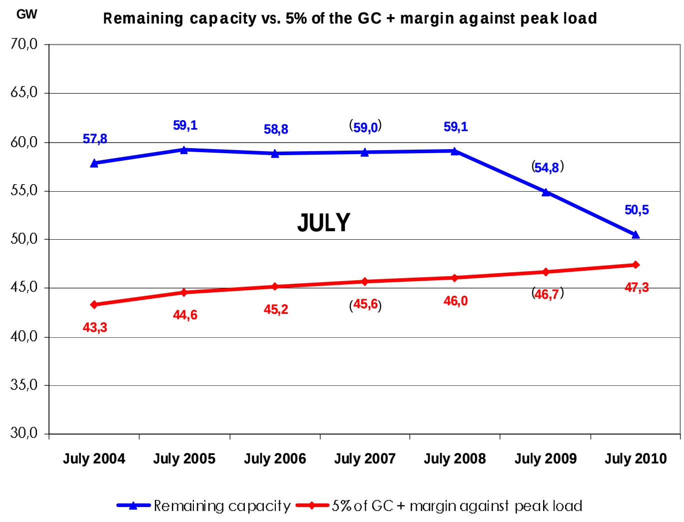
Method for UCTE System reliability assessment

The reliability of the UCTE system is assessed taking into account both generation and transmission aspects.
Generation adequacy assessment is based on the estimation of the so called “Remaining capacity” which can be interpreted as the capacity that the system needs to cover the difference between the peak load of each country and the load at the UCTE synchronous reference time (so called “margin against peak load”), and, at the same time, exceptional demand variation and longer term unplanned outages which the power plant operators are responsible to cover with additional reserves. It is often estimated that remaining capacity at the level of 5% of installed capacity is enough for the latter, while in the systems which are not well interconnected with the rest of the UCTE (due to structural bottlenecks on their borders) this shall be increased by the margin against peak load. Thus the sum “5% of installed capacity + margin against peak load” is called adequacy reference margin. But it is important to keep in mind that uncertainties affect these results especially for the year 2008 and 2010. Because the objectives of this exercise is to provide early warning signals concerning system reliability and to highlight opportunities or necessity to invest in generation, only future generation capacities whose construction and commissioning are considered as “firm” are included. On the opposite, because decisions concerning decommissioning of generating units are notified to TSO’s very little in advance, the installed capacity can be overestimated. After the generation adequacy assessment has underscored how each country could satisfy its interior load with the available national capacity, transmission adequacy assessment consists in investigating if the transmission system is sufficiently sized in order to enable the potential imports and exports resulting from the various national power balances, improving by this way the reliability of the European power system. At the UCTE level the transmission system adequacy analysis is focused on the interconnection and on the internal lines which have a direct effect on the international exchanges.
At this stage the methodology doesn’t aim at identifying the cross border flows that would be originated by market price differences resulting for example from differences in fuel mix between countries.

Main results

The reliability of the UCTE System as a whole should stay at an acceptable level over the **2004-2006** period, due to both the expected new generating capacity and some development of the national and international transmission grids. Expected remaining capacity remains stable over the period from **2004 to 2006** (with a slight decrease in winter between 2005 and 2006). In the medium term **(200**8), levels of remaining capacity are still those observed at the beginning of the period under study. But between **2008 and 2010,** a sensible decrease in remaining capacity is expected. Given the elements currently available, remaining capacity may not be sufficient to meet the adequacy refrence margin in winter **2010** (see figures here below).
That means that there is a potential deficit in generation unless additional firm investment decisions are taken soon. This deficit will be increased by the decommissioning decisions which could occur from now to these time horizon, especially from 2008 when the large combustion plant directive will come into force.





These global results must be analysed while taking into account that the UCTE system is actually made of different geographical blocks connected to each other by relatively limited transmission capacity due to geographical or historical reasons. As far as transmission system adequacy is concerned, the expected development in the different grids (new lines, new sub-stations, new equipment like phase shift transformer) in the UCTE countries shall reduce or prevent existing or foreseeable congestion on the interconnections by reducing internal constraints and/or by facilitating the energy flows.

- **The main UCTE block**: the remaining capacity of the main UCTE block will be decreasing from **2004** to **2010**. It is expected to represent 11.3 % of generating capacity in 2004 but only 7% in 2010, that is not sufficient to ensure a 5% margin at the synchronous peak load of this block. Inside this block, remaining capacity in winter is negative for Belgium in 2006 and on and in 2010 for the Netherlands. Croatia, Luxembourg, Austria and Switzerland expect to meet the adequacy reference margin from 2004 to 2010. Germany shows a ratio remaining capacity / generating capacity between 5 and 7%, lower than the average of the block. The ratio for France decreases from 12.7% in 2004 to 7% in 2010 ; this ratio is not sufficient to meet the adequacy reference margin in 2010. Interconnection capacity play an important role in the reliability of this block because for some of these countries long term import contracts and participation contracts in power plants located outside the national territory actually improve the power balance. Nevertheless Belgium considers that adequacy problems could occur from 2006 at peak load, and France from 2008. Network reinforcements are reported that should help to counteract like France – Belgium and France – Spain interconnections.

- **Spain + Portugal**: when comparing the remaining capacity to the capacity that the system needs to cover the adequacy reference margin, it should be noticed that remaining capacity is higher than this sum over the period from **2004** to **2008** (10.1 GW remaining capacity vs. 9.1 GW in January 2004 and 8.3 GW remaining capacity vs. 6.3 GW in July 2004). It clearly appears that the situation for the Iberian block will be improving in winter over the period from **2004** to **2006** from the remaining capacity point of view. The expected remaining capacity will represent 14.9 %, 15.6 % and 16.1% of the national generating capacity for 2004, 2005 and 2006 respectively.When analysing this situation, it should be taken into account that a significant increase in generating capacity both in Spain and Portugal is expected. The newly commissioned power plants will be essentially conventional thermal plants and renewable. From **2006** to **2010**, the share of remaining capacity in the generating capacity will then decrease (down to 12.4% in 2010). Reinforcement of the interconnections of this block with France and Morocco are foreseen.

- **Italy** : The remaining capacity is lower than the capacity that the system needs to cover the adequacy reference margin in 2004 and 2005, but improves for the following years. The foreseen remaining capacity as a percentage of the generating capacity will evolve from 1.9 % in **2004** to 5.6% in **2006** in winter, and from 2.2 % to 7.5 % in summer, thanks to an important expected commissioning of new plants (approx. 4 GW per year from 2004 to 2006). It is expected to stabilise at 7.1% in **2010**. The expected importable capacity (approx. 6.5 GW, up to 9.5 GW in 2010) could supply a surplus of available capacity, useful to improve the security of supply.

- **JIEL[1] + Greece** the slight increase in the generating capacity for this block seems to be inadequate to match the load growth. The remaining capacity will not be sufficient to cover the adequacy reference margin. It represents 5.4% of the generating capacity in 2004, 4.2% in 2006, and 7.2% in 2010 thanks to expected commissioning of new plants. The interconnection with Romania and Bulgaria helps to maintain the adequacy of the systems in this region. It is also expected that forthcoming resynchronisation of the 2 nd UCTE synchronous zone with the rest of UCTE, expected mid 2004, will further improve the situation in this region.

- **Centrel block**: without extraordinary changes in both the generating capacity and the load, the Centrel block will reach easily the adequacy reference margin with a stable share of remaining capacity (approx. 16.3% in winter and 14.4% in summer) in the generating capacity over the period **2004-2006**. Later on, it is expected to decrease down to 13.0% and 11.9% in **2010**.

- **Romania & Bulgaria[2]**: The remaining capacity is expected to decrease over the period from **2004** to **2010** (with a ratio in the generating capacity of 14.4% in 2004, 9.5% in 2006 but only 4.5% in 2010).

Comparison with the previous forecasts [3]

As far as changes in generating capacity are concerned, for the period from January 2004 to July 2005, figures of the new forecast, when excluding the generating capacity for new countries in this year's forecasts' perimeter, are lower than in the last year's forecast in an approx. 3 GW (January 2004) to 6 GW (July 2004) range. The expected UCTE load according to this year's forecast, when not taking into account data for Romania, Bulgaria and Burshtyn Island, is 4-5 GW (in winter) and 3 GW (2004) and 1 GW (2005) in summer lower than the load of the forecast carried out in 2002.
Concerning the remaining capacity, figures of the new forecast, when excluding the remaining capacity for Romania, Bulgaria and Burshtyn Island, are higher in winter (by 9.1 GW in 2004 and 5.1 GW in 2005) than figures of last year's report. In summer values are consistent with last year's forecasts. This can be partly explained by a decrease of expected non-usable capacities (approx. 3.5 GW lower in winter).

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1 JIEL Block is made of SCG and FYROM
2 Romania and Bulgaria are separated area control blocks
3 Note: it has to be retained that, for this forecast, the perimeter for the UCTE includes Romania, Bulgaria and Burshtyn Island, which were not included in last year's UCTE perimeter. The contribution of these countries is specified in the report when necessary, in order to make a pertinent comparison between last year's forecast and the new one.

1. Foreword

The present UCTE System Adequacy Forecast report marks a new step in UCTE efforts to provide to Transmission System Operators (TSOs), public Authorities and European Electricity market players valuable information on the perspectives of the European power system. After the fundamental changes of the methodology introduced in 2000, information concerning the transmission grid developments were included in 2002, aiming at extending the generation adequacy forecast to a system adequacy forecast. However the traditional three years ahead time horizon of these forecasts, well adapted to the time schedule of operating decisions, was too limited to provide useful information in the field of investments. It takes generally at least 4 to 5 years to build a new generating unit, and even more for transmission lines. In the meantime questions concerning the security of supply in the European power system arise more and more, with the general feeling that the over-capacities existing in the 90's are decreasing, as a result of the load increase, de-investment incentives observed nowadays in the deregulated power industries, and of the uncertainties concerning the future of some thermal units when the new environmental legislation will come into force. The events that occurred in 2003 in the European power system and in North America have reinforced these concerns. In this framework the ability of the market to provide in due time incentives to investment becomes a central issue. Considering these elements, UCTE has decided to extend the time horizon of the system adequacy forecast in order to give early warning signals to decision makers and market players. The final UCTE objective is to provide information up to ten years ahead, but considering the difficulties of the exercise these improvements will be implemented in a step by step approach. Therefore this year's report provide forecasts up to 2010. The present report is based on data collected in August 2003.

2. Methodology

2.1 Definitions

The following CIGRE definitions were adopted while preparing the report:

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

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

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

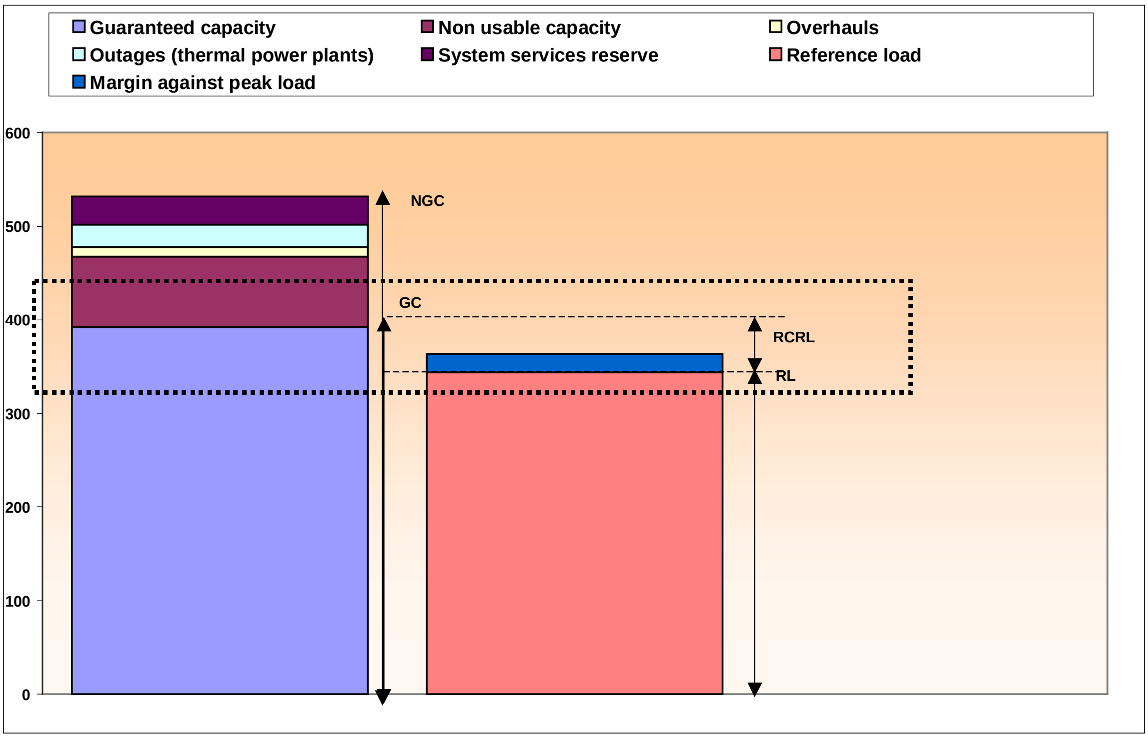
The above definitions are described in detail in the following two CIGRE reports:

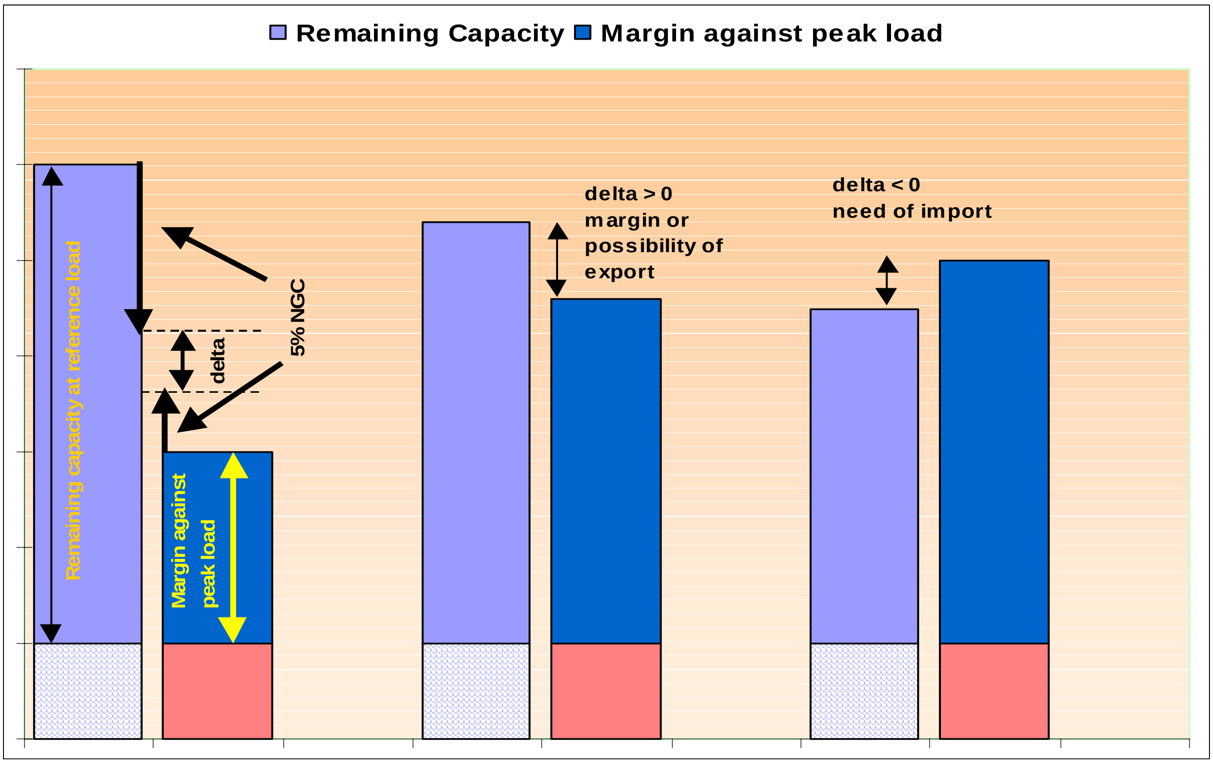
· Power System Reliability Analysis – Application Guide, Paris, 1987,
· Power System Reliability Analysis – Composite Power System Reliability Evaluation, Paris, 1992.

2.2 Generation adequacy assessment

Generation adequacy assessment consists in investigating the ability of the generating units to match the system load evolution. UCTE approach is based on a comparison between the load and the generating capacity considered as "guaranteed" for power plant operators (generating capacity after the deduction of various sources of unavailability - non-usable capacity, scheduled and unscheduled outages - and reserves required by TSOs for system services; see figure1). The load corresponds to a common synchronous reference for the entire UCTE network; the selected reference points are the third Wednesday of January and the third Wednesday of July at 11 a.m.; the load forecast is based upon the assumption of normal climatic conditions. In addition the difference between this reference load and peak load is estimated for each country (so called "margin against monthly peak load"). The resulting balance, called "remaining capacity", can be interpreted as the capacity that the system needs to cover the difference between the peak load of each country and the load at the UCTE synchronous reference time, and, at the same time exceptional demand variations and longer term unplanned outages which the power plant operators are responsible to cover with additional reserves; some UCTE members have indicated that such a reserve should represent 5% of the installed capacity in order to provide a reliable supply. Thus when considering individual countries generation adequacy will be assessed on the basis of the comparison between the "remaining capacity" and the so called adequacy reference margin corresponding to "5% of installed capacity + margin against peak load". This method is also applied to assess generation adequacy for the whole UCTE system or for larger geographical blocks ; in this cases the peak load of the set of countries is estimated by the sum of the peak loads of the individual countries. This approximation leads on one hand to an overestimation of the peak load for the largest geographical blocks and to a conservative view of the level of adequacy. On the other hand, considering the synchronous peak load of large size blocks leads to rely on the assumption that it is always possible to carry where needed the generating power available in any other part of the block, whereas the capacities of the transmission system actually limit these possibilities. It is also important to keep in mind the uncertainties which affect these results. Because the objectives of this exercise is to provide early warning signals concerning system security and opportunities to invest in generation, only future generation capacities whose construction and commissioning are considered as "firm" by the TSO's are included : connection agreement signed, power plants taken into account in long term transmission plans.... Thus if a negative power balance appears in the medium or long term, it must be interpreted as a potential deficit if no investment decision concerning generation is taken from now to that time horizon. Decisions can consist in the confirmation of projects presently planned but not yet firmly engaged, or decisions concerning other new generating units whose time of construction is compatible with the considered time horizon. On the opposite, because decommissioning decisions concerning generation units are often notified to TSO's with a short notice, the installed capacity can be overestimated, especially on the medium long term. In addition, because cross-border exchanges forecasts are not taken into account in the power balance, the analysis considers neither long term contracts nor the participation in power plants located out of the national territory. However, these contracts can represent a significant and permanent contribution to satisfying the national load in some countries.

Here below are shown the graphs illustrating the Power Balance according to UCTE :





2.3 Transmission system adequacy

After the generation adequacy assessment has highlighted the capacity of each country to cover its interior load with the available national capacity, transmission adequacy assessment consists in investigating if the transmission system is sufficiently sized in order to enable the power flows across the European system resulting from the location of loads and generation, and in analysing the role which the internal and the interconnected networks play in terms of system security. **At this stage the methodology doesn't aim at identifying the cross border flows that would be originated by market price differences resulting for example from differences in fuel mix between countries. At the UCTE level the transmission system adequacy analysis is focused on the interconnection and on the internal lines which have a direct effect on the international exchanges.**
Because the remaining capacity (as a result of the power balance) represents, if positive, a potential possibility for export and, if negative, a potential need for imports, transmission adequacy assessment consists in comparing this remaining capacity with the Net Transfer Capacity at the borders of the country concerned, as calculated by ETSO or estimated by the TSOs. The comparison is made for each country considered individually, but also at the interfaces of the different regional blocks which can be identified in the UCTE system. For more details about the methodology, the reader can also refer to the document "Methodology of the Power Balance" (April 2000) available on the UCTE web site (www.ucte.org).

2.4 Structure of the report

The 2004 - 2010 forecast includes the following countries and electricity systems:

B	Belgium	**NL**	The Netherlands
D	Germany	**A**	Austria
E	Spain	**P**	Portugal
F	France	**CH**	Switzerland
GR	Greece	**CZ**	Czech Republic
I	Italy	**H**	Hungary
SLO	Slovenia	**PL**	Poland
HR	Croatia	**SK**	Slovakia
BiH	Bosnia and Herzegovina	**RO**	Romania
FYROM	Former Yugoslav Republic of Macedonia	**BG**	Bulgaria
SCG	Serbia and Montenegro*	**BI-UA**	Burshtyn Island** part of Ukrainia
L	Luxembourg		

* SCG and FYROM make the JIEL system up.

** in synchronous operation with UCTE since July 1st, 2002

For the first time, the report includes the balances of Bulgaria and Romania which are UCTE members since the 8th May 2003, and of Burshtyn Island (western part of Ukrainian power system) which is in synchronous operation with UCTE power systems since July 1st, 2002. In addition this year the data concerning FYROM are separated from the ones of Serbia and Montenegro.
Discrepancies in relation to other national statistics may result from the fact that, for the majority of countries, the UCTE power balance does not cover all the generating capacity and loads, but only the part involved in the synchronous operation of public electricity systems. This so called representativity factor varies between 90% and 100%. The overall results of the forecasts are shown in Chapter 3 (with Appendix A showing a more detailed analysis of the power balance elements), with a special focus on remaining capacity. Chapter 4 of the report deals with the transmission system adequacy (supported by Appendix C). Appendix D presents extraordinary trends and remarks about the status of deregulation in UCTE countries. It is to be noticed that power balance elements for 2008 and 2010 do not present the same level of credibility as data for the three years ahead.

2.5 Comparison with EURPROG exercise

Another report showing a general picture of the perspectives of the European electricity system is published by EURELECTRIC in its yearly EURPROG report and can be ordered at **www.eurelectric.org**. UCTE is producing its system Adequacy Reports to give accurate information concerning the future situation from a today's operational perspective without considering major macroeconomic changes or political trends and to provide to market players and public authorities early warning signals concerning potential needs for new investments. These assumptions are taken to best meet the aims of the Association focusing on providing a complete overall view on the power system evolution and at investigating system adequacy and not only generating capacity adequacy (in order to match the system load evolution). Therefore, concerning generating capacity commissioning, only those new projects are taken into account, which are considered as sure, according to the information TSO receive (connection agreement signed or going to be signed, new power plants taken into account in the long-term plan for transmission system development, or signature of other agreements according to country rules). As far as shutdowns are considered, the best estimation is given, being as close as necessary to the present situation.
The EURPROG report of EURELECTRIC is based on the best view of country experts of what is likely to occur in each country with respect to the plant demand balance, taking into account recent trends and projections of economic, social, environmental and technological developments. The capacity projected allows for growth in demand and the adoption of a national plant capacity margin based on historical experience, which is sufficient to meet the security standards regarded as the norm in each country. This may mean the allowance for closures which have not been notified and the building of new plant which is not existing or under construction. Therefore, both reports are complementary and follow different objectives with different approaches. However, the consistency is closely checked between both involved associations through regular contacts to make sure that the best data quality can be reached in all reports. The volitional differences in the data sets are based on:

- different points of view (pure TSO information versus a more general electricity industry view),
- different assumptions for forecasting values ("conservative" estimations from TSO reality versus global industrial estimations),
- different time frames,
- minor methodological differences.

3. Generation Adequacy : main results

The most significant overall results of the "System Adequacy Forecast 2004-2010" for the third Wednesdays in January (the representative winter day) and July (the representative summer day) are shown in Table 1, for the entire UCTE[4]. Appendix A contains forecasts for national generating capacity, non usable capacity, system service reserves and load for each country.

[4] It has to be retained that, for this forecast, the perimeter for the UCTE includes Romania, Bulgaria and Burshtyn Island (Ukrana), which were not included in last year's UCTE perimeter. The contribution of these are specified when neccessary, in order to make a pertinent comparison between last year's forecast and the new one.

Table 1	UCTE Power balance forecasts 2004-2010 on the 3rd Wednesday	Results in GW

	2004		2005		2006		2008		2010	
	Jan.	July	Jan.	July	Jan.	July	Jan.	July	Jan.	July
National generating capacity	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
1. Hydro power stations	131.1	131.7	132.0	132.2	132.4	132.6	133.6	133.9	134.7	134.9
2. Nuclear power stations	112.6	112.6	112.6	112.6	112.4	112.4	111.1	110.2	109.5	110.5
3. Conventional thermal power stations	294.1	295.0	298.3	300.8	303.3	306.9	312.2	314.0	316.2	317.9
4. Renewable energy sources	27.6	29.8	34.2	35.9	39.2	41.9	49.8	53.1	60.9	63.9
5. Not clearly identifable energy sources	2.3	2.4	2.6	2.6	2.7	2.7	3.0	3.0	3.3	3.3
6. National generating capacity (6 = 1+2+3+4+5)	**567.8**	**571.6**	**579.7**	**584.1**	**590.0**	**596.3**	**609.6**	**614.3**	**624.6**	**630.4**
7. Non-usable capacity[5]	79.4	95.3	81.4	97.5	84.8	101.3				
8. Overhauls (thermal power stations)	9.8	50.1	11.1	50.8	11.5	51.7	160.3	213.7	168.7	223.7
9. Outages (thermal power stations)	24.4	23.5	24.6	23.9	25.4	24.7				
10. System services reserve	33.4	31.9	34.2	32.3	34.2	32.5	35.1	33.1	35.6	33.8
11. Guaranteed capacity (11 = 6-(7+8+9+10))	**420.8**	**370.7**	**428.4**	**379.6**	**434.0**	**386.1**	**449.4**	**400.6**	**455.9**	**406.7**
12. Load	358.8	312.9	366.1	320.5	373.6	327.3	388.7	341.5	403.9	356.2
13. Margin against monthly peak load	21.9	14.7	22.6	15.4	23.5	15.4	12.4	15.3	23.7	15.8
14. Remaining capacity (14 = 11-12)	**62.0**	**57.8**	**62.4**	**59.1**	**60.5**	**58.8**	**60.6**	**59.1**	**52.0**	**50.5**

Changes in generating capacity, guaranteed capacity, remaining capacity and load are shown in Table 2.

Table 2	UCTE Power balance, 2004 - 2010 forecasts	Results in GW

	Forecast January			
	Variation 2004 - 2006 GW	Variation 2004 - 2006 %	Variation 2006 - 2010 GW	Variation 2006 - 2010 %
National generating capacity	22.2	3.9	34.6	5.9
Guaranteed capacity	13.3	3.2	21.8	5.0
Load at 11:00 a.m.	14.8	4.1	30.3	8.1
Remaining capacity	-1.5	-2.4	-8.5	-14.1
	Forecast July			
	Variation 2004 - 2006 GW	Variation 2004 - 2006 %	Variation 2006 - 2010 GW	Variation 2006 - 2010 %
National generating capacity	24.7	4.3	34.1	5.7
Guaranteed capacity	15.4	4.2	20.7	5.3
Load at 11:00 a.m.	14.3	4.6	29.0	8.9
Remaining capacity	1.1	1.8	- 8.3	-14.2

[5] For 2008 and 2010, non usable capacity, overhauls and outages are aggregated

Period 2004 - 2006

A significant growth in generating capacity (+22.2 GW) is expected over this period. It is particularly noticeable that renewable energy sources account for half (11.6 GW) of this increase; most of these new plants are wind power plants. Conventional thermal power stations represent a lesser share of the total increase with expected commissioning contributing for 9.2 GW. The increase in guaranteed capacity (+13.3 GW) represents only 60% of the increase in the national

generating due to the poor contribution of wind power to guaranteed capacity. The increase observed for load at reference time over the same period (+14.8 GW) is slightly higher than the increase in guaranteed capacity.
Consequently, the remaining capacity can be considered as stable from 2004 to 2006, with values reaching 62.0 GW in January 2004, 62.4 GW in January 2005, and 60.5 GW in January 2006. Remaining capacity in July is even slightly improving in summer (from 57.8 GW in 2004 to 58.8 GW in 2006).
These levels are higher than the indicative adequacy reference margin as shown in figures 2 and 3.
In order to assess generation the level of security, some characteristics of the UCTE system must be taken into account. The most important point is the significant sensitivity of the load to the temperature. It can be estimated at more than 3000 MW by degree Celsius in Winter and 1800 GW in summer. The second factor is the random nature of the "guaranteed capacity" which results from the forced outages of the thermal plants and from variations of the inflows in the hydro power plants. According to the expertise of the TSO's, the standard deviation of each of these factors can be estimated between 2500 and 3000 MW. In addition there is a significant correlation between low temperature and low inflows in the hydro plants as a result of anticyclonic meteorological conditions. In the future these periods will also be characterised by a low contribution of wind power generation.
Thus a remaining capacity of 60 GW aims at supplying the UCTE peak load during a cold wave leading to temperature up to 7°C below normal temperature, while keeping a margin of about 20 GW in order to cover some plants unavailability higher than average. The forecasted generating capacities seem to be sufficient to cover the load for the 3 coming years without any major risks as shown in figures 2 and 3. However it must be noticed that this conclusion rely on the assumption that all the plants whose commissioning is expected during this period will actually be put into operation; in addition it is important to note that some decommissioning can still be decided during this period.

Period 2006 – 2010

It can be observed that the national generating capacity increases from 590 GW in January 2006 to 624.6 GW in 2010, with still rather important commissioning in renewable energy sources (+21.8 GW from January 2006 to January 2010), often resulting from plans engaged by the member states to fulfil the requirements of the European directive on renewable sources. Given the lesser availability ratio of renewable, the additional guaranteed capacity over the period (+21.8 GW) represent only 63% of the increase in generating capacity (the ratio for the overall production system is approx. 74% in January 2006). This effect is particularly sensitive from 2008 to 2010, with only an additional guaranteed capacity of only 6.5 GW (as compared to +15.4 GW from January 2006 to January 2008). The expected trend for load in the medium long term remains the same as over the period from 2004 to 2006 same (with an average annual growth approx.+2%). Thus, the increase in guaranteed capacity, sufficient to cover the increase expected for load from January 2006 to January 2008 (+15.1 GW), does not meet the additional load (+15.2 GW) from January 2008 to January 2010. As a result, **remaining capacity remains in 2008** at the level expected in the short term (respectively 60.6 GW in January and 59.1 in July), but **drops significantly to 52 GW in January 2010 (50.5 GW in July).** When comparing this level of remaining capacity with the indicative adequacy reference margin, it can be observed that this condition is respected till 2008 but no more in 2010. **That means that the investments in generation today firmly decided or planned are not sufficient to meet this condition in 2010. The system security could be degraded over the period from 2008 to 2010.**

When drawing this conclusion, two elements must be taken into consideration:

- **it is still possible to decide new investments for this time horizon; there is a need of approx. 2 GW guaranteed capacity to reach the adequacy reference margin level, and around 8 GW to maintain this margin at the existing level.**

- **decommissioning (on top of those currently expected) may occur during the period especially as result of the effects of new environmental requirements on the oldest thermal plants; an equivalent level of investment should then be decided at the horizon 2010.**

Renewable sources could amount to 64 GW at the end of the period. This increasing share of renewable in the UCTE system, most of them being wind power, asks for an increasing need of balancing power whereas in the same time some thermal plants able to deliver this kind of service could be decommissioned.

Figure 2 | **Remaining capacity vs. 5% of NGC and margin against peak load - January**

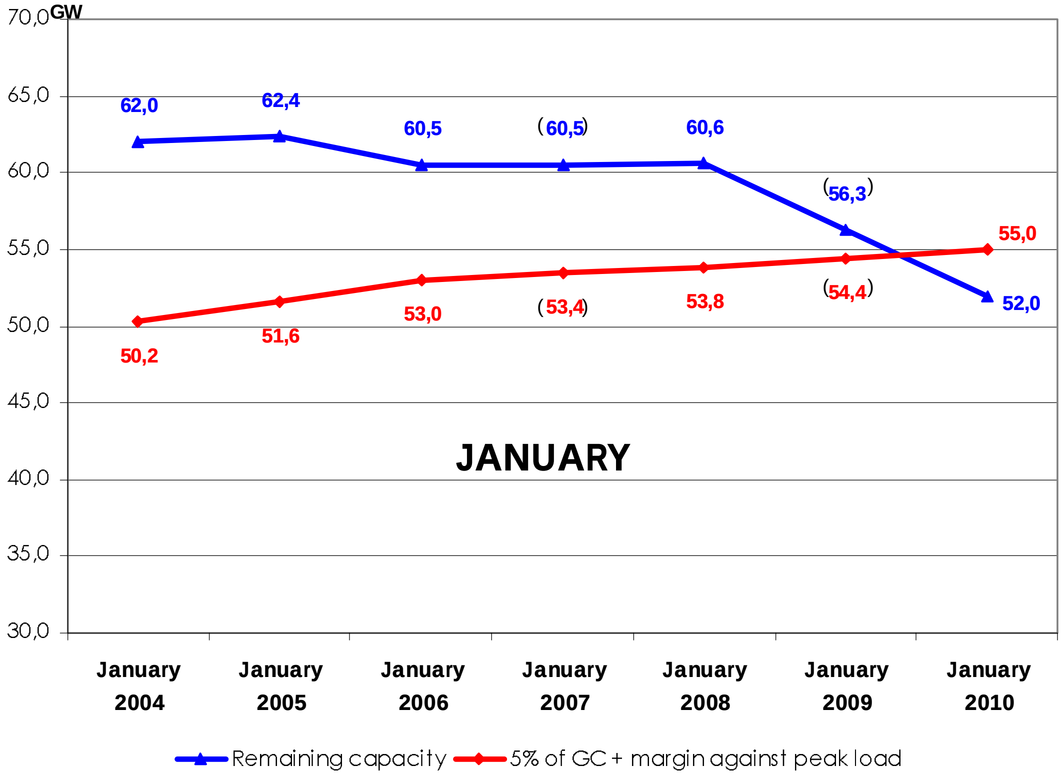
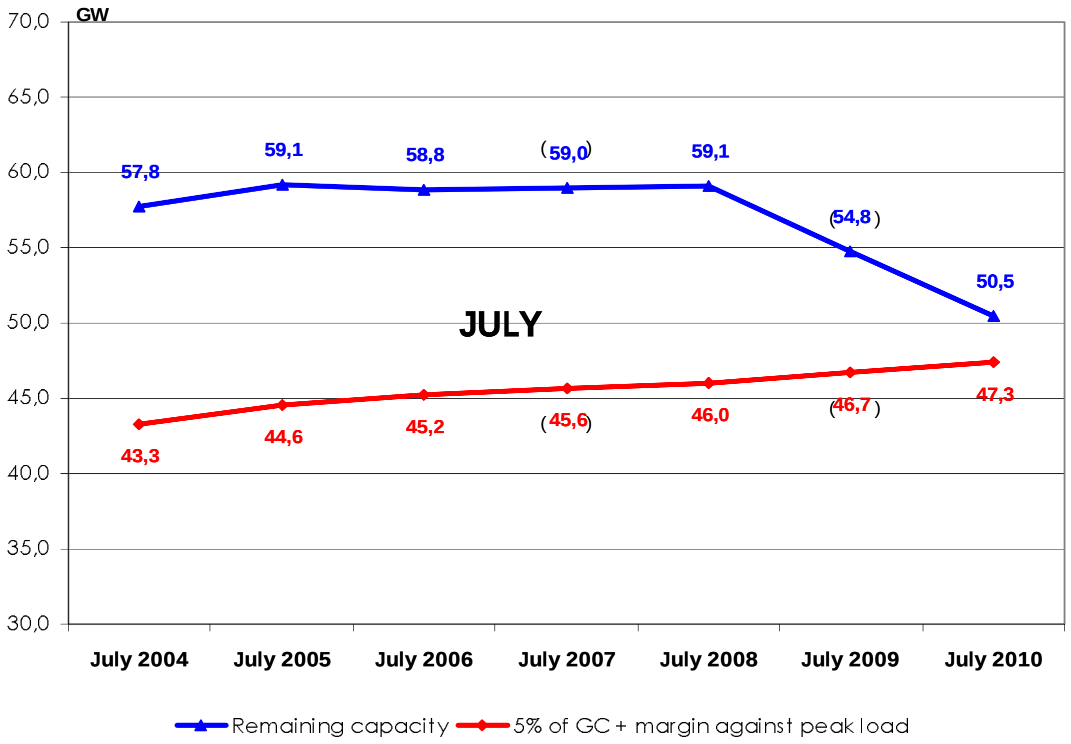


Figure 3 | **Remaining capacity vs. 5% of NGC and margin against peak load - July**



When comparing this year's forecast for 2004 with current situation in 2002 (excluding countries taken into account this year) and last year's forecast for 2003, it appears that remaining capacity has improved. Expected remaining capacity for 2003 was 49 GW in January, and is for 2004 57.4 GW (without Bulgaria, Romania and Burshtyn Island).

Analysis of remaining capacity at national and regional levels

The detailed results concerning remaining capacity are displayed in table 4 hereafter:

Table 4	**Remaining capacity on the 3rd Wednesday**	**Results in GW**

	2004		**2005**		**2006**		**2008**		**2010**	
	January	July	January	July	January	July	January	July	January	July
Country	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
B	0.0	1.3	-0.1	1.2	-0.8	0.6	-1.5	0.1	-2.0	-0.4
D	8.1	5.2	7.1	4.5	7.4	5.0	6.9	5.2	6.5	4.5
E	8.9	6.8	9.7	7.3	7.3	10.8	7.2	10.2	9.3	6.3
F	14.1	10.9	12.4	9.8	11.0	8.8	9.9	7.8	8.2	6.0
GR	0.9	-0.3	0.7	-0.4	0.6	-0.3	1.0	-0.4	0.9	-0.5
I	1.5	1.8	3.5	5.0	4.9	6.8	8.1	8.3	6.7	5.8
SLO	0.2	0.3	0.6	0.2	0.1	0.2	0.3	0.4	0.2	0.3
HR	1.3	1.4	1.3	1.4	1.2	1.8	1.4	1.6	1.4	2.0
BiH	0.9	1.1	0.8	1.0	0.8	1.0	0.7	0.9	0.6	0.8
FYROM	0.1	0.6	0.1	0.6	0.1	0.6	0.4	1.0	0.6	1.3
SCG	0.1	0.5	0.1	0.6	0.1	0.5	0.3	0.7	0.2	0.7
L	0.7	0.4	0.7	0.4	0.7	0.4	0.7	0.4	0.7	0.4
NL	0.5	1.4	1.0	1.9	0.8	1.7	0.3	1.2	-0.2	0.7
A	5.4	5.5	5.4	5.5	5.2	5.3	5.2	5.3	5.2	5.3
P	1.2	1.5	1.5	1.3	1.4	1.3	1.7	1.3	1.4	1.1
CH	3.2	4.7	3.0	4.5	2.8	4.4	2.4	4.1	2.0	3.7
CZ	3.1	2.4	3.0	2.3	2.9	2.2	2.6	1.8	1.9	1.4
H	0.4	0.4	0.2	0.0	0.4	0.2	0.4	0.1	0.5	0.2
PL	6.3	5.4	6.9	6.3	6.5	6.2	6.9	7.5	6.5	6.5
SK	0.4	0.5	0.2	0.4	0.2	0.4	-0.3	-0.4	-0.8	-0.8
RO	1.7	2.2	1.3	1.7	0.4	1.0	0.4	1.1	0.3	1.1
BG	2.2	3.2	2.1	3.0	2.1	3.0	2.0	2.7	1.0	3.3
BI-UA	0.6	0.6	0.6	0.6	0.7	0.6	0.7	0.7	0.7	0.7
UCTE	**62.0**	**57.8**	**62.4**	**59.1**	**60.5**	**58.8**	**60.6**	**59.1**	**52.0**	**50.5**

Figures 4-1 and 4-2 show the share of remaining capacity in the national generating capacity for each country, in 2004 and 2010. As already stated, remaining capacity represents 10-11 % of the total generating capacity for the whole UCTE system between 2004 and 2008 but only 8% in 2010.

Figure 4 - 1 **Remaining capacity / National generating capacity 2004**

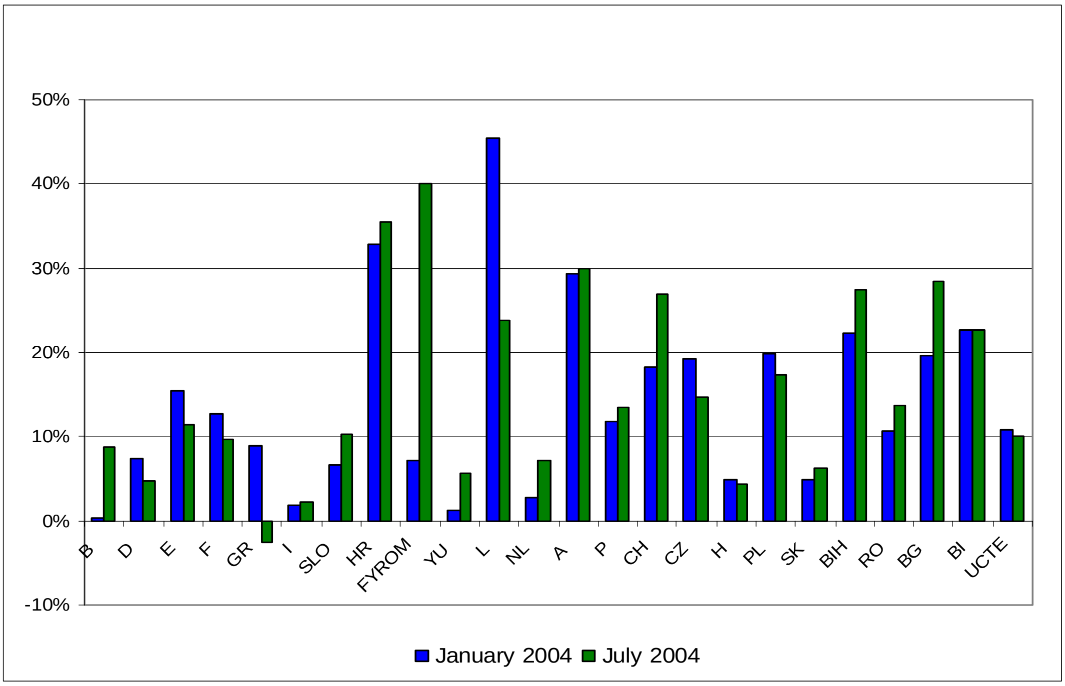
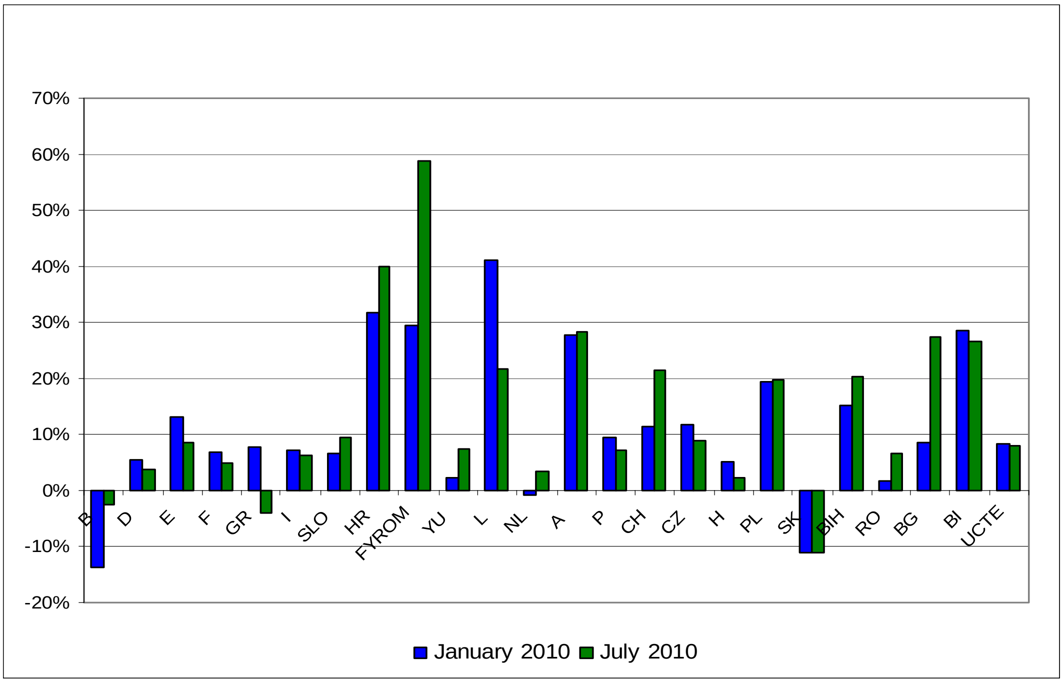


Figure 4 - 2 | **Remaining capacity / National generating capacity 2010**



Usually, remaining capacity represents more than 5 % of the national generating capacity in 2004, but exceptions become more and more numerous over the time, revealing an erosion of the present margins.

These exceptions concern:

- Belgium in winter with an increasing deficit which also occurs in summer condition in 2010
- Germany in summer period
- Greece in summer with negative values (summer corresponds to the annual peak for the Greek system)
- Italy in 2004, then the situation should improve
- Serbia Montenegro over the period
- The Netherlands in winter with a deficit at the end of the period
- Hungary in summer
- Romania in winter from 2006 and on
- Slovak Republic in winter 2005 and on (with negative values in 2010).

Comments

- In **Germany**, in this year's forecast values vary between 4 and 7% for 2004-2006; amounting to 5% on average, they are considered adequate for power plant operation reserve. From the TSOs' point of view, power station operators would have to secure at least the output of the largest unit as hours reserve within the respective control area, as the TSO makes the reserve available only for a maximum of one hour (dimensioning of system services). However, almost all power station operators try to reduce this power through pooling with other power station operators.

- In **France**, the TSO considers necessary around 8.5% of the guaranteed capacity must remain as reserve because of the strong variability of demand with the climatic conditions and of the composition of the national generating capacity. The remaining capacity represents 12% of the national generating capacity in winter 2004, but only 7% in 2010.

- As far as **Slovenia** is concerned, the estimated value of necessary power plant operator reserve is 300 MW (11% of national generating capacity) – this is an example of a relatively small power system, where necessary reserves are usually higher.

- In **Croatia**, the estimated value of necessary remaining capacity is 300 MW, corresponding to 8% of the generation capacity.
- **Luxembourg** is in a particular situation, where one large power plant exports control power to Germany and a second power plant exports base load to Belgium, while demand is largely covered by imports.

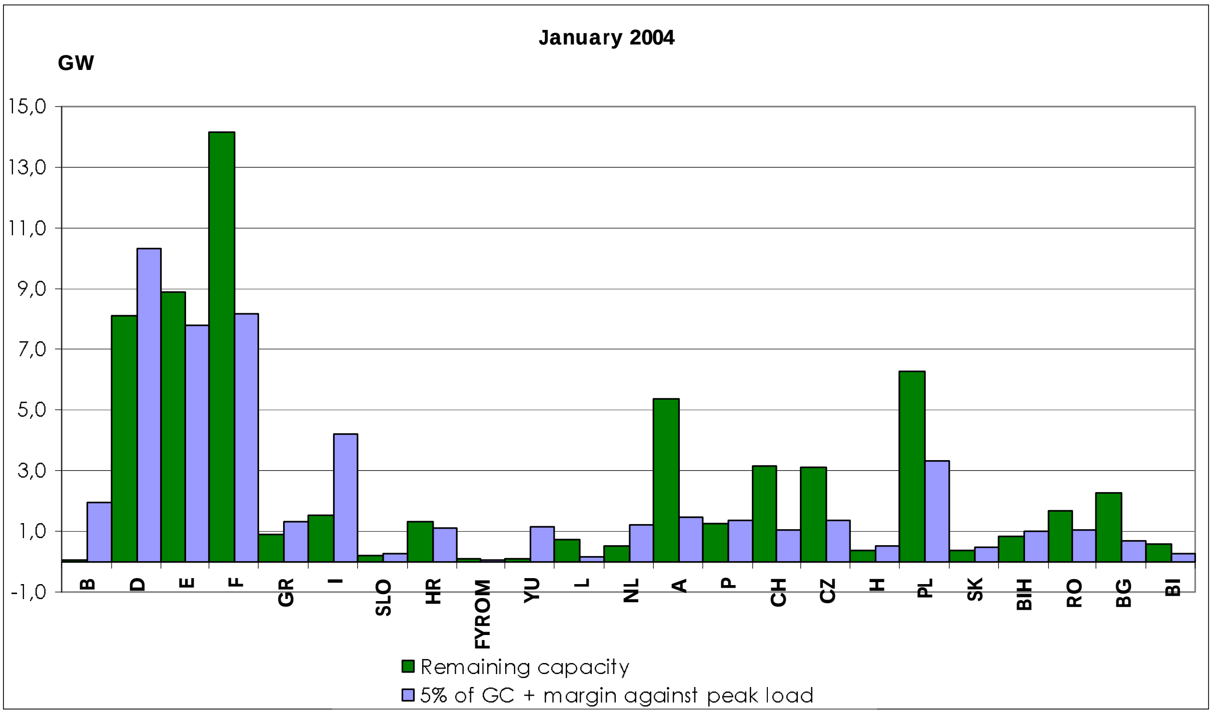
- In **The Netherlands**, the TSO until now was able to handle all contingencies with the available amount of capacity. So it appears there are sufficient resources in the Netherlands and externally to maintain the schedules in balance by the market parties themselves, with sufficient resources left to maintain system balance in an adequate way.

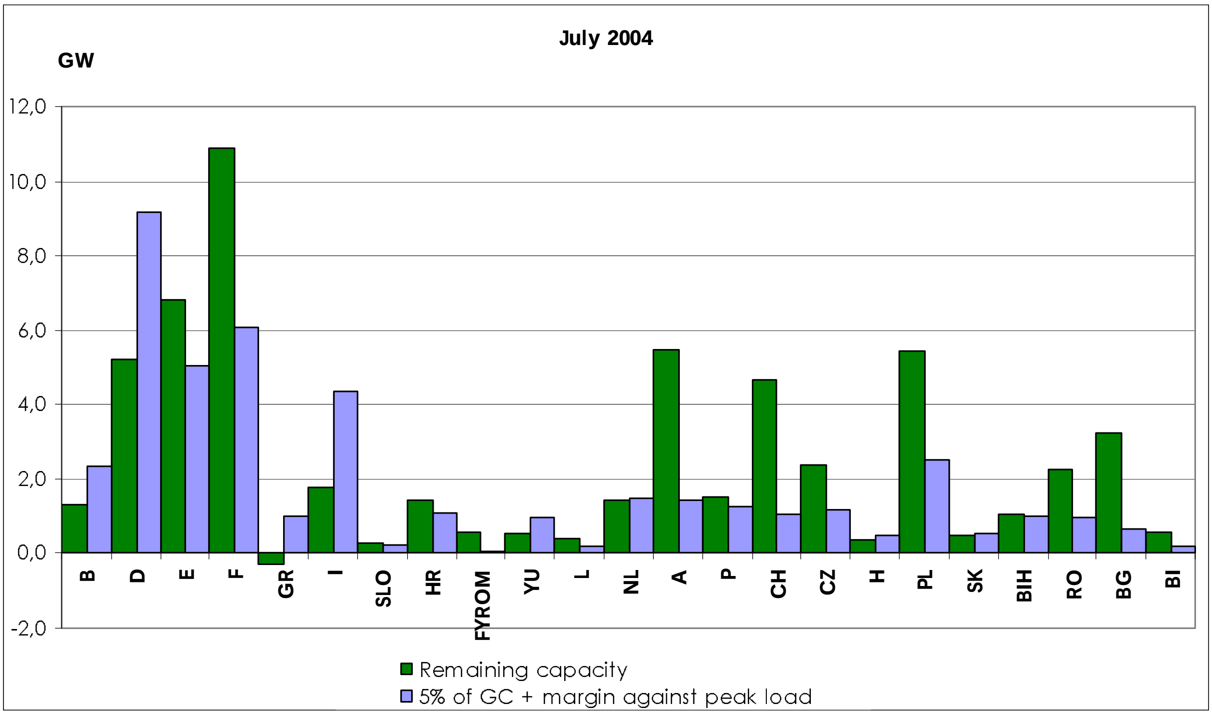
- In **Austria**, a very high percentage of the electrical energy production comes from hydroelectric power plants (around 70%) . As the installed electric power of storage power plants is about 4300 MW there is no lack of capacity in the short-term.

- In **Poland** the Grid Code requires 15% power reserve (specially defined) over the forecasted demand in a yearly time horizon. This amount of power reserve as defined in the Polish Grid Code corresponds to 5-7% of the remaining capacity (as defined in the UCTE power balance methodology) under the current Polish conditions, so this level of remaining capacity is considered as minimal necessary power plant operation reserve in Poland.

Figures 5-1 and 5-2 show the comparison between the remaining capacity and the indicative adequacy reference margin in 2004 and 2010 (respectively January and July), detailed by country.

Figure 5 - 1	" Margin against monthly peak load " and 5% of the generating capacity - 2004

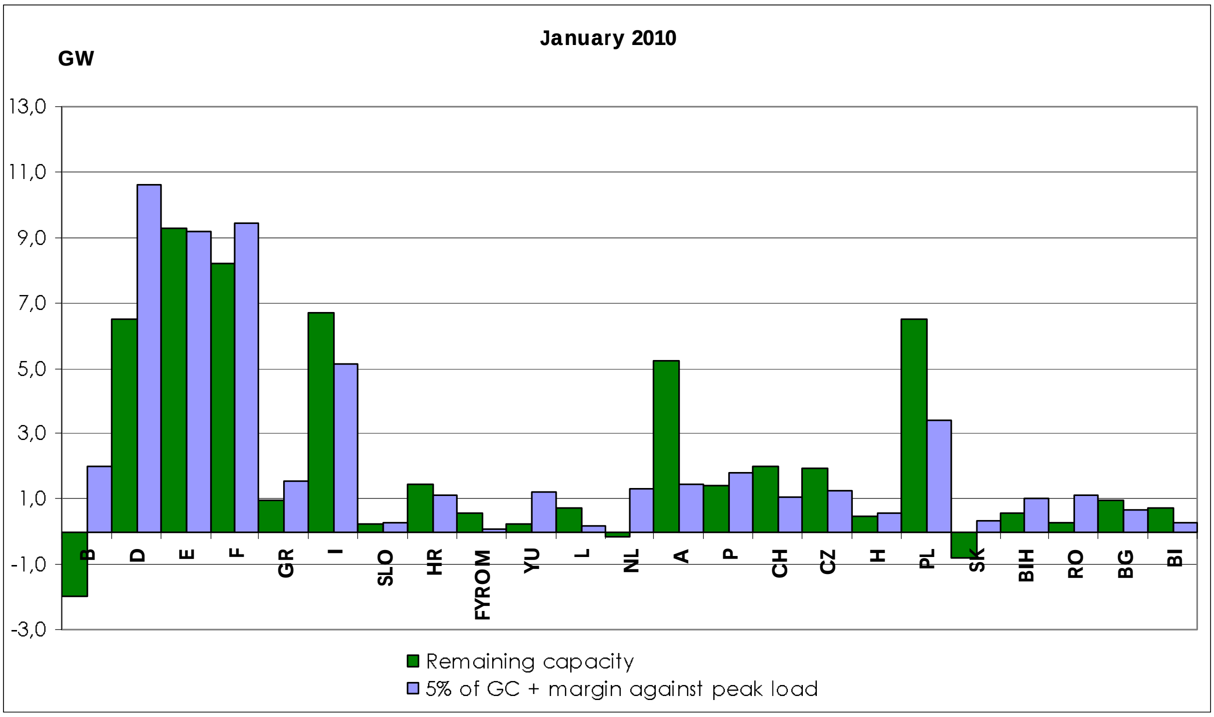


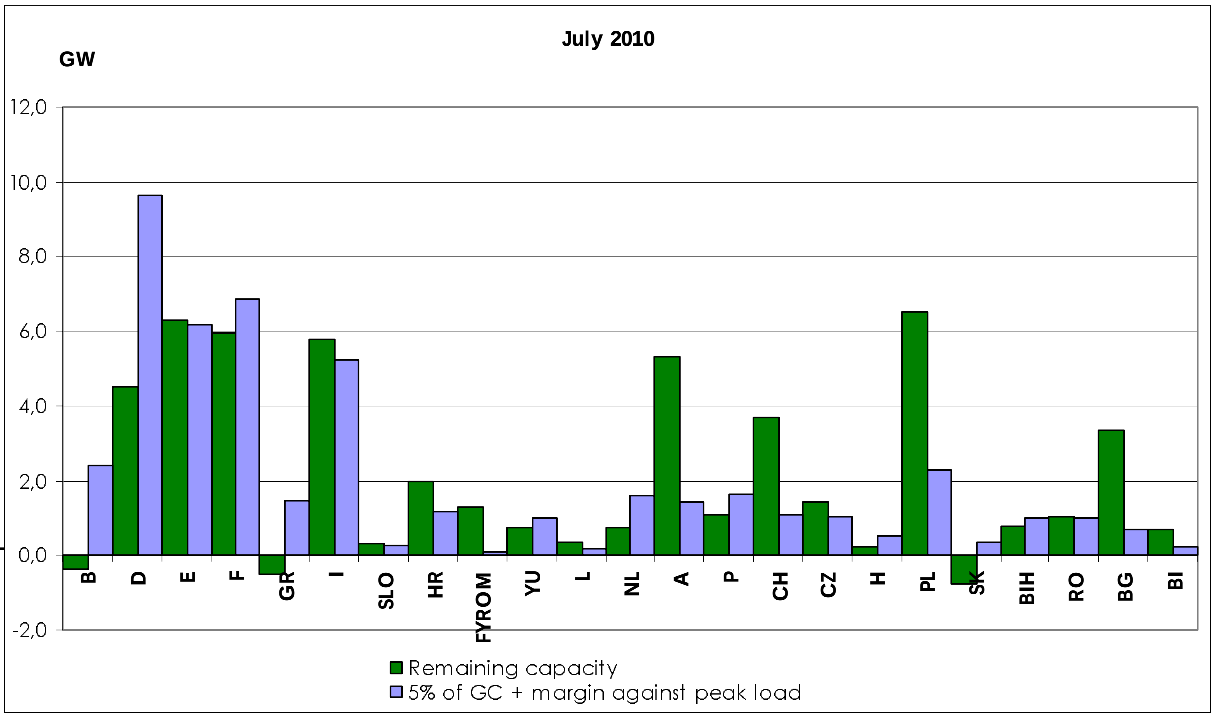


We can observe that 11 countries do not meet this indicative reference margin in winter 2004; 8 of them do not meet it also in summer.

However some of these countries consider that system security will not be at risk over the period 2004 - 2006 thanks to the use of the interconnection capacities, long term import contracts and participation contracts in power plants located territory.

Figure 5 - 1 | **" Margin against monthly peak load " and 5% of the generating capacity - 2010**





In 2010, according to the data today available for TSOs, a general decrease of the remaining capacity can be observed. France and Romania are the two countries whose remaining capacity met the adequacy reference margin in January 2004, and do not anymore in January 2010. On the contrary, Italy is the only country whose remaining capacity improves from 2004 to 2010 both in winter and summer, so as to meet the adequacy reference margin in 2010, thanks to expected new generation.

Analysis by geographical blocks

Considering the role that the interconnected transmission system plays for the reliability of some national systems, the situation of different geographical blocks is analysed (see representation in Figures 1A, 1B, 1C and 1D for 2004, 2005, 2006 and 2010, respectively).

The main UCTE block The remaining capacity of the main UCTE block will be decreasing from **2004** to **2010**. It is expected to represent 11.3%, 10.4% and 9.4% of the generating capacity in January 2004, 2005 and 2006 respectively. It continues to decrease in 2008 (8.3%) and reaches 7.0% in 2010 just beneath the indicative adequacy reference margin. Inside this block, Croatia, Luxembourg, Austria and Switzerland expect to meet the adequacy reference margin from 2004 to 2010. But this is not the case of the other countries especially Germany from 2004 and France in 2010. Remaining capacity in winter is negative for Belgium in 2006 and on, and in The Netherlands in 2010. Thus Belgium considers that adequacy problems could occur from 2006 at peak load, that some network reinforcements may help to counteract. The use of interconnection capacity and long term import contracts and participation contracts in power plants located outside the national territory help to maintain an acceptable level of generation adequacy in some of these countries at short term. But with the general decrease of the remaining capacities there is a risk of tight situations inside this block at the end of the period if no decision to improve the power balance of some of these countries are taken. Imports from other blocks could be necessary when the temperature drops to 5°C below normal with an average availability of generating units.

Spain + Portugal When comparing the remaining capacity to the adequacy reference margin it should be noticed that it is higher than this reference margin over the period from **2004** to **2008, and just below in 2010.** It clearly appears that the situation for the Iberian block will be improving in winter over the period from **2004** to **2006**. The expected remaining capacity will represent 14.9%, 15.6% and 16.1% of the national generating capacity for 2004, 2005 and 2006 respectively. It results from a significant increase in generating capacity expected both in Spain and Portugal. The newly commissioned power plants will be mainly conventional thermal plants and wind power. From **2006** to **2010**, the share of remaining capacity in the generating capacity could then decrease (down to 12.4% in 2010). The availability ratio between generating capacity and guaranteed capacity remains stable over the period (75% in winter and 67% in summer), the expected commissioning of renewable sources capacities compensating the one of thermal power stations. This block is very sensitive to hydro conditions and in the future to the stochastic nature of wind power generation. The expected developments of interconnections with France and Morocco should improve the reliability of this area but also facilitate the help that the Iberian block could provide to the UCTE main block.

Italy The events that occurred in Italy during the year 2003 have put forward the need for additional generating capacities. The remaining capacity will still be lower than the capacity that the system needs to cover the adequacy reference margin in 2004 and 2005, but should improve in the following years.The foreseen remaining capacity as a percentage of the generating capacity will evolve from 1.9% in **2004** to 5.6% in **2006** in winter, and from 2.2% to 7.5% in summer, thanks to an important expected commissioning of new plants (approx. 4 GW per year from 2004 to 2006). It is expected to stabilise at 7.1% in **2010**. The expected importable capacity should be improved (approx. 6.5 GW, up to 9.5 GW in 2010), but the recent blackout has shown that the balance between imports and native generation must be carefully managed in order to maintain the reliable supply.

JIEL[6] + Greece The situation of this block seems to remain fragile over the period. The slight increase in the generating capacity just matches the load growth. The remaining capacity is not sufficient to meet the indicative adequacy reference margin. It represents 5.4% of the generating capacity in 2004, 4.2% in 2006, and 7.2% in 2010 thanks to expected commissioning of new plants. The interconnection with Romania and Bulgaria, which together possess a surplus of generating capacity at short term helps to maintain the adequacy of the systems in this region. The forthcoming resynchronisation of the 2nd UCTE synchronous zone with the rest of UCTE is expected at mid 2004 and will also further improve the situation in this region.

Centrel block Without extraordinary changes in both the generating capacity and the load, the Centrel block should easily reach the indicative adequacy reference margin with a stable share of remaining capacity (approx. 16.3% in winter and 14.4% in summer) in the generating capacity for the three coming years. Later on, it is expected to decrease down to 13.0% and 11.9% in **2010**. The main uncertainties about this block concern the effects of the future environmental requirements on the duration life of the conventional thermal units which form most of the generating capacity of this block.

Romania & Bulgaria[7] The remaining capacity is expected to decrease over the period from **2004** to **2010** (with a ratio in the generating capacity of 14.4% in 2004, 9.5% in 2006 and only 4.5% in 2010). It is expected to be sufficient to cover the adequacy reference margin till 2008, but no more in winter 2010.

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6 JIEL block is made of Serbia Montenegro and FYROM.
7 Romania and Bulgaria are separated area control blocks

4. Transmission System Adequacy

The table in Appendix C shows the details on grid developments in the UCTE countries.
The following table shows the clearly identified main developments on international interconnections over the period from 2004 to 2010 :

Line or equipment	Voltage level	Date of commissioning	Cross-border
Avelgem – Avelin – Mastaing (second circuit)	400 kV	2005	B - F
PST Zandvliet	400 kV	2006	B - NL
BALBOA – ALQUEVA line	400 kV	2004	E - P
France – Spain : eastern reinforcement	400 kV	2006	F - E
ESTRECHO-FARDIOUA (2nd circuit), Interconnection	400 kV	2005	E - MA
Double AC tie-line Robbia – San Fiorano	400 kV	2005	CH - I
Lienz – Cordigniano Line	380 kV	2008	A - I
Cirkovce – Pince Line	400 kV	2010	SLO - H
Phase shifter transformer in Nosovice	400 kV	2005	PL - CZ
OHL Isaccea–Dobroudja line	400 kV	2004	RO - BG
OHL Isaccea–Vulkanesti line	400 kV	2004	RO - MD
OHL Isaccea – Varna (build at 750 kV, in operation at 400 kV)	400 kV	2004	RO - BG
OHL Oradea –Bekescsaba	400 kV	2008	RO - H
Kechros – Turkey Line	400 kV	2006	GR - TR

As far as regional blocks are concerned, noticeable increase of exchange capacities are expected according to developments on interconnections:

- Reconnection of the second UCTE zone with **UCTE main block** and **CENTREL** at mid 2004
- between **main UCTE** and **Spain+Portugal** (+1200 MW in 2006).
- between **main UCTE** and **Italy** (+1800 MW in 2005, +1000 MW in 2010)
- between main Spain + Portugal and Morocco (+ 350 MW in 2005).

Because the UCTE system adequacy forecasts are established without taking exchanges into account, the remaining capacity is a useful indicator of the "exportable" capacity of each country or, conversely, of its need for imports. In order to evaluate the reliability of electricity systems, it is useful to compare remaining capacity to the "transportable capacity" provided by systems at the borders of the countries or groups of countries concerned. Net Transfer Capacity values calculated by the ETSO are used as a reference. However, as the transfer capacity is not available for all countries, some values are simply estimations. Figures 6-1, 6-2 and 7-1, 7-2 show a comparison of the remaining capacity in various countries in January and July 2004 and 2010 with the transportable capacity (exportable and importable). The minimum value from among the remaining capacity and the exportable capacity may be interpreted as the capacity that the country concerned is able to make available to the interconnected network in order to ensure the security of the interconnected system. It could be noticed that, in certain countries, the remaining capacity is significantly greater than the potential export capacity : this applies to Spain, France in 2004, Poland and Austria, Portugal. On the other hand, countries with a low remaining capacity have potential need for power imports. Overall, it emerges that transfer capacities do not seem to be an obstacle to system security. However it can not be excluded that, due to market phenomena (striving for the most economic use of power system resources), some congestion points could appear in the interconnected network,where transmission bottlenecks make it impossible to use available more economical electricity sources abroad.

Figure 6 - 1 | **Net Transfer capacity, January 2004**

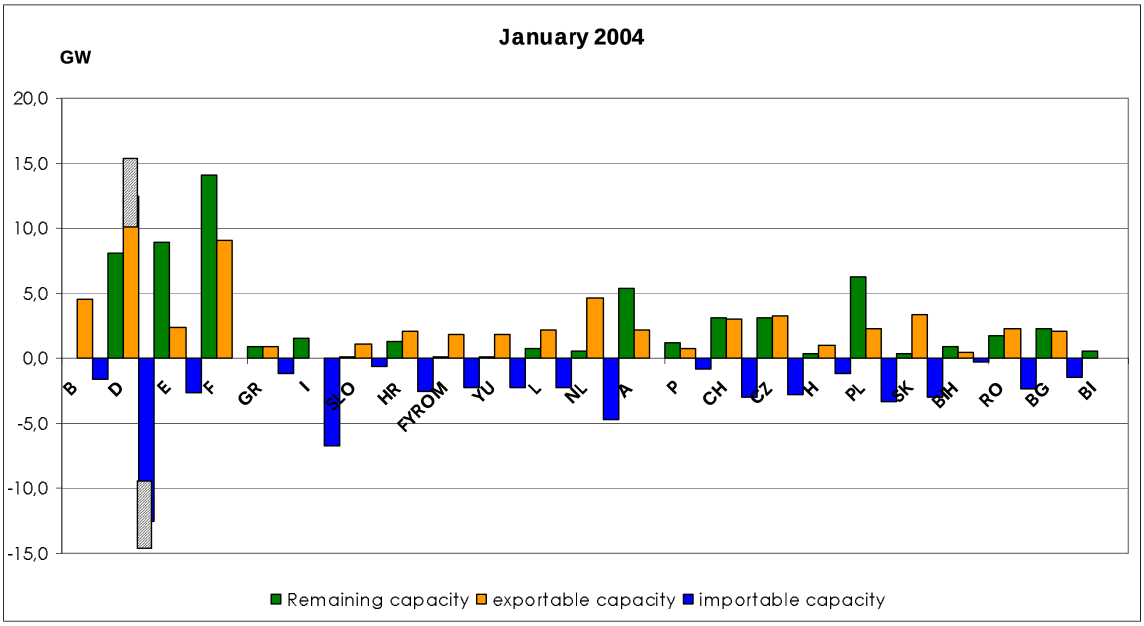


Figure 6 - 2 | **Net Transfer capacity, July 2004**

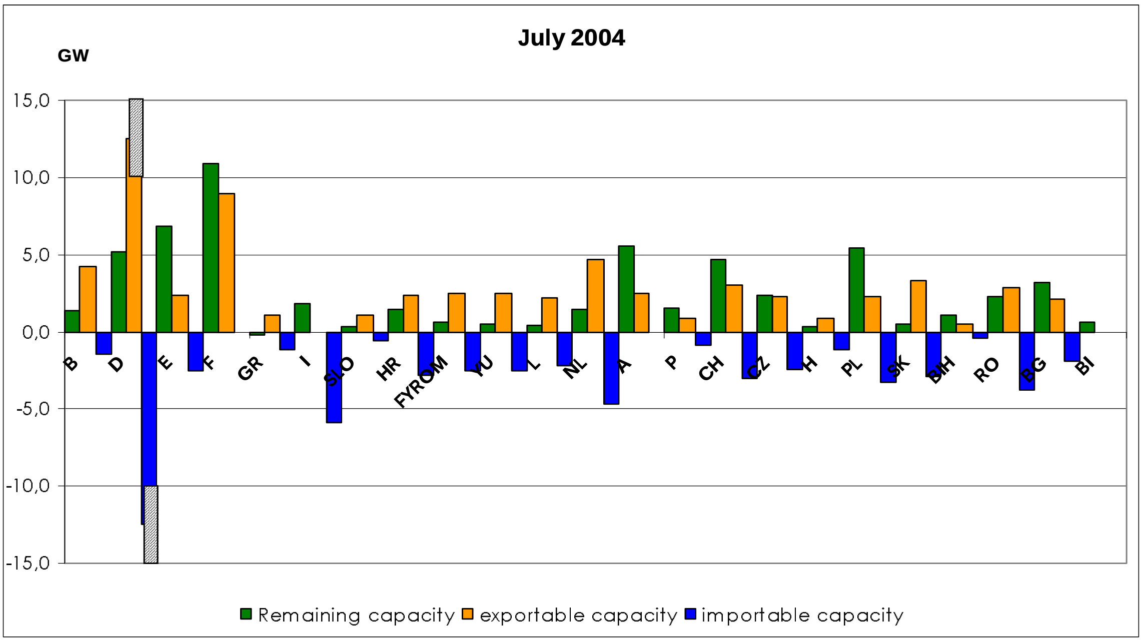


Figure 7 - 1 | **Net Transfer capacity, January 2010**

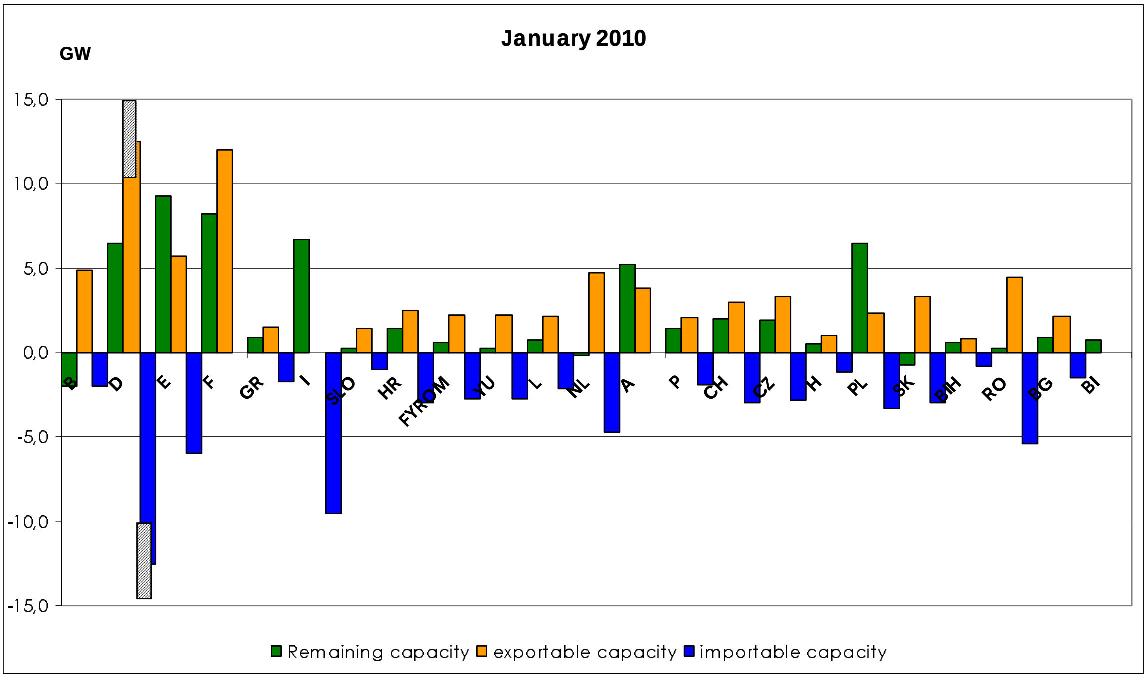
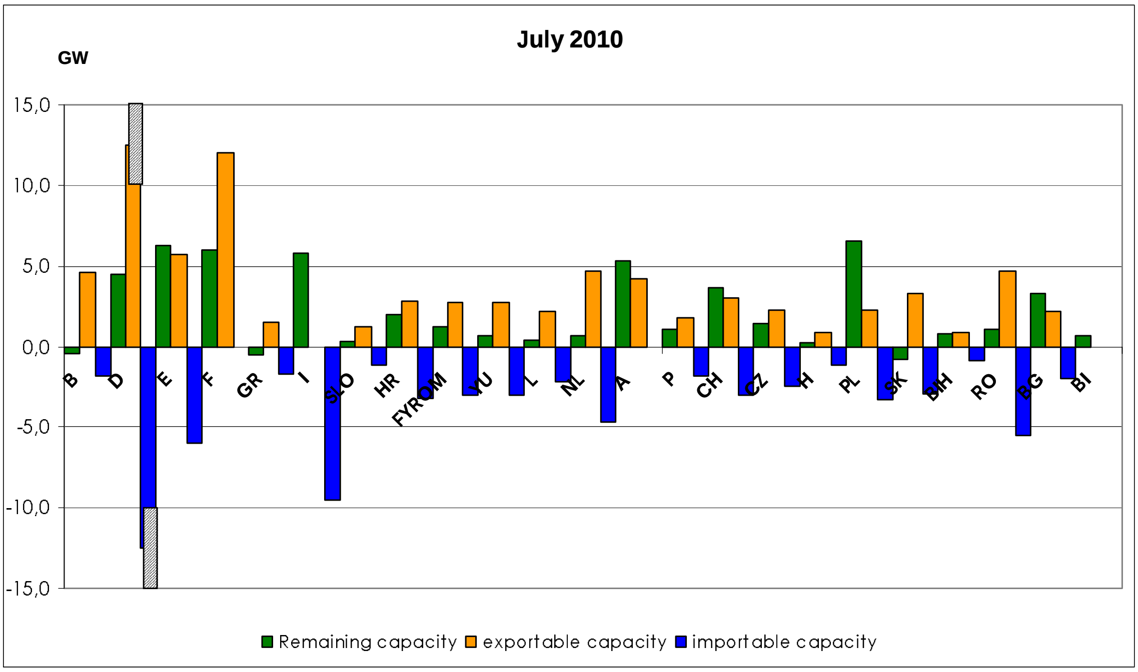


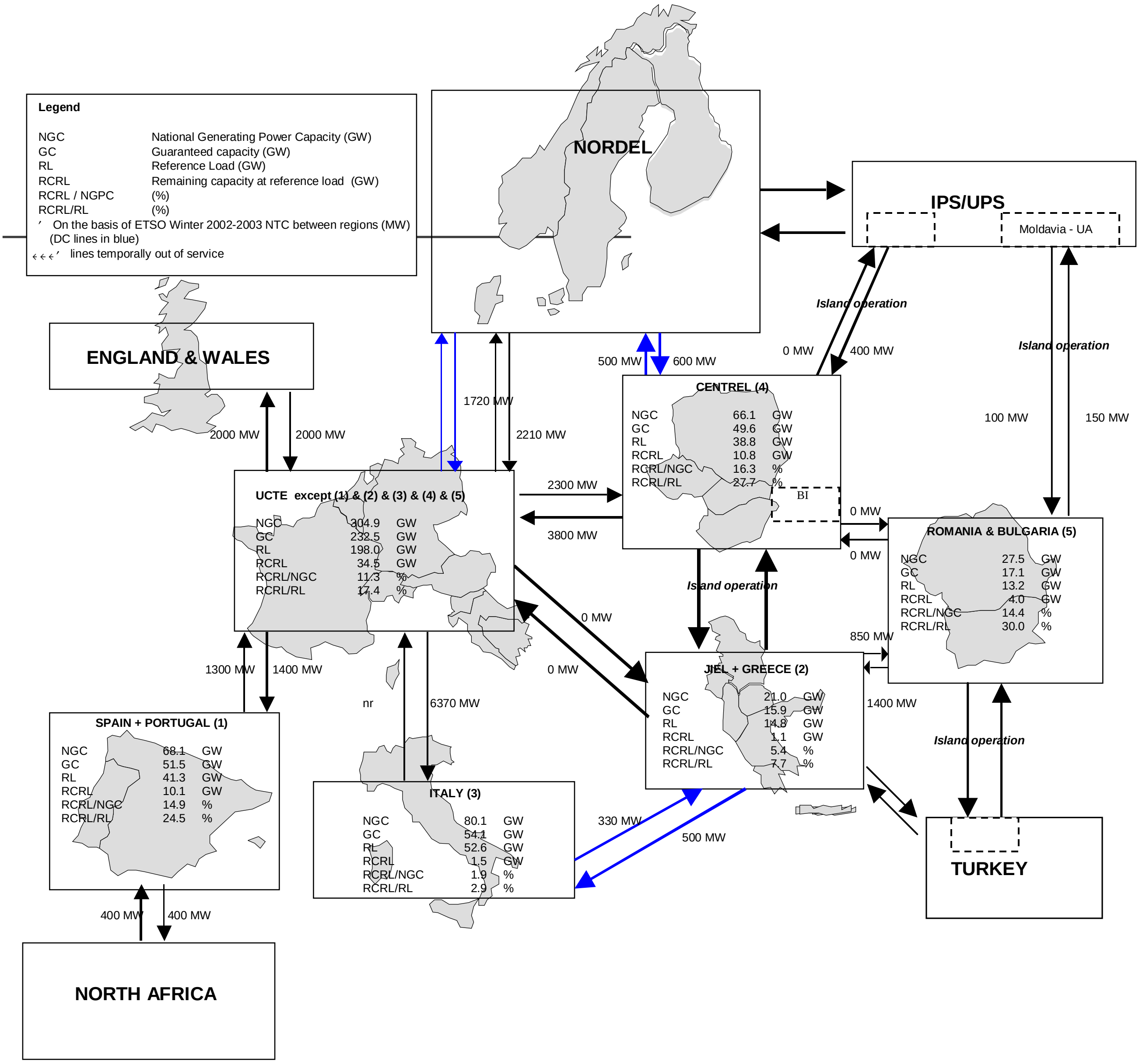
Figure 7 - 2 | **Net Transfer capacity, July 2010**



D : The estimated importable and exportable capacity for Germany varies between 10 and 15 GW
F : Import capacity is not relevant
I : Export capacity is not relevant
A : No real limits for import capacity exist
CH: Importable and exportable capacity fall within a range of +3GW to +6GW; these are indicative values

Figures 1A, 1B and 1C summarise the results of the power balance forecasts in different regions of the UCTE synchronous area for the 3 rd Wednesdays in January, 2004, 2005, 2006 and 2010, respectively.

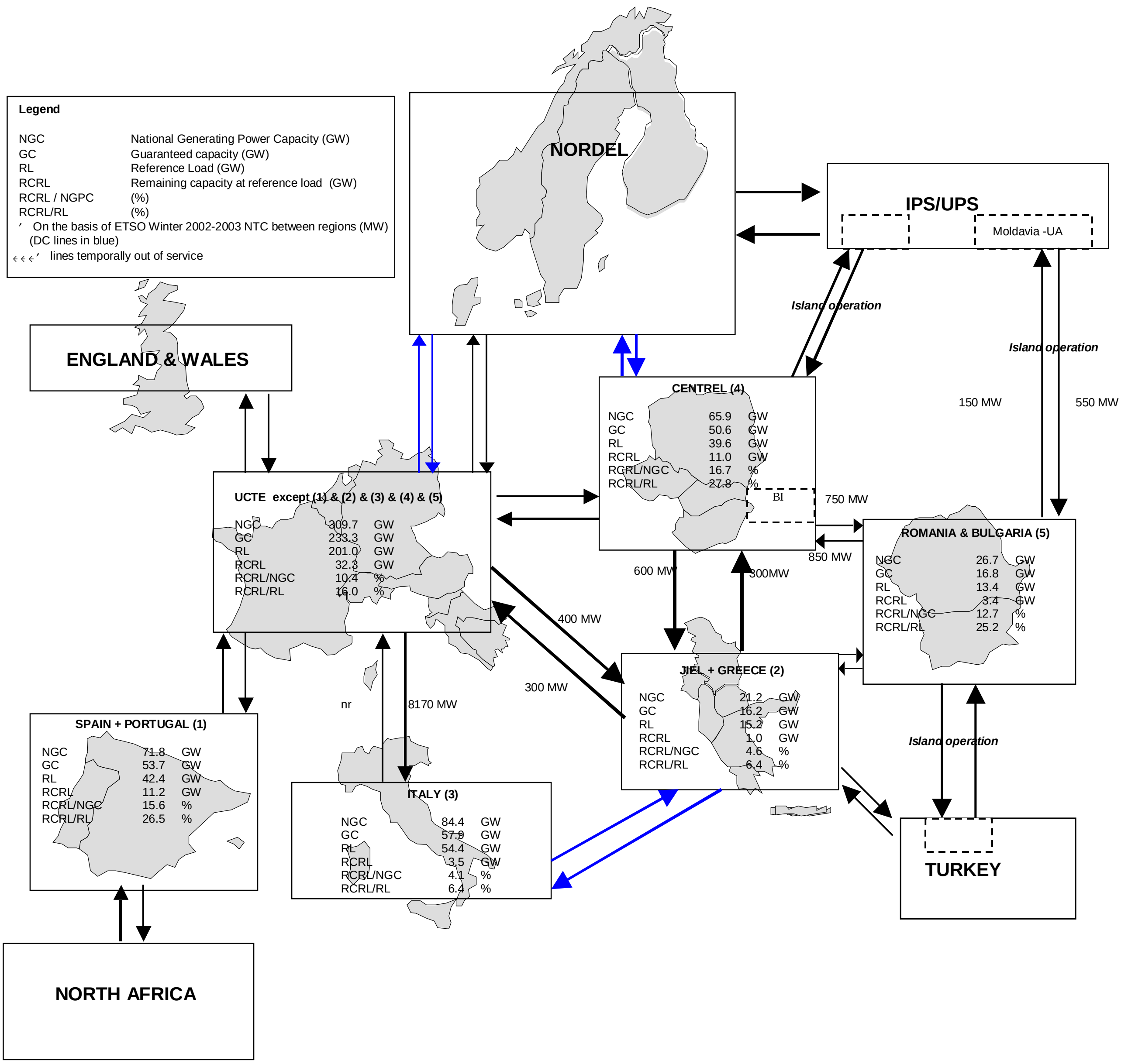
Figure 1A [8] **Data for January 2004**



[8] Remarks: The Burshtyn Island is operated synchronously with the UCTE since July 1st, 2002; it has been included in CENTREL block in this year' report.

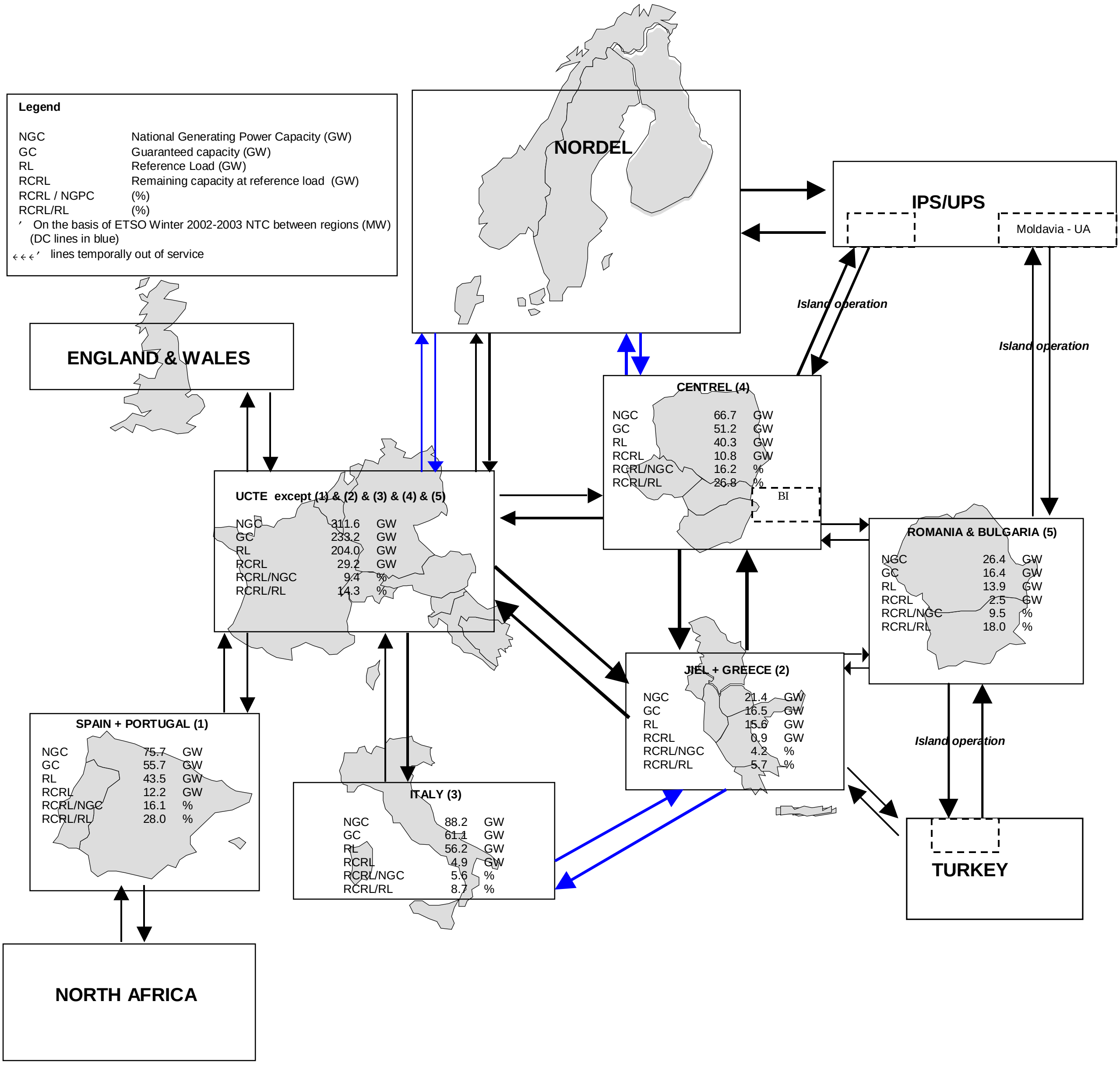
Figure 1B [9] **Data for January 2005**

Only changes in transportable capacity through interconnections are indicated



[9] Remarks: The Burshtyn Island is operated synchronously with the UCTE since July 1st, 2002; it has been included in CENTREL block in this year' report.

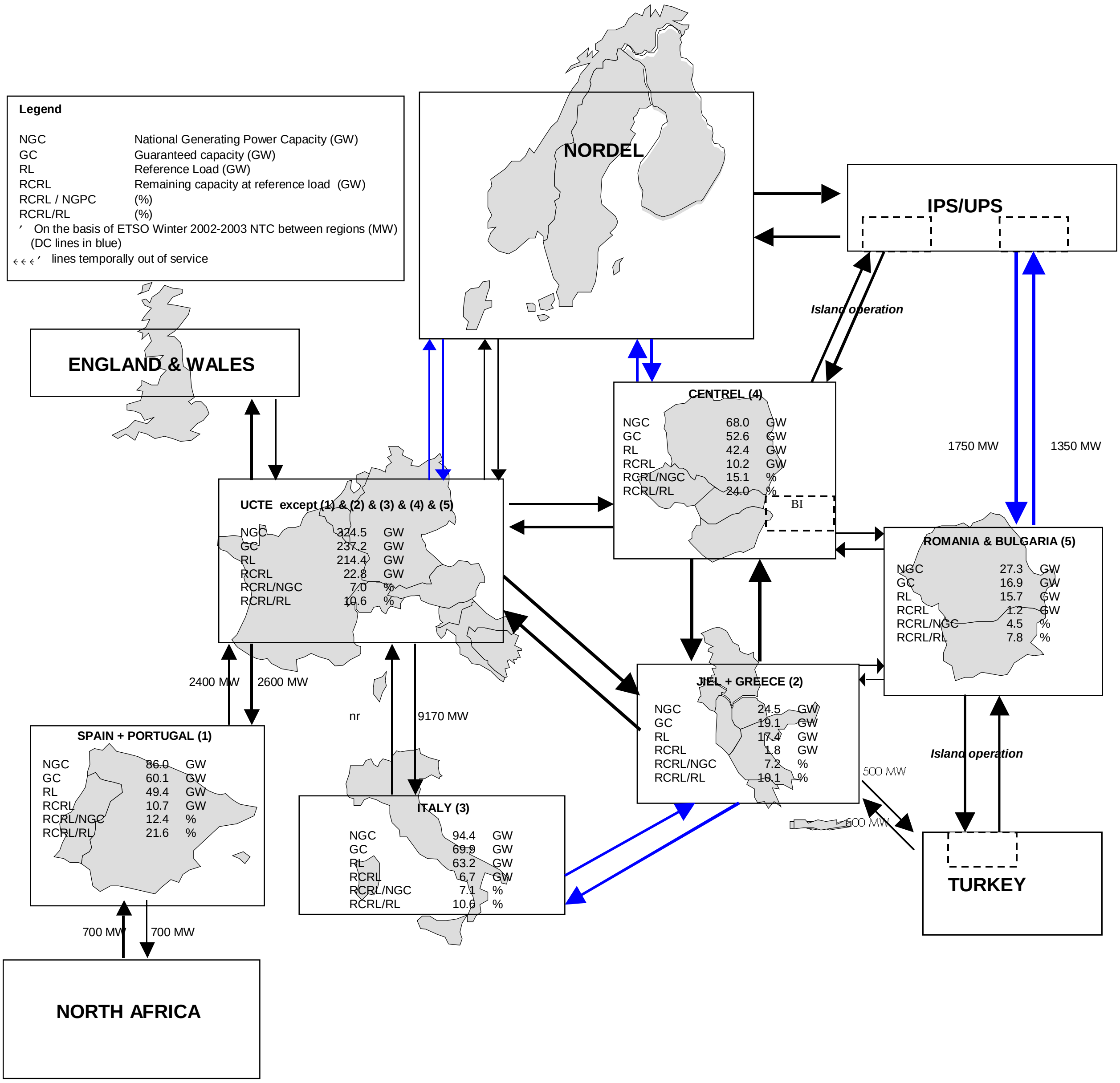
Figure 1C[10] | **Data for January 2006**
Only changes in transportable capacity through interconnections are indicated



[10] Remarks: The Burshtyn Island is operated synchronously with the UCTE since July 1st, 2002; it has been included in CENTREL block in this year' report.

Figure 1D[11] **Data for January 2010**

Only changes in transportable capacity through interconnections are indicated



[11] Remarks: The Burshtyn Island is operated synchronously with the UCTE since July 1st, 2002; it has been included in CENTREL block in this year' report.

5. Conclusion

From a global point of view and according to the information available for the TSOs, the reliability of the UCTE system should not be degraded over the next three years.

But when drawing this conclusion it must be recalled that future decommissioning decisions are not necessarily know by the TSOs.

Reliability assessment in 2010 shows a general decrease of the margins in generating capacities.

The CENTREL block seems to be the only one in position of remaining a structural exporter. But the effects of the future environmental legislation could affect this position as it is already the case for Slovakia.

On the opposite the UCTE main block, which represents a major part of the installed capacity and was till now exporting towards the surrounding areas, is facing a decrease in the remaining capacity below the indicative adequacy reference margin. In 2010 this block could become a net importer as the temperature drops 5°C below normal. Inside this block Belgium and the Netherlands present a negative power balance in 2010.

The reliability of the Iberian and Italian blocks is expected to improve thanks to strong programs leading to the commissioning of many GW of new generating plants. The ability of these countries to effectively reach this goal has to be followed in the next exercises.

JIEL block and Greece are in a weak position concerning generation adequacy; the reconnection of the second UCTE zone expected for mid 2004 will be of great importance for reliability of this block. This reconnection will also play an important role for Romania and Bulgaria whose margins are eroding all along the period.

It is also important to note the increasing part of renewable sources, mainly wind power, in the generation mix of the UCTE system. This development is liable to create some new problems concerning the availability of sufficient balancing power, especially if in the same time important decommissioning of conventional thermal plants are decided. This important role of wind power is also liable to generate large short term variations of flows across the transmission system. It can also be observed that in the countries where the share of wind power become significant (Spain and Germany), specific developments of the 400kV transmission network are necessary.

The projects concerning the development of the international interconnection are limited; however they should help to improve the reliability of the surrounding blocks (Italy, Spain) and of deficit areas (Belgium and The Netherlands).

Nevertheless the number of projects is limited. It reflects the difficulties encountered by the TSOs to let these projects accepted by local people.

APPENDIX A : Detailed analysis of the power balance elements

National Generating capacity

Changes in national generating capacities of UCTE countries are shown in Table A/1. These values represent the maximum net available capacity from electric utility companies and auto-producers in the countries concerned by the study. The details of national capacity (hydro, nuclear, conventional thermal, renewable, energy sources which cannot be reliably identified) can be available from members of the Working Group.

Table A-1 | **National generating capacity on the 3rd Wednesday[12]** | **Results in GW**

Country	2004 Jan.	2004 July	2005 Jan.	2005 July	2006 Jan.	2006 July	2008 Jan.	2008 July	2010 Jan.	2010 July	Variation 2004-2006 % January	Variation 2006-2010 % January
B	15.0	15.0	15.0	15.0	14.6	14.6	14.3	14.3	14.2	14.2	-2.7	-2.6
D	110.6	111.1	112.6	113.3	114.8	115.5	116.8	117.7	119.9	120.9	3.8	4.4
E	57.6	59.2	60.5	62.2	63.9	64.8	67.1	69.0	71.3	73.4	10.9	11.6
F	111.5	111.5	112.5	112.3	112.9	113.4	116.2	116.7	118.7	119.2	1.2	5.2
GR	10.4	10.4	10.4	10.6	10.6	11.0	11.7	11.8	12.4	12.6	2.7	16.2
I	80.1	80.8	84.4	86.3	88.2	90.8	92.1	93.2	94.4	94.4	10.1	7.0
SLO	2.8	2.8	3.3	2.8	2.9	2.9	3.2	3.2	3.3	3.3	4.6	13.9
HR	4.0	4.0	4.0	4.1	4.1	4.5	4.4	4.4	4.5	4.9	1.0	11.9
BiH	3.8	3.8	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	0.7	-
FYROM	1.4	1.4	1.4	1.4	1.4	1.4	1.8	1.8	2.0	2.2	3.1	41.4
SCG	9.3	9.3	9.3	9.3	9.3	9.3	10.0	10.0	10.1	10.1	-	8.8
L	1.6	1.6	1.6	1.6	1.7	1.7	1.7	1.7	1.7	1.7	2.3	2.6
NL	19.9	19.9	20.9	20.9	21.1	21.1	21.5	21.5	21.9	21.9	6.0	3.8
A	18.3	18.3	18.5	18.5	18.3	18.3	18.6	18.6	18.9	18.9	0.3	3.1
P	10.5	11.2	11.3	11.6	11.8	12.4	13.5	13.8	14.7	15.0	12.5	24.9
CH	17.4	17.4	17.4	17.4	17.4	17.4	17.4	17.4	17.4	17.4	0.1	0.1
CZ	16.2	16.2	16.2	16.2	16.3	16.3	16.4	16.4	16.4	16.4	0.6	0.9
H	8.0	8.2	7.6	7.7	7.8	7.9	8.3	8.4	8.7	8.7	-1.9	11.2
PL	31.6	31.4	31.8	32.0	32.4	32.3	33.3	33.8	33.3	33.2	2.4	2.9
SK	7.8	7.8	7.7	7.7	7.7	7.7	7.3	7.3	6.9	6.9	-0.8	-9.8
RO	16.1	16.3	15.3	15.3	14.8	14.8	15.5	15.6	16.1	16.1	-0.8	9.2
BG	11.4	11.4	11.4	11.4	11.6	11.6	11.9	11.0	11.1	12.2	1.9	-4.3
BI-UA	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	-	-
UCTE	**567.8**	**571.6**	**579.7**	**584.1**	**590.0**	**596.3**	**609.6**	**614.3**	**624.6**	**630.3**	**3.9**	**5.9**

[12] Note: as specificied in the methodology, "Renewable energy sources" and "not clearly identifiable energy sources" comprise capacities which, as a function of the primary energy used, do not correspond to the categories of hydro power stations, nuclear power stations and conventional thermal power stations, and which can be used for public/general supply and can thus be transported across the distribution and/or transmission networks.
"Renewable energy sources" comprise the following primary energies:
1. wind energy
2. photovoltaics/solar energy
3. geothermal energy
4. energy from biomass and waste (e. g. biogas, damp gas, municipal waste, industrial waste, wood and waste of wood)

Over the period from January 2004 to July 2006, the increases in generating capacity for the UCTE are more related to renewable energy power plants (+14.3 GW, i.e. approximately + 51% between January 2004 and July 2006) than conventional thermal power plants (+12.8 GW). This tendency seems to be even more important for the period from July 2006 to July 2010, that brings an additional 11 GW conventional thermal power capacity, and a 22 GW renewable energy capacity.

The most significant trends concern renewable energy, which is promoted by regulatory mechanisms in several countries. Conventional power plants are essentially combined cycle power plants. Among renewable energies, wind power plants represent the most important part.

More precisely, the following developments can be noticed in several countries for the short term:

- In **Spain**, 6.2 GW new thermal power plants will be commissioned from 2004 to 2006 while 2.2 GW will be shutdown over the same period ; more than 1.2 GW per year of renewable energy sources (for an average of 1.1 GW per year of new wind power plants) will be connected to the system over the same period ; from 2006 to 2010, new commissioning will result in an additional generating capacity of approx. 9.5 GW, among which 5 GW of renewable energy sources.

- In **Portugal**, approx. 500 MW of new hydro power plants will be commissioned from 2004 to 2006; over the same period, 1.3 GW of new thermal power plants will be connected to the grid; as far as renewable sources are concerned, 1.1 GW wind power per year will be added; later on, 3.2 GW of renewable energy sources are expected from 2006 to 2010, accounting for the total increase in generating capacity.

- In **Italy**, an increase of approx. 10.7 GW in thermal generating capacity is expected from January 2004 to July 2006; the newly commissioned renewable energy sources (essentially wind power) will represent an additional generating capacity of 2 GW for 2006 ; from 2006 to 2010, commissioning of conventional thermal power plants will reach +1.3 GW, and renewable energy sources 2.7 GW.

- In **Germany**, during the period from 2004 to 2006, the installed generating capacity will increase by approx. 4 GW in wind power stations; also it will be reduced by approx. 0.4 GW (shutdown) in nuclear power stations. Renewable energy sources are expected to contribute to an increase of 6 GW in national generating capacity from 2006 to 2010.

- In **The Netherlands**, an additional 300 MW in renewable energy capacity is expected over the period from 2004 to 2006 (wind power contributing for half of the increase), as long as the commissioning of 0.8 GW in new thermal power plants. Later on, the increase in generating capacity is 0.8 GW from 2006 to 2010, renewable energy sources accounting for 0.4 GW.

- As far as **France** is concerned, it should be retained that the generating capacity changes in renewable energy and combined heat/power plants as estimated based only on connection demands directly received by the French TSO. The expected increase in generating capacity results of the commissioning of combined cycle power plants (approx. +1.1 GW before 2006, and an additional 600 MW in 2008). In the meanwhile, shutdown of conventional thermal plants are expected (approx. 1200 MW) before the end of 2005. Concerning renewable energy power plants, forecasts include the commissioning of 2 GW (wind) before 2006, and 5.5 GW over the period from 2006 to 2010.

In terms of generation mix, significant changes can be noticed in many countries, mainly owing to:

- the development of renewable energy sources (mainly wind power), expected to be particularly noticeable in countries such as Germany (+ 4.5 GW from January 2004 to July 2006, and + 6.1 GW from July 2006 to July 2010), Spain (+ 3 GW and +4 GW), France (+2 and +5.5 GW) and Italy (+ 2 GW and +2 GW).

- gas combined cycles : In Portugal, natural gas production should be higher than coal production in 2006; in Spain, the share of natural gas production is expected to increase too, since almost all new thermal plants will be combined cycles; a shift from oil fired power plants to combine cycle is expected too in Italy. Combined cycles will contribute for most of the increase of conventional thermal capacity in France.

Non usable capacity

Non usable capacity is the part of generating capacity which cannot be scheduled, for different reasons:

a temporary shortage of primary energy sources (hydroelectric plants, wind farms), power plants with multiple functions, in which the generating capacity is reduced in favour of other functions (co-generation, irrigation, etc.), reserve power plants which are only scheduled under exceptional circumstances, unavailability due to cooling-water restrictions, etc..

Table A-2	Non-usable capacity on the 3rd Wednesday	Results in GW

	2004		2005		2006		2008		2010	
	January	July	January	July	January	July	January	July	January	July
Country	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
B	0.5	0.9	0.5	0.9	0.6	1.0	*	*	*	*
D	16.9	18.2	19.0	19.9	20.2	21.2	*	*	*	*
E	10.4	13.9	11.3	14.9	12.3	15.9	*	*	*	*
F	15.6	25.5	16.0	26.0	16.7	26.9	*	*	*	*
GR	1.5	1.0	1.5	1.0	1.5	1.0	*	*	*	*
I	11.8	12.2	11.9	12.2	12.0	12.3	*	*	*	*
SLO	0.3	0.2	0.3	0.2	0.3	0.2	*	*	*	*
HR	-	-	-	-	-	-	*	*	*	*
BiH	0.7	0.7	0.7	0.7	0.7	0.7	*	*	*	*
FYROM	-	-	-	-	-	-	*	*	*	*
SCG	1.0	1.9	0.9	1.8	0.9	1.8	*	*	*	*
L	0.0	0.0	0.0	0.0	0.0	0.0	*	*	*	*
NL	0.8	1.4	0.8	1.4	0.8	1.4	*	*	*	*
A	2.9	2.0	2.9	2.0	2.9	2.0	*	*	*	*
P	0.8	2.1	1.0	2.4	1.3	2.7	*	*	*	*
CH	3.7	2.1	3.7	2.1	3.7	2.1	*	*	*	*
CZ	1.8	1.8	1.8	1.8	1.8	1.8	*	*	*	*
H	0.9	0.9	0.6	0.6	0.5	0.5	*	*	*	*
PL	3.3	3.9	2.5	3.5	2.7	3.7	*	*	*	*
SK	1.8	1.9	1.8	1.9	1.7	1.9	*	*	*	*
RO	3.1	3.3	2.6	2.8	2.7	2.9	*	*	*	*
BG	1.1	1.0	1.3	1.0	1.2	1.0	*	*	*	*
BI-UA	0.5	0.4	0.4	0.4	0.4	0.4	*	*	*	*
UCTE	**79.4**	**95.3**	**81.4**	**97.5**	**84.8**	**101.3**	*	*	*	*

* non usable capacity are not distinguished from overhauls and outages in 2008 and 2010

In UCTE, the non usable capacity accounts for approximately 14% of generating capacity in winter and 16 to 17% of generating capacity in summer. It is expected to remain stable until 2006. There are wide variations from country to country, with the non usable capacity ranging from a few percent up to 24-25% of the generating capacity. The highest values in winter concern Switzerland, Romania, Spain, Slovak Republic, Austria, and JIEL. In some of these countries, hydro is a relevant part of generating capacity. In summer, Spain, France, Romania, Portugal and Slovak Republic (because of limitations in combined heat/power plants and hydroelectric constraints in summer) assume the highest non usable capacity ratio. Non usable capacity for the whole UCTE shows an increase over the period from 2004 to 2006 (+5.4 GW in winter and +6 GW in summer). The major contribution to this growth (2004-2006) comes from countries in which the new commissioning of renewable energy, particularly wind power, and co-generation is most significant. Non usable capacity is not distinguished from expected overhauls and outages in 2008 and 2010, but aggregated figures show that the sensible share of wind power commissioning in the increase of generating capacity tends to increase the non availability ratio by 2010. On average, at least 75% of installed wind power capacity (e.g. 90% in Spain, 85-90% in Germany, 75% in Poland, Croatia, Portugal, Netherlands, 75-95% for Italy, 70% in Luxembourg) is considered as not to be usable at peak-load. In Greece, the "non usable capacity" mainly consists of the capacity of hydro power plants. This capacity is usually reduced due to limited reservoir capacity. In case of poor hydro conditions the hydro production will be used just for covering the peak load. Therefore, at peak load the total hydro capacity must be considered as usable.

Conventional thermal and nuclear power plant overhauls and outages

The overhauls remain stable over the considered period. Overhauls account for 2% of generating capacity in winter and for approximately 8-9 % of generating capacity in summer. Outages are of the order of 3.5%. With regard to expected outages, the data are essentially based on estimations from past statistical values. The new expected values for overhauls are comparable to the values of the forecast carried out last year for 2003 and 2004 ; outages are slightly lower in the new forecast.

Reserve for system services

The reserve for system services is the estimated reserve capacity which is required for system operation. It is therefore the reserve capacity which is available to TSOs from power plant operators, and includes the following specific elements:

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

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

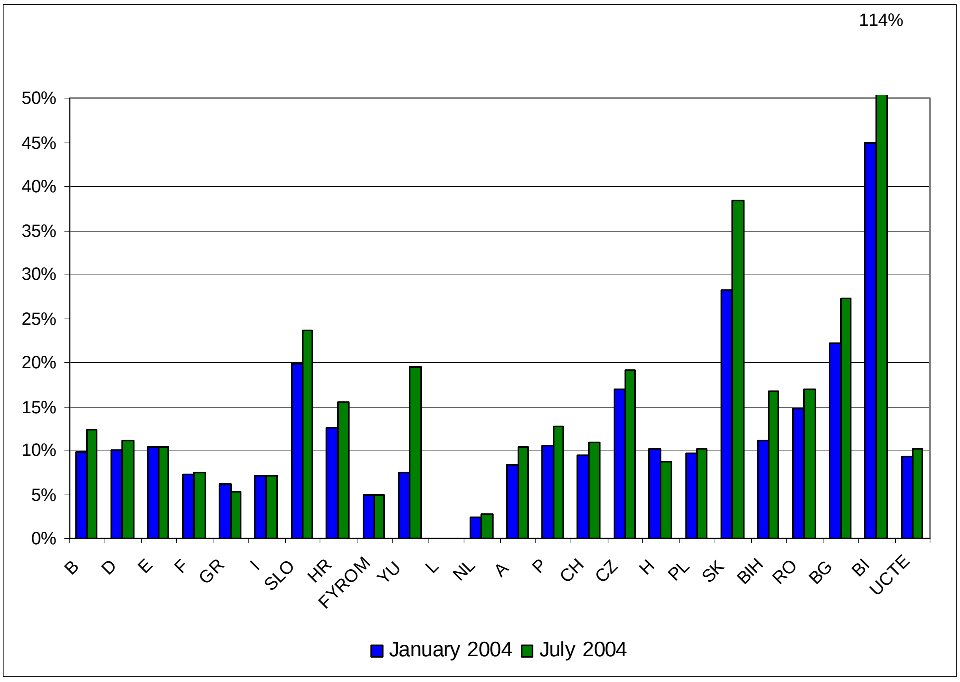
Table A-3 | **Reserve for system services on the 3rd Wednesday** | **Results in GW**

	2004		2005		2006		2008		2010	
	January	July	January	July	January	July	January	July	January	July
Country	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
B	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
D	7.3	7.3	7.5	7.3	7.4	7.2	7.4	7.1	7.5	7.2
E	3.5	3.5	3.9	3.9	3.9	3.9	4.1	4.1	4.3	4.3
F	5.2	4.2	5.2	4.2	5.2	4.2	5.2	4.2	5.2	4.2
GR	0.4	0.5	0.4	0.5	0.4	0.5	0.5	0.6	0.5	0.6
I	3.7	3.7	3.8	3.8	3.9	4.1	4.3	4.3	4.5	4.5
SLO	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
HR	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
BiH	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
FYROM	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0
SCG	0.5	0.8	0.5	0.8	0.5	0.8	0.6	1.0	0.6	1.0
L	-	-	-	-	-	-	-	-	-	-
NL	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
A	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
P	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
CH	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
CZ	1.5	1.3	1.5	1.3	1.5	1.3	1.5	1.3	1.5	1.3
H	0.6	0.4	0.6	0.5	0.6	0.5	0.6	0.5	0.7	0.6
PL	1.8	1.5	1.8	1.5	1.8	1.5	1.8	1.5	1.8	1.5
SK	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
RO	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
BG	1.3	0.9	1.3	1.0	1.3	1.0	1.3	1.0	1.3	1.0
BI-UA	0.4	0.6	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
UCTE	**33.4**	**31.9**	**34.2**	**32.3**	**34.2**	**32.5**	**35.1**	**33.1**	**35.6**	**33.8**

The reserve capacity for system services is stable from 2004 to 2006 (approximately 33-34 GW in winter, and 32 GW in summer), and reaches 35 GW in January 2010 (respectively 33.5 GW in summer). This accounts for approximately 9% and 10% of the UCTE load, in winter and in summer respectively. Country-specific data are shown in Figure A/1 for January and July 2004.

There are substantial variations, ranging from less than 5% to more than 50%. The highest values are indicated for Slovenia, Bosnia and Herzegovina, and the Czech Republic, Slovak Republic: in these countries, where the peak load is less than 10 GW, the reserve capacity is determined by the rating of the largest generating units, which can be even greater than 1 GW. In larger systems, the reserve capacity for system services represents between 8% and 12% of the load.

Figure A - 1 | **System services reserve versus load**



As compared with forecasts carried out in 2003 (when excluding new countries taken into account this year), the expected total reserve values for system services remain at the same level for the coming years. The amount of system reserves is computed according to requirements defined in documents like the Grid Code and, in general, according to the UCTE recommendations.

In Germany, the provision of reserves for system services of TSOs is regulated on the basis of private-law contracts. Since 2001, a tendering procedure has existed in Germany for control power and imbalance energy. TSOs are not prohibited from holding available their own generating capacity for control energy. However, this is currently not being practised.

- In **Greece**, the TSO keeps as a reserve all the available generating capacity to use it for voltage control and congestion management according to the economic offers submitted by the generators.

- In **The Netherlands**, the seconds reserve is fixed on basis of the UCTE - obligations, which are included in the System Code. 65 % of minutes reserve requirements are contracted by the TSO and must be direct available.The remaining 35% are obtained by voluntary bids within a bidding system, which is managed by the TSO. Besides the generating companies maintain an unknown amount of reserves for their own purposes. In case of congestions the same bidding system is used to extract power from the market to manage these congestions.

- In **Switzerland**, every TSO has its own rules regarding the division of capacity from different reserves. They are not published. In general, the rules fixed by the UCTE are respected.

- Concerning **Portugal**, reserves are contracted with producers through the Power Purchase Agreements.

- As far as other reserves are concerned, **Slovak Republic**, **Hungary** and **Poland** do keep cold reserves (for Slovak Republic, to be provided in case of outage of the greatest power unit). For Poland Other Reserves did not appear in the Report of System Adequacy Retrospect 2002.

- In **Italy** and **Luxembourg**, TSOs are allowed to own power plants as system reserve, but do not own any. Luxembourg's TSO is not in charge of the frequency control of the public network (assumed by RWE Net).

- In **Greece** under the current Legislation, TSO is not allowed to own power plants as system reserve. The new Electricity Law, however, states that the old units of PPC that are under decommissioning will be allotted to the TSO for reserve.

- In **Poland**, TSO is allowed to own power plants used for system security, providing system services (pumped storage power station).
- In **Switzerland** (where no legal unbundling is under way), TSO is allowed to own and actually owns power plants (pumped storage power plants), used for system reliability.

- In **Romania**, TSO signs yearly with qualified producers contracts for all classes of reserves: secondary, running, tertiary rapid and tertiary slow, voltage control. Reserves are scheduled for each class (which units will provide, which amount for which hourly interval) daily in the same time with day-ahead energy market. Conditions which entitles the provider to conclude contracts for reserves are prescribed through the Qualification Procedure issued by the TSO.Merit ordering is not used.Reserves are activated according to amount and ramp needed, energy schedule and reservoir level of hydro plant and geographical location. Price is regulated and may be changed by the Regulatory Authority, together with System Service fee.

Guaranteed capacity

Guaranteed capacity is obtained by deducting non usable capacity, overhauls, outages and system reserve from the national generating capacity. Guaranteed capacity represents the capacity which is available to power plant operators and electricity traders for meeting their clients' demand.

Table A-4 | **Guaranteed capacity on the 3rd Wednesday** | **Results in GW**

	2004		2005		2006		2008		2010	
	January	July	January	July	January	July	January	July	January	July
Country	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
B	12.3	11.0	12.3	11.0	11.9	10.7	11.6	10.4	11.5	10.3
D	81.6	71.1	81.3	71.5	82.2	72.2	82.3	72.8	82.6	73.0
E	42.7	40.3	44.3	41.9	46.2	42.8	47.7	45.9	49.2	46.8
F	85.1	66.7	84.4	66.5	84.2	66.7	85.3	67.7	85.9	68.2
GR	7.8	8.6	7.9	8.8	8.1	9.3	9.1	9.9	9.7	10.7
I	54.1	54.3	57.9	59.3	61.1	62.9	67.8	67.9	69.9	68.9
SLO	2.1	1.9	2.6	1.9	2.2	2.0	2.5	2.3	2.5	2.3
HR	3.7	3.4	3.7	3.4	3.8	3.9	4.1	3.8	4.2	4.3
BiH	2.7	2.3	2.7	2.3	2.7	2.3	2.7	2.3	2.7	2.3
FYROM	1.3	1.4	1.3	1.4	1.3	1.3	1.7	1.8	1.9	2.2
SCG	6.8	4.6	6.9	4.7	7.0	4.7	7.4	5.0	7.5	5.1
L	1.6	1.2	1.6	1.2	1.6	1.2	1.7	1.3	1.7	1.3
NL	16.9	16.3	17.9	17.3	18.1	17.5	18.5	17.9	18.9	18.3
A	13.7	12.2	13.9	12.4	13.7	12.2	14.0	12.5	14.3	12.8
P	8.8	7.8	9.4	7.8	9.5	8.0	10.5	8.6	10.9	9.0
CH	12.8	13.0	12.8	13.0	12.8	13.0	12.8	13.0	12.8	13.0
CZ	12.2	9.2	12.2	9.2	12.3	9.3	12.4	9.4	12.4	9.4
H	5.8	5.3	5.8	5.0	6.1	5.3	6.6	6.0	7.0	6.4
PL	25.5	20.4	26.4	21.6	26.5	21.7	27.5	23.2	27.6	22.5

The guaranteed capacity within the UCTE shows an increase of 13.2 GW from January 2004 to January 2006, and 21.9 GW from January 2006 to January 2010. These values can be compared with the increase in the national generating capacity over the same periods (+22.2 GW and +40.3 GW). In addition to the customary reductions associated with overhauls and outages, it appears that a proportion of this additional installed capacity cannot be classified as completely usable for electricity producers.
The values for January 2004 is 4.3 GW higher than the forecasts carried out last year (4.1 GW lower for July 2004), values for 2005 respectively 1.3 GW higher in winter and 0.4 GW in summer, than last year's expected values.

Load

The load values shown in the table correspond to normal climatic conditions:

Table A-5 | **Load at 11:00 a.m. on the 3rd Wednesday** | **Results in GW**

Country	2004 Jan.	2004 July	2005 Jan.	2005 July	2006 Jan.	2006 July	2008 Jan.	2008 July	2010 Jan.	2010 July	Variation 2004-2006 % January	Variation 2006-2010 % January
B	12.0	9.7	12.4	9.9	12.7	10.0	13.1	10.4	13.5	10.7	3.5	6.3
D	73.5	65.9	74.2	67.0	74.8	67.2	75.4	67.6	76.1	68.5	1.8	1.7
E	33.8	33.5	34.6	34.6	35.4	35.6	37.5	38.0	39.9	40.5	4.7	12.7
F	71.0	55.8	72.0	56.7	73.2	57.9	75.4	59.9	77.7	62.2	3.1	6.1
GR	6.9	8.9	7.2	9.2	7.5	9.6	8.1	10.4	8.8	11.2	8.1	17.5
I	52.6	52.5	54.4	54.3	56.2	56.1	59.7	59.6	63.2	63.1	6.8	12.5
SLO	1.9	1.6	2.0	1.7	2.1	1.8	2.2	1.9	2.3	2.0	10.5	9.5
HR	2.4	1.9	2.5	2.0	2.5	2.1	2.7	2.2	2.8	2.3	5.8	10.2
BiH	1.8	1.2	1.9	1.3	1.9	1.3	2.0	1.4	2.1	1.5	5.6	10.5
FYROM	1.2	0.8	1.2	0.8	1.2	0.8	1.3	0.9	1.3	0.9	-	8.3
SCG	6.7	4.1	6.8	4.2	6.9	4.2	7.1	4.3	7.3	4.4	3.0	5.8
L	0.9	0.8	0.9	0.8	0.9	0.9	0.9	0.9	1.0	0.9	4.4	7.0
NL	16.4	14.9	17.0	15.5	17.4	15.9	18.2	16.7	19.1	17.6	5.9	10.0
A	8.3	6.7	8.4	6.8	8.6	7.0	8.8	7.2	9.1	7.5	3.1	6.1
P	7.5	6.3	7.8	6.5	8.1	6.8	8.8	7.3	9.5	7.9	8.2	17.0
CH	9.6	8.3	9.8	8.5	10.0	8.6	10.4	8.9	10.8	9.3	4.2	8.0
CZ	9.1	6.8	9.2	6.9	9.3	7.0	9.9	7.6	10.5	8.0	3.1	12.4
H	5.4	4.9	5.6	5.0	5.7	5.1	6.3	5.9	6.5	6.2	3.9	15.0
PL	19.2	14.9	19.5	15.2	20.0	15.5	20.7	15.7	21.1	16.0	4.3	5.4
SK	4.3	3.1	4.4	3.1	4.4	3.2	4.6	3.3	4.7	3.4	3.8	6.5
RO	7.5	6.4	7.6	6.5	7.9	6.6	8.6	7.0	9.2	7.5	5.2	16.3
BG	5.7	3.4	5.8	3.5	6.0	3.6	6.2	3.9	6.5	4.1	5.1	9.1
BI-UA	0.9	0.5	0.9	0.6	0.9	0.6	1.0	0.6	1.0	0.6	3.3	6.5
UCTE	**358.8**	**312.9**	**366.1**	**320.5**	**373.6**	**327.6**	**388.7**	**341.5**	**403.9**	**356.2**	**4.1**	**8.1**

The load in the UCTE countries shows an increase of 14.8 GW between January 2004 and January 2006, as well as an increase of 14.4 GW between July 2004 and July 2006. This represents, in winter, a growth of 2.0% per year from 2004 to 2006. In summer, the increase is approximately 2.4% from July 2004 to July 2005, and 2.1% from July 2005 to July 2006. The trend is followed over the period from 2006 to 2010, with annual growth rate approx. 2.0% per year. These values show a decrease as compared to forecasts carried out last year (when taking into account last year's forecasts' perimeter) : the expected load values decrease from 5.2 for the January 2004 and 2005 forecast, and respectively 2.8 GW and 1.6 GW July 2004 and 2005 forecast.

The global trend hides differences between countries (e.g. there is significant growth in the forecast for Slovenia, Greece, Italy). It should be noticed that, in specific countries, the reference points selected (third Wednesday of the month at 11 a.m.) do not correspond to the monthly peak load. There are significant discrepancies in relation to this monthly peak in some countries: in January for instance, the margin against the peak load represents approximately 5 GW in Germany and Spain, approximately 2-3 GW in Poland. This factor must be taken into account when analysing the results for the capacity available in each country.

APPENDIX B : Generation adequacy criteria

The table here below shows which kind of criteria are used to assess the generation adequacy in the different countries. That point is interesting on the power system reliability point of view.

Country	Deterministic or probalistic	Mandatory standards on generation adequacy
B	Probalistic, (LOLE, 16 hours/year)	No mandatory standards
D	Deterministic for primary control power; Probalistic approach used by the TSOs	"Transmission Code" requirements
E	Deterministic	"Operation procedures" requirements
F	Probalistic, (10% of probability of loss of load within one year, fairly consistent with a LOLE of 4/year)	No mandatory standard but agreement with the Ministry in charge of Energy
GR	Deterministic for te short term, probalistic for the medium long term	Operation code, Power Exchange Code and the "Authorisations Regulation for Generation and Supply" requirements
I	Both	
SLO	Deterministic	"System Operating Instructions for The Electricity Transmission Network" requirements
HR	Probalistic, LOLE	"Annual Energy Balancing Plan"
JIEL		
BiH		"ZEKC Book of Rules and obligations" requirements
L		
NL	None	"National system code" requirements
A		No mandatory standards
P	Probalistic, • LOLE - less than 2.5% of the months • loss of energy propability (in dry hydro conditions) - below 0.4% of total consumption	No mandatory standards
CH	Deterministic	No mandatory standards - shared responsibilit between the Federal Ministry of Energy, the cantonal ministries and the Power Utilities
CZ	None	No mandatory standards
H		
PL	Deterministic	"Polish Grid Code" requirements
SK		
RO	Deterministic for short term ("largest unit"), probabilistic for medium and long term (LOLE and LOLP)	"Grid Technical Code" requirements
BG		
BI-UA		"ZEKC book of Rules and obligations" requirements

APPENDIX C : Transmission grid development

Belgium				
Line or Equipment name	**Voltage Level**	**Commis-sioning Date**	**Main Characteristics** (single or double circuit line, length, AC lines or DC lines,...)	**Comments, Impact on the intercon-nections and on congestions** (increasing the NTC, by reducing or increasing constraints, by decreasing congestion costs, ...)
2nd Avelgem - Avelin	400 kV	2005	2nd circuit	All these investments will increase the ca-pacity of transactions between B and F. 2005: +700MVA - 2006: +700MVA Conservative option: Only the value for 2005 has been taken into account in the Power data table because it is the only reasonably sure project.
Chooz - Monceau	225 kV	2006	Increasing capacity 290 => 400 MVA	
Zandvliet	400 kV	2006	PST in the coupling Zandvliet => NL	
Kinrooi	400 kV	2006	PST in the coupling on the lines B => Maasbracht	

Germany				
Line or Equipment name	**Voltage Level**	**Commis-sioning Date**	**Main Characteristics** (single or double circuit line, length, AC lines or DC lines,...)	**Comments, Impact on the intercon-nections and on congestions** (increasing the NTC, by reducing or increasing constraints, by decreasing congestion costs, ...)
Niederrhein - Hamborn	380 kV	2003	Double circuit line	
Punkt Merzen-Westerkappeln	380 kV	2003	Double circuit line, upgrading from 220 kV to 380 kV	
Anschluß Wustermark	380 kV	2003	Double circuit	
Anschluß Windpark Putlitz	380 kV	2003	Single circuit	
Anschluß Windpark Bertikow	220 kV	2003	Double circuit	
Kriftel-Marxheim	380 kV	2004	Four circuit	
Conneforde substation	380 kV	2005	Gross additional capacity = 660 MVA (Net additional capacity depends on system conditions)	
Weisweiler-Oberzier	380 kV / 110 kV	2007	Four circuits	
The circuit in the table mentioned above have been reported as being "under construction". Procted lines without a decision for construc-tion are not included.				

Spain				
Line or Equipment name	**Voltage Level**	**Commis-sioning Date**	**Main Characteristics** (single or double circuit line, length, AC lines or DC lines,...)	**Comments, Impact on the intercon-nections and on congestions** (increasing the NTC, by reducing or increasing constraints, by decreasing congestion costs, ...)
Aguayo - Penagos	400 kV	2004	1685 MVA	
La Eliana - La Plana (3th circuit)	400 kV	2004	1685 MVA	
Castejón - Muruarte	400 kV	2004	1685 MVA	
Fuendetodos - Escucha	400 kV	2005	1685 MVA	
Penagos - Abanto	400 kV	2004	2415 MVA	
Balboa - Alqueva Interconnection E - P	400 kV	2004	1685 MVA	
Nueva Escombreras - EL Palmar	400 kV	2004	2525 MVA	
Estrech - Fardioua (2sd circuit) interconnection E - MA	400 kV	2005	730 MVA	
La Serna - Magallón	400 kV	2005	1685 MVA	
Escucha - Morella	400 kV	2005	1685 MVA	
Bescano - Figueras	400 kV	2005	1685 MVA	
Sentmenat - Bescano	400 kV	2005	1685 MVA	

France				
Line or Equipment name	**Voltage Level**	**Commis-sioning Date**	**Main Characteristics** (single or double circuit line, length, AC lines or DC lines,...)	**Comments, Impact on the intercon-nections and on congestions** (increasing the NTC, by reducing or increasing constraints, by decreasing congestion costs, ...)
Line reinforcement / renewal in the northern region of the French grid: Argoeuves-Chevalet-Gravelle (replacement exicting single circuit line)	400 kV	2004	AC line, double circuit, 3x570 mm^2 AM, 72 km	Argoeuves- Chevalet-Gravelle: by reducing the constraints in France and easing future power exchanges with Belgium
Avelgem - Avelin - Mastaing	400 kV	2005	Second circuit	This project will increase the NTC between France and Belgium
New line in the French grid: Vigy - Marlenheim	400 kV	2006	AC line, double circuit (one of them operated at 225 kV), 3x570 mm^2 , 115 km	
Boutre - Broc Carros	400 kV	2006	AC line	
Lyon - Chambery	400 kV	2007	AC line, double circuit, 75 km	
France - Spain: eastern reinforcement	400 kV	2007		This project will increase thr NTC between France and Spain of 1200 MW.

Greece				
Line or Equipment name	**Voltage Level**	**Commis-sioning Date**	**Main Characteristics** (single or double circuit line, length, AC lines or DC lines,...)	**Comments, Impact on the intercon-nections and on congestions** (increasing the NTC, by reducing or increasing constraints, by decreasing congestion costs, ...)
Line Amyndeo - Lagada	400 kV	2006	AC line, double circuit, 21 km	The new line between Greece and Turkey and the upgrade of the 150 kV tie line Amyndeo - Bitola to 400 kVwill increase the total NTC.
Line Koumoundourou-Korinthos	400 kV	2006	AC, double circuit, 72 km	
Line Kechros - Turkey	400 kV	2006	AC, single circuit, 50 km	
Line Philippi - Kechros	400 kV	2006	AC, double circuit, 140 km	
Line Trikala - Ag.Dimitrios	400 kV	2007	AC, double circuit, 127 km	
Further needs of the system:	The 400 kV grid extension to the southern part of the country (Peloponnese) and the reinforcement of the 150kV grid in Peloponnese and in Eastern Macedonia and Thrace.			

Italy

Line or Equipment name	Voltage Level	Commis-sioning Date	Main Characteristics (single or double circuit line, length, AC lines or DC lines,...)	Comments, Impact on the intercon-nections and on congestions (increasing the NTC, by reducing or increasing constraints, by decreasing congestion costs, ...)
Trino - Lacchiarella	380 kV	Jan.2005	Single circuit line	The new commissioned devices with direct impact on the interconnections and con-gestions mainly concern the north-east fron-tier (Slovenia border). In that case a new AC line is to built in order to increase the import of energy with security limiting the actual constraints.
Avenza - S.Colombano	220 kV	Oct.2004	Single circuit line	
Turbigo - Rho	380 kV	Dec.2004	Single circuit line	
Voghera - La Casella	380 kV	Dec.2004	Single circuit line	
Udine - Redipuglia	380 kV	Dec.2006	Single circuit line	
Cordignano - Lienz	380 kV	2008	Single circuit line	
Venezia Nord - Cordig.	380 kV	Dec.2005	Single circuit line	
Udine - Okroglo	380 kV	2011	Double circuit line	
Redipuglia Padriciano	380 / 220 kV	To define	PST	
Tavernuze - Castellina	380 kV	June 2005	Single circuit line	
Rizziconi - Laino	380 kV	June 2004	Single circuit line	
Candela - Foggia	380 kV	Jan.2005	Single circuit line	
Sorgente - Rizziconi	380 kV	Dec.2006	Second AC link	
Sardegna - Continente	380 kV	Dec.2005	AC plus DC line	

Slovenia

Line or Equipment name	Voltage Level	Commis-sioning Date	Main Characteristics (single or double circuit line, length, AC lines or DC lines,...)	Comments, Impact on the intercon-nections and on congestions (increasing the NTC, by reducing or increasing constraints, by decreasing congestion costs, ...)
Bericevo - Krsko	400 kV	2008	Double	The connection between Slovenia and Hungary will increase the NTC values i this area.
Circovce - Pince (SLO - H)	400 kV	2010	Double	
Further needs of the system:	The line Okrogle - Udine 400 kV 82011)will be a strong connection between the Slovenian and Italian border, where the congestions are observed. The line will have a direct impact on the increasing the NTC value on this border. After the new interconnection line to Italy and hungary the planned investment is: internal 400 kV line Bericevo - Podlog - Divaca.			

Croatia				
Line or Equipment name	**Voltage Level**	**Commis-sioning Date**	**Main Characteristics** (single or double circuit line, length, AC lines or DC lines,...)	**Comments, Impact on the intercon-nections and on congestions** (increasing the NTC, by reducing or increasing constraints, by decreasing congestion costs, ...)
Further needs of the system:	new 400 kV line between Croatia and Hungary			

Serbia and Montenegro				
Line or Equipment name	**Voltage Level**	**Commis-sioning Date**	**Main Characteristics** (single or double circuit line, length, AC lines or DC lines,...)	**Comments, Impact on the intercon-nections and on congestions** (increasing the NTC, by reducing or increasing constraints, by decreasing congestion costs, ...)
Further needs of the system:	The reconnection of the two UCTE synchronous zones, expected in 2004 will enable the use of the import/export capacities at the northern and western SCG borders, and in the same time increase the transfer capabilities to Romania, Bulgaria FYROM and Albania.			

Luxembourg				
Line or Equipment name	**Voltage Level**	**Commis-sioning Date**	**Main Characteristics** (single or double circuit line, length, AC lines or DC lines,...)	**Comments, Impact on the intercon-nections and on congestions** (increasing the NTC, by reducing or increasing constraints, by decreasing congestion costs, ...)
Centrale TGV-SOTEL	220 kV	2006	220 kV cable	No impact on interconnections.
Schifflange - CFL Berchem	220 kV	2006	2x220 kV	
Further needs of the system:				

The Netherlands

Line or Equipment name	Voltage Level	Commis-sioning Date	Main Characteristics (single or double circuit line, length, AC lines or DC lines,...)	Comments, Impact on the intercon-nections and on congestions (increasing the NTC, by reducing or increasing constraints, by decreasing congestion costs, ...)
Phase shifters in Meeden	380 kV	January 2003	2 x 1000 MVA	- The phase shifters in Meeden are built to upgrade the NTC of the cross-border line Meeden- Diele/Conneforde with about 1100 MVA. - The sustation in Borssele will be built to withdraw a restriction in the cross-border line Zandvliet-Borssele, because one trans-former in Borssele is now directly connec-ted to the line. -The static-VAR equipment will better the performance of the entire 380 kV network under varying import/export conditions.
Substation in Borssele	380 kV	2006-2008		
Static VAR equipment at different locations	380 kV	2003-2004		
Upgrading of 150 kV line Diemen - Velsen	380 kV	2003-2005	2 x 1645 MVA	
Construction of substation Oostzaan and Velsen	380 kV	2003-2005	2 x 500 MVA and 1 x 500 MVA	

Further needs of the system : some regional reinforcements

Austria

Line or Equipment name	Voltage Level	Commis-sioning Date	Main Characteristics (single or double circuit line, length, AC lines or DC lines,...)	Comments, Impact on the intercon-nections and on congestions (increasing the NTC, by reducing or increasing constraints, by decreasing congestion costs, ...)
Transformer Malta	220/ 110kV	2003-2004	200 MVA	380 kV transmission line from Südburgen-land to Kainachtal: the building of this trans-mission line will lead to an increase of NTC towards CZ, H and SLO and to a decrease of congestion costs.
Südburgenland - Kainachtal (A - A)	380 kV	2007	AC, 3000 MVA	
Tauern - St.Peter (A - A)	380 kV	2010	AC, 3000 MVA	
Lienz - Cordignano (A - I)	380 kV	2008	AC, 3000 MVA	

Further needs of the system:

Interconnections:
- 380 kV interconnection line from A, St.Peter to I, Isar (AC-Double)

Within Austria:
- Ernsthofen substation (Upgrade from 220 kV to 380 kV)
- St Peter substation (Upgrade from 220 kV to 380 kV)
- Zell/Ziller - Westtirol (Upgrade from 220 kV to 380 kV)
- Bisamberg substation (Upgrade from 220 kV to 380 kV)
- Wien Südost - Györ (Construction of an additional 380 kV line)

Because of bottlenecks from north to south in inner Austria it is necessery to Redispatch in Austria. This Situation causes limited NTCs.

Portugal

Line or Equipment name	Voltage Level	Commis-sioning Date	Main Characteristics (single or double circuit line, length, AC lines or DC lines,...)	Comments, Impact on the intercon-nections and on congestions (increasing the NTC, by reducing or increasing constraints, by decreasing congestion costs, ...)
Pereiros-Zêzere-Carregado	220 kV	2004	AC, double circuit, 2x153 km	The new interconnection line Alqueva-Balboa will clearly increase the export values in dry situations. The new 220 kV line Pereiros-Zêzere-Carregado will reduce internal constrains and will facilitate the international north-south energy flows. The new 400 kV line Sines-Portimão will increase system reliability to the consump-tion area of South decreasing congestion cost. The new 400 kV line Pego-Batalha will pro-vide a second connection at 400 kV between the main grid on the coastline and the Pego's substation. It will increase system reliability providing an important 'n-1' line security to the 400 kV international interconnection in central region of Portugal. The new Pedralva substation, equipped with phase-shifters autotransformers, will allow a better use of existing 400 kV network, with subsequent increase on import regimes. The new phase-shifters autotransformers (400/150kV) in Falagueira substation will relieve Chafariz-Vila Chã-Pereiros 220 kV axis with subsequent increase of import ca-pacity at Northeast 220 kV Portugal intercon-nections. The new 400 kV line Valdigem-Viseu-Anadia will facilitate the energy flows from north to central regions. Mainly on wet regimes, the import values will rise considerably. The new Ribatejo substation, as well as Ribatejo-Alto de Mira, Ribatejo-Fanhões and Fanhões-Alto de Mira lines will increase system reliability nearby the consumption area of Lisbon, overcoming some difficul-ties of the south-north transmission capa-city in dry situations.
Alqueva-Balboa (Spain)	400 kV	2004	AC, double circuit, one circuit equipped, 2x75 km	
Valdigem-Viseu	400 kV	2005	AC, double circuit, 2x60 km (initially operating at 220 kV	
Viseu- Anadia	400 kV	2006	AC, double circuit 2x60 km (initially operating at 220 kV with one circuit equipped)	
Petralva (new substation)	400/150	2006	Phase-Shifter Autotransfor-mer, 400/150 kV, 450 MVA	
Anadia (new substation)	400 kV	2005	In coastline (Littoral Center), on a north-south 400 kV corridor	
Valdigem (upgrading)	400/220	2008	Phase-Shifter Autotransfor-mer, 400/220 kV, 450 MVA	
Ribatejo (new substation)	400 kV	2005	Nearby Lisbon, on a south-north 400 kV corridor	
Sines-Portimão	400 kV	2005	AC, single circuit, 97 km (initially operating at 150 kV)	
Ferro-Castelo Branco	220 kV	2006	AC, double circuit, 2x57 km	
Castelo Branco-Falagueira	150 kV	2005	AC, single circuit, 120 km	
Pego-Batalha	400 kV	2005	AC, double circuit, 2x81 km (one circuit equipped)	
Falagueira	400/150	2005	Phase-Shifter Autotransfor-mer, 400/150 kV, 450 MVA	
Ribatejo-Alto de Mira	400 kV	2005	AC, single circuit, 43 km	
Ribatejo-Fanhões	400 kV	2005	AC, single circuit, 25 km	
Fanhões-Alto de Mira	400 kV	2005	AC, single circuit, 18.4 km	

Further needs of the system : In order in order to improve the international interchange power on step with internal reinforcements and to desired levels compatible with the Iberian Power Market (MIBEL), either from the Portuguese side or the Spanish one, there is still a need for interconnection upgrading in the Northeast part of the Douro area and, likely, in a long term, for a new interconnection line in the south region, which will be fully studied in next future. In a near future we want to obtain a NTC around 15% of the Portuguese peak load.

Switzerland				
Line or Equipment name	**Voltage Level**	**Commis-sioning Date**	**Main Characteristics** (single or double circuit line, length, AC lines or DC lines,...)	**Comments, Impact on the intercon-nections and on congestions** (increasing the NTC, by reducing or increasing constraints, by decreasing congestion costs, ...)
Robbia-San Fioranio	400 kV	2005	Double AC tie-line with Italy	Will increase significantly the NTC with Italy

Czech-Republic				
Line or Equipment name	**Voltage Level**	**Commis-sioning Date**	**Main Characteristics** (single or double circuit line, length, AC lines or DC lines,...)	**Comments, Impact on the intercon-nections and on congestions** (increasing the NTC, by reducing or increasing constraints, by decreasing congestion costs, ...)
Phase-Shifter transformer in Nosovice, on the PL-CZ cross-border	400 kV	2005		
Further needs of the system :	there is still the need of completing of the last section 400 kV north-south link in Bohemia (in the conrete: to construct the 400 kV line between the substations Cechy Stred and Bezdecin; supposed commissioning about 2007).			

Hungary				
Line or Equipment name	**Voltage Level**	**Commis-sioning Date**	**Main Characteristics** (single or double circuit line, length, AC lines or DC lines,...)	**Comments, Impact on the intercon-nections and on congestions** (increasing the NTC, by reducing or increasing constraints, by decreasing congestion costs, ...)
Sánderfalva - Békéscsaba	400 kV	01.01.2004	single circuit, AC line	
Paks - Pécs	400 kV	2005	single circuit, AC line	

Poland				
Line or Equipment name	**Voltage Level**	**Commis-sioning Date**	**Main Characteristics** (single or double circuit line, length, AC lines or DC lines,...)	**Comments, Impact on the intercon-nections and on congestions** (increasing the NTC, by reducing or increasing constraints, by decreasing congestion costs, ...)
Dobrzen-Wielopole*	400 kV	2003	AC, 105 km	*) As a result of these commissioning the line Wielopole - Albrechtice will does not exist any more.
Dobrzen - Albrechtice*	400 kV	2003	AC, 173.5 km	
Olsztyni - Olsztyn Matki	220 kV	2003	AC, 17.6 km	
Ostrow - Plewiska	400 kV	2005	AC, double circuit, 150 km	
Tarnów - Krosno	400 kV	2005	AC, 75 km	
Further needs of the system:	Increasing of import/export capacities.			

Slovak Republic				
Line or Equipment name	**Voltage Level**	**Commis-sioning Date**	**Main Characteristics** (single or double circuit line, length, AC lines or DC lines,...)	**Comments, Impact on the intercon-nections and on congestions** (increasing the NTC, by reducing or increasing constraints, by decreasing congestion costs, ...)
Reconstruction of Križovany substation - exchange of the control system - building of 2 new transfor-mers 400/110 kV - renewal od fields connection from Malženice	400 kV	2002-2010		
Compensation of Stupava	10.5 kV	2003		
Compensation of Lemešany	34 kV	2003		
Upgrading of the Dispatch control center		2002-2004		

Without any further information in this year's questionnary, last year's new lines and transmission devices commissioning projects are reported here.

Romania				
Line or Equipment name	**Voltage Level**	**Commis-sioning Date**	**Main Characteristics** (single or double circuit line, length, AC lines or DC lines,...)	**Comments, Impact on the intercon-nections and on congestions** (increasing the NTC, by reducing or increasing constraints, by decreasing congestion costs, ...)
OHL Isaccea - Dobroudja	400 kV	2004	AC line, single circuit, 150 km	The project will impact on the interconnec-tions and congestions are the following: - OHL Oradea - Bekescsaba - OHL Isaccea - Dobrudja - OHL Isaccea - Varna - Back-to-back station Isaccea, depending upon discution between UCTE and IPS/UPS
OHL Isaccea - Vulkanesti	400 kV	2004	AC line, single circuit, 57 km	
OHL Isaccea - Varna (build at 750 kV, in operation as 400 kV)	400 kV	2004	AC line, single circuit, 235 km	
OHL Portile de Fier II - Cetate	220 kV	2005	AC line, single circuit, 52 km	
OHL Oradea - Bekescsaba	400 kV	2008	AC line, single circuit, 115 km	
OHL Portile de Fier I - Resita (actualy operating as 220 kV, double circuit)	400 kV	2010	AC line, single circuit, 117 km	
OHL Resita- Timisoara (actualy operating as 220 kV, double circuit)	400 kV	2010	AC line, single circuit, 73 km	
OHL Timisoara - Arad (actualy operating as 220 kV, double circuit)	400 kV	2010	AC line, single circuit, 54 km	

APPENDIX D : Exceptional trends, Status of deregulation and special remarks

Exceptional trends

In several countries (Germany, Italy, France, Slovenia, Poland …) there is a governmental support to renewable sources, consistent with European environmental goals. Consequently, renewable sources and combined heat/power plants form a considerable part of new generating capacity in the UCTE.

Some significant information should be retained :

- **Germany** The law concerning the primacy of renewable energies and the Co-generation Act, decided three years ago, entail an increased development of wind power and secure the operation of existing co-generation plants. The consensus achieved about the remaining life of nuclear power stations has led to first effects with the scheduled shutdown of a nuclear plant over the period covered by this year's forecast.

- **France** A national debate was held in 2003 aiming at publishing the Law on Energy orientations for France.

- **The Netherlands** since the beginning of 2001 the Dutch TSO have set in action an auction of the cross-border transmission capacity together with the neighbouring TSO's. Through this auction eventual cross-border congestions can be well managed by forehand. The Dutch Government imposed a stimulation program for renewables by subsidising and certification of so called green energy. This program has until a certain degree impact on the origin of imports, as non native renewable energy is eligible under this scheme. So international flows may change substantially.

- **Austria** Law concerning electric power from Renewables (indicative targets), the share of electric energy from renewables has to increase up to 4% in the year 2008. In the same period the share of electric energy from small hydropower plants (<10MW) has to increase up to 9%. A great influence on the generation mix could have the national implementation of the "Wasserrahmenrichtlinie" of the European Union. Depending on the intensity of directives to rebuild hydro power stations the share of energy out of hydro power could decrease by 5-15%. Due to the rather low energy prices a thermal power plant has been shutdown and another is planned to shutdown. This has a strong impact on the loading of the transmission system for the direction north to south and causes bottlenecks within Austria.

- **Czech Republic** The amendment of the Electricity Law No. 458/2000 Coll. has come into effect. The market will be opened for all consumers (other than householders) from 1st January 2005 (i.e. one year earlier than originally expected).

- **Romania** The main objective of environmental policy is the implementation of an efficient environment management system, which targets the reduction of transmission network negative effects on the environment according to European standards.

Status of deregulation and special remarks

The status of electricity market deregulation is not homogeneous over the UCTE countries. Some significant information should be retained:

- **Germany** As a result of unbundling (required by law) between generation, transmission and distribution, the flow of information concerning power balance data has been interrupted to a large extent between TSOs and power station operators. Individual items of the power balance have been based on model calculations and estimations of TSOs for their respective control area. The German power balance values are obtained as aggregate value by adding up the individual values of TSOs concerned. In order to obtain a realistic representation of renewable energies, the German data on the UCTE power balance forecast 2004 - 2010 comprise estimated and forecast values of TSOs for plants<1MW, which were largely not included in the German power balance data dating back more than 3 years. This means that the large coherence of data about the generating capacity and peak load with official statistics does not longer exist, as plants < 1 MW were not (or only insufficiently) taken into consideration by these statistics. This should be noted when making comparisons with former power balances. A regulatory body will be institutionalised in July 2004 to replace the system of the Associations' Agreement on network access. To date, the missions of this regulatory authority have not been determined yet in detail. So we assume that the electricity market in Germany will continue to function on the basis of the Associations' Agreement, all the more since the German model of negotiated network access has been explicitly provided for the in the amended EU Internal Electricity Market Directive. Besides, the instrument of the electricity industry's self-regulation represented by the Associations' Agreement has proven to be successful as it enabled the swift and complete opening-up of the German electricity market. Therefore, the refinement of the current Associations' Agreement II plus is being pursued.

· **Greece**

A new electricity Law has come into effect. The basic changes that the new legislation sets are the following:

- Introduction of Contracts for Capacity Availability. HTSO undertakes the obligation to contract in advance a regulated amount of available capacity corresponding to new generating units in order to ensure the system adequacy in future.
- All of the consumers connected to the mainland interconnected system other than householders become eligible customers on 1.7. 2004. On 1.7.2007 the householders become eligible, too.
- A day ahead market has been introduced. The market settlement takes place the day ahead. The market is cleared at the day ahead SMP.
- The definition of the imbalances has changed. The imbalances between the scheduled quantities and the quantities of energy injected or absorbed in real time are settled at the imbalance SMP.
- The method of calculating the Market prices is under reconsideration.

The deregulation of the Market has been taken into account in this forecast, especially as far as the uncertainty of the commissioning of new generation is concerned. The new generating capacity taken into account includes power plants scheduled for commissioning either by PPC or by authorisation holders who have already completed the entire preliminary procedure and they are ready to start the construction of their power plants. The provisions of the new Law concerning the Contracts for Capacity Availability will be an incentive for the stakeholders to start the construction of their power plants. According to the Law the HTSO will start a tendering procedure concerning the CCA for new generating capacity up to 1300MW. provided that the 1100 MW of them will be installed by independent generators. The new power plants should be in commercial operation on 1.7.2007 the latest.

· **Slovenia**

The Energy Act brings most of Slovenia's legislation on the electricity market in line with Directive 96/92/EC.

- Opening of the market: The market was opened to all domestic customers having a connected load of more than 41kWh (60% of the market) on 15 April 2001 and from January 2003 also for nondomestic costumers.
- Access to the network: Regulated TPA is the chosen model
- Regulator: Presently being set up as an Independent Energy Authority. The Regulator will be in charge of setting and monitoring energy prices, settling disputes arising from refusal of access to networks or system tariffs and issuing licences.
- Competition in generation: Authorisation procedure.
- Unbundling: Unbundling is limited to accounts only for the time being. The Energy Act stipulates that transmission, distribution and operation of the relevant networks and supply of electricity to non-eligible customers are compulsory national commercial public services.
- Unbundling of TSO: Management unbundling is foreseen.
- Tariff setting: Responsibility of the Independent Energy Authority
- Stranded costs: The extent and dimension of stranded costs is still unknown. The Slovene government expects to be in a position to notify its stranded costs to the European Commission by its accession date.

- **Croatia** The gradual opening of the electricity market in Croatia is expected, proceeding in pace defined by development of the procedure of joining the EU. Croatia started procedure to implement a rotational principle in the Control Block co-ordination with three existing members (Slovenia, Croatia and Bosnia and Herzegovina).

- **Bosnia and Herzegovina** Three vertical integrated power companies (three EPs) wereestablished in Bosnia and Herzegovina during the last war. All of them are state owned companies. They are Elektroprivreda of Republic of Srpska Trebinje, Elektroprivreda of Herzeg-Bosnia, Mostar and Elektroprivreda BiH, Sarajevo. Many of generation, transmission and distribution facilities in Bosnia and Herzegovina were significantly damaged during the last war. Because the high voltage transmission network is damaged electricity system in B&H was split in two different synchronic zones. The main condition for reconnection of the first and the second UCTE synchronous zones is the realisation of the Power III Project under World Bank umbrella with main subprojects: the rehabilitation of high voltage transmission lines, the rehabilitation of the key transmission substations, under umbrella of European Investment Bank, and the SCADA/EMS and Communication system project in Bosnia and Herzegovina, under EBRD umbrella. According to the planning of the high voltage network reconstruction in Bosnia and Herzegovina, Croatia and Serbia, reconnection of these two synchronous zones will be complete by the end of 2003. On December 1998, all three EPs have signed agreement that they will establish Joint Power Co-ordination Center for co-ordination of control power system in BIH in order to provide integrity and security of system and complete restructuring and privatisation process. The State Electricity Act on Transmission, Regulatory Commission and Independent System Operator of Bosnia and Herzegovina was adopted in April 2002. The State Regulatory Commission and the single transmission company for B&H will be established by the end of 2002. Joint Power Co-ordination Center (ZEKC) will become an Independent System Operator (ISO) by summer 2003 with consultancy assistance of KEMA Consortium from Germany (financed by DFID, UK). ZEKC – ISO transformation project has started early this year and New B&H Grid Code and market and commercial rules are under preparation. Establishing the state single transmission company and ISO for B&H will cause unbundling present power utilities (EPs), it means that rest of EPs, production and distribution, will be privatised (ISO and transmission company will be state owned companies) Conclusion is that situation in B&H will dramatically change very soon and because of this fact above mentioned “Book of rules” will be very soon replaced by Grid and commercial codes.

- **Portugal** With the implementation of Iberian Power Market probably during 2004, the responsibility of the Portuguese TSO, REN, will become very different. However significant modifications in the Portuguese power balance are not expected.

- **Switzerland** A new law for the opening of the electricity market is in preparation for 2004.

- **Czech Republic** The electricity market has been opened for consumers with consumption greater than 9 GWh per year since 1st January 2003 (2nd threshold, i.e. market opening of about 33 – 34%). Next steps of the market opening are following:
  - from 1st January 2004 - for all consumers with continuous measurement (one-hour meter readings) of the electricity consumption (other than householders)
  - from 1st January 2005 - for all consumers (other than householders)
  - from 1st January 2006 - for all consumers.

- **Poland** The negotiation related to the EU accession is finished. Polish power sector is preparing for Poland’s accession to EU on 1 May 2004, and becoming the full member participant in the Internal Electricity Market. Moreover, due consideration is given to the influence of the latest adoption of the power market liberalisation package in June 2003, and its necessary implementation in the national legislation, leading to further convergence and harmonisation of the Polish power market rules with the EU model.

- **Slovak Republic** Opening of electricity market continued according to the Decree of Ministry of Economy of the Slovak Republic. The process started in 2002. Eligible customers that can choose their suppliers of electricity generated either in Slovakia or in abroad are divided as follows:
  - since 1st January 2003: customers with consumption no less than 40 GWh per year
  - since 1st January 2004: customers with consumption no less than 20 GWh per year
  - since 1st January 2005: customers with consumption higher than 0 GWh per year

  Slovakia is significantly involved in electricity transits, especially in the north-south direction (from Poland to Hungary), as well as in the east-west direction. To cope with bottlenecks on the international profiles the allocation mechanism has started on the border with Czech Republic and common yearly and monthly auctions are performed on this border. There are still negotiations with TSO from Hungary to start the auction mechanism from the beginning of the next year. Particular interest is paid to the CBT mechanism in which SEPS would like to be involved from 1st Jan 2004.

- **Romania** At present, the domestic primary legislation for the Romanian electricity industry is made up of law No. 318/2003, ("Energy Law"). The European Union legislation is a relevant part of the Romanian legislative framework. The secondary legislation consists of regulations issued by the Romanian Electricity and Heat Regulatory Authority (ANRE) and includes:
  - Licenses and authorisations
  - Technical Transmission Grid Code
  - Technical Distribution Grid Code
  - Wholesale Electricity Market Commercial Code
  - Tariffs and tariff methodology
  - Framework contracts for trading arrangements

  All regulations were drafted on the basis of laws with a view to setting out correct, transparent and market-driven relationships among market participants. As per Government Decision no.48/31.01.02, the competitive market is up to 33% of the total wholesale electricity traded. Eligible customers may choose their own power supplier and conclude bilateral negotiated contracts, in compliance with the relevant regulations. The current licensing criteria for eligible consumers are:
  - annual consumption over 40 GWh/year
  - creditworthiness
  - no outstanding debts to the existing power suppliers.

  Transelectrica is the administrator of the electric market, through its legal subsidiary the market operator OPCOM. OPCOM plays the role of electric market administrator, as stated in the primary and secondary legislation in force, providing an organising, viable and efficient framework for the commercial transactions traded within the wholesale power market, under the conditions of consistency, fairness, objectivity, independence, equidistance, transparency and non-discrimination. As an early recognition of its efforts, OPCOM has been accepted as full member of the International Power Exchanges Association (APEX) starting the October 1st, 2001. The Romanian wholesale electric market, which started on August 1st, 2000, is aimed for electricity and ancillary services trade among market participants and is made up by two components - the regulated market and the competitive market:

  - The regulated market is meant for electricity and ancillary services trade on regulated contract basis (with regulated prices and regulated and usually firm quantities). The contracts concluded on the regulated market are:
    - portfolio contracts (firm quantities and regulated prices)
    - contracts for electricity in cogeneration (quantities and regulated prices)
    - PPA contracts (long term contracts with regulated prices) - the "must run-must take" contract for SN Nuclearelectrica SA concluded for the whole output of the power plant
    - ancillary services contracts (firm quantities, established by the System Operator, and regulated prices)
    - transmission contracts (regulated tariffs).

  - The competitive market is meant for electricity trade through bilateral contracts (firm quantities and negotiated prices) and by auction on the spot market (bulk transactions based on bids from producers). The following contracts are concluded on the competitive market:

- bilateral contracts between internal producers/suppliers with eligible consumers or with other suppliers for the eligible consumers' consumption
- import contracts of the producers (for the unbalances that arise in portfolio contracts) and the suppliers import contracts
- export contracts
- negotiated contracts concluded by independent producers and self-producers, others than the owners of portfolio contracts
- transactions on spot market at the System Marginal Price.

At present OPCOM administrates about 200 contracts per month. OPCOM aims at becoming an attractive and efficient trading environment for all the agents interested to be actively involved in the domestic and regional energy market as well, by developing the market instruments required by every stage of the Romanian wholesale power market progress and at permanently contributing to the improvement of the legislative framework governing the electricity trade. Transelectrica is in charge of substantiating the portfolio selling/purchasing contracts established between some generation companies and supply companies. This is carried out by means of a computer simulation model, approved by the ANRE, and consists in determining the hourly electricity generation of each company according to the merit order of its units and in shaping the regulated prices for each base settlement period of electricity load curve. The tariffs for the regulated market, corresponding to the captive consumers, are established by the regulator. Eligible consumers, power suppliers and even Electrica have the opportunity to trade electricity on the competitive market, where prices are directly negotiated according to bilateral contracts or settled on the spot market. Both the existing and the new participants on the electric market are equally treated on a transparent and nondiscriminatory basis, which also includes the regulated access to the transmission and distribution networks. In this respect, connection to the grids is a compulsory public service.
Participants to the market :

- Producers: main producers (7): Termoelectrica, Hidroelectrica, Nuclearelectrica, Deva, Rovinari, Turceni, Bucuresti, as well as other independent producers (28) and self producers (8).
- Buyers: Suppliers and/or generators(51) : Main Suppliers : Electrica and its 8 subsidiary companies, Termoelectrica, Hidroelectrica, Nuclearelectrica, Romenergo, Romelectro, UNICOM, ALRO , GRIVCO ; Eligible Consumers (49) ; Transmission System Operator (for transmission and ancillary services at regulated tariffs).

The table from page 65 to page 67 below give the information about the opening degree (eligibility for consumers) in electricity markets in UCTE cuontries:

Country	Date of beginning of deregulation process	1st threshold	2nd threshold	other threshold
B	Royal decree, May 5th, 2000	January 1st,2003 Brussels: consumers > 10 GWh Wallonia: consumers >10 GWh Flanders: customers with a distribution system connection capacity of 56 kVA or over. Federal level: consumers > 10 GWh or other specific conditions	July 1st,2003 Brussels: consumers > 10 GWh Wallonia: consumers >10GWh Flanders: All residential clients Federal level: consumers > 10 GWh or other specific conditions	Third threshold: January 1st, 2005 Brussels: all high voltage clients Wallonia: all high voltage clients Flanders: all high voltage clients Federal level: consumers > 10 GWh or other specific conditions Fourth threshold: January 1st, 2007 Brussels: all residential clients Wallonia: all high voltage clients Flanders: all residential clients Federal level: consumer > 10 GWh or other specific conditions
D	Law, dated April 25th, 1998	100%	100%	100%
E	Electricity Act November 27st 1997	January 1st, 1998, consumers > 15 GWh/year (i.e. market opening of 27%)	January 1st, 1999, consumers > 5 GWh/year (i.e. market opening of 33%)	April 1st, 1999, consumers > 3 GWh/year (i.e. market opening of 37%) July 1st 1999, consumers > 2 GWh/year (i.e. market opening of 39%) October 1st 1999, consumers > 1 GWh/year (i.e. market opening of 42%) July 1st 2000, consumers connected to > 1kV networks (i.e. market opening of 54%) January 1st 2003, all consumers (100%)
F[13]	Law 2000-108 February 10th 2000	by February 2000: 16 GWh/year/site (i.e. market opening of about 30%)	by February 2003 at the latest: 7 GWh/year/site (i.e. market opening of about 35%)	July 1st 2004: all costumers excepted residential

[13] The status of eligible customer is reviewed every two years.

Country	Date of beginning of deregulation process	1st threshold	2nd threshold	other threshold
GR	LAW 2773799	by February 2001, HV/MV consumers (market opening of about 34%)	July 1st 2004: all consumers connected to the mainland interconnected system other than housholders	July 1st 2007: all consumers connected to the mainland interconnected system
I	Law 1999-79 March 16th 1999	by January 1st, 2000: 20 GWh/year/site (i.e. market opening of about 25%)	by January 1st, 2002 9 GWh/year/site (i.e. market opening of about 38%)	by January 1st, 2003: 0.1 GWh/year/site
SLO	Date of the beginning of deregulation is October 1999 with the Energy Law. On January 2003 the electricity market will be opened up to 60%.			
L	Law July 24th, 2000	by February 19th, 1999: consumers > 100 GWh and distributers > 800 GWh by January 1st, 2001: consumers > 20 GWh and distributers > 800 GWh	by January 1st, 2003: consumers > 9 GWh and distributers > 90 GWh	by July 1st, 2004: all nonhousehold consumers by July 1st, 2007 all the consumers
NL	Electricity Law, July 1998	by January 1999: big consumers > 2 MW (i.e. market opening of about 30%)	by January 2002: 35 kW < middle consumers > 2 MW (i.e. market opening of about 35%)	by July 2001: all consumers of certified green energy (renewable sources; relative small groups) by January 2004: all other consumers and households (i.e. market opening of about 35%)
A	Electricity Act (ElWOG) 1998	particial opening of the market	October 1st 2001: 100% of the electricity market is liberalised (Amendment to the Electricity Act)	
P	Law 213/98, September 15th, 1998	by January 1st, 1999: consumers > 30 GWh (i.e. market opening of 27%)	by January 1st, 2000: consumers > 20 GWh (i.e. market opening of 29%)	by January 1st, 2001: consumers > 9 GWh (i.e. market opening of 33%) by January 1st, 2002: all consumers connected to > 1 kV network (i.e. market opening of 44%)
CH	not applicable	not applicable	not applicable	not applicable

Country	Date of beginning of deregulation process	1st threshold	2nd threshold	other threshold
CZ	Law 458/2000 January 1st, 2002	by January 2002: consumers > 40 GWh/year/site	by January 2003: consumers > 9 GWh/year/site	from January 1st 2004: for all consumers with continuous measurement (one-hour meter readings) of the electricity consumption (other than householders) from January 1st 2005: for all consumers (other than householders) from January 1st 2006: for all consumers
H	January 1st , 2003 Act of CX/2001 (Electricity Act)	from January 1st , 2003: consumers ≥ 6.5 GWh (33-35% of total consumption)	will be decided according to the accession to EU and experience gained	
PL	Energy Law, April 10th, 1997	till August 6tht, 1998: final consumers > 500 GWh/year (i.e. market opening of about 16%)	from January 1st, 1999: final consumers > 100 GWh/year (i.e. market opening of about 28%)	from January 1st, 2000 : final consumers > 40 GWh/year (i.e. market opening of about 33%) from January 1st, 2002 : final consumers > 10 GWh/year (i.e. market opening of about 40%) from January 1st, 2004 : final consumers > 1 GWh/year (i.e. market opening of about 46%) from December 5th, 2005: all consumers (i.e. market opening of 100%)
SK	January 1st, 2002, Edict Mo. 562/2001 to the Energy Law No.70/1998, this was replaced by Edict No.548/2002 and 549/2002	since January 2002: consumers > 100 GWh/year	from January 2003 on: consumers > 40 GWh/year	from January 2004 on: consumers > 20 GWh/year from January 2005 on: consumers > 0 GWh/year; all consumers except household
RO	Government Emergency Ordinance no.68/1998; in July 2003 the Romanian Parliament adopted a comprehensive Energy Law (no. 318/2003) including all former changes	Government decision (GD) no.122/2000: competitive market up to 10%	GD no.982/2000: compentitive market up to 15% GD no.1272/2001: compentitive market up 25% GD no.48/31.01.2002: compen-	The market will open at 40% by the end of 2003, at 80% by 2005 and 100% by 2007.

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