UCTE

Austria
Belgium
Bosnia-Herzegovina
Croatia
Czech Republic
France
Germany
Greece
Hungary
Italy
Luxembourg
Macedonia
The Netherlands
Poland
Portugal
Slovakia
Slovenia
Spain
Switzerland
Yugoslavia

2 / 2002

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 20 European countries. Their common objective is to guarantee the security of operation of the interconnected power system.

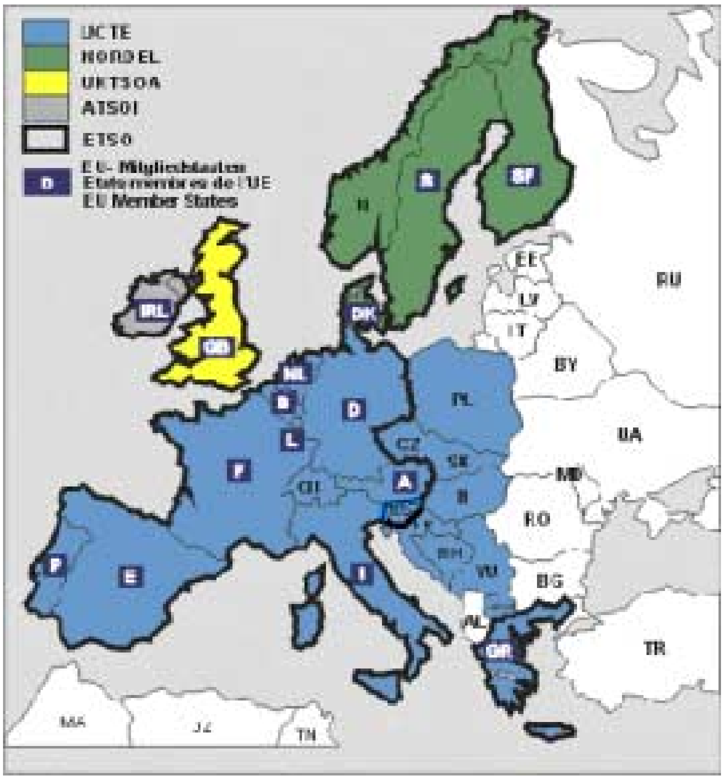
50 years of joint activities laid the basis for a leading position in the world which the UCTE holds in terms of the quality of synchronous operation of interconnected power systems.

Through the networks of the UCTE, 400 million people are supplied with electric energy; annual electricity consumption totals approx. 2100 TWh.

As of July 2001, in accordance with the new Articles of Association, the member companies of the UCTE come from the following countries :

B	Belgium	**BiH**	Bosnia-Herzegovina
D	Germany	**L**	Luxembourg
E	Spain	**NL**	The Netherlands
F	France	**A**	Austria
GR	Greece	**P**	Portugal
I	Italy	**CH**	Switzerland
SLO	Slovenia	**CZ**	Czech Republic
HR	Croatia	**H**	Hungary
YU	Federal Republic of Yugoslavia	**PL**	Poland
FYROM	Former Yugoslav Republic of Macedonia	**SK**	Slovakia

With regard to the other members of the ETSO (European Transmission System Operators, 35 Transmission System Operators in 17 countries), the geographical extension of UCTE is represented in the picture below :



Optimum 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 in the future to set standards In terms of security and reliability 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-2002

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Values as of the UCTE database from 31 December 2002

Electricity supply situation in UCTE countries in the summer period 2002

1.1 Introduction

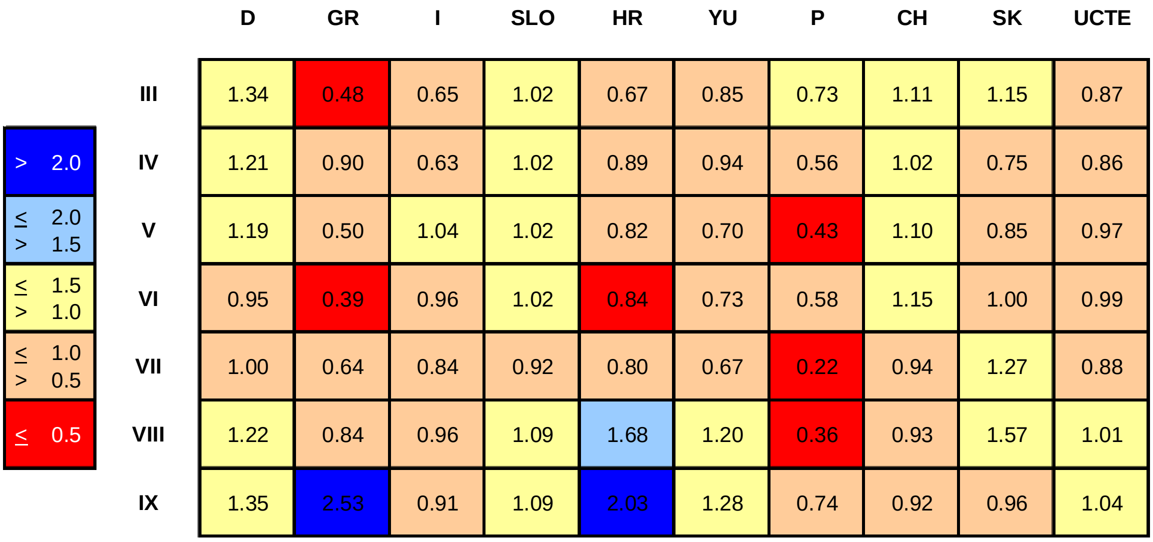
This half-yearly report deals with the electricity supply situation, exchanges and load curves during the summer period 2002, i.e. from 1 April to 30 September 2002.

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 **1023.5 TWh** during this summer period, an increase of 1.0 % in comparison with the same period in 2001.

G1 Hydro power energy capability factor 2002



> 2.0
≤ 2.0 > 1.5
≤ 1.5 > 1.0
≤ 1.0 > 0.5
≤ 0.5

	D	GR	I	SLO	HR	YU	P	CH	SK	UCTE
III	1.34	0.48	0.65	1.02	0.67	0.85	0.73	1.11	1.15	0.87
IV	1.21	0.90	0.63	1.02	0.89	0.94	0.56	1.02	0.75	0.86
V	1.19	0.50	1.04	1.02	0.82	0.70	0.43	1.10	0.85	0.97
VI	0.95	0.39	0.96	1.02	0.84	0.73	0.58	1.15	1.00	0.99
VII	1.00	0.64	0.84	0.92	0.80	0.67	0.22	0.94	1.27	0.88
VIII	1.22	0.84	0.96	1.09	1.68	1.20	0.36	0.93	1.57	1.01
IX	1.35	2.53	0.91	1.09	2.03	1.28	0.74	0.92	0.96	1.04

The highest consumption increase in the period of report was registered in June with 2.4 %, the lowest was registered in May with 0.4 %.

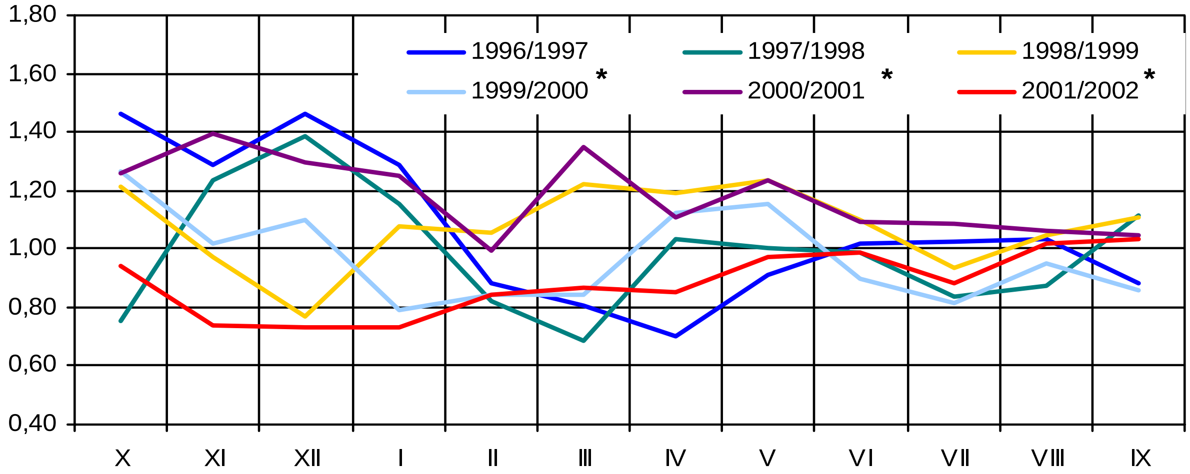
The peak load from all UCTE countries in the period of report amounted to 294.4 GW in June, this was 0.1% below the April 2001.

The highest utilisation factor of maximum load was reported in September with 83.6 %, in the summer period 2001 this factor was reported with 95.3 % in August .

1.3 Generation and hydraulicity

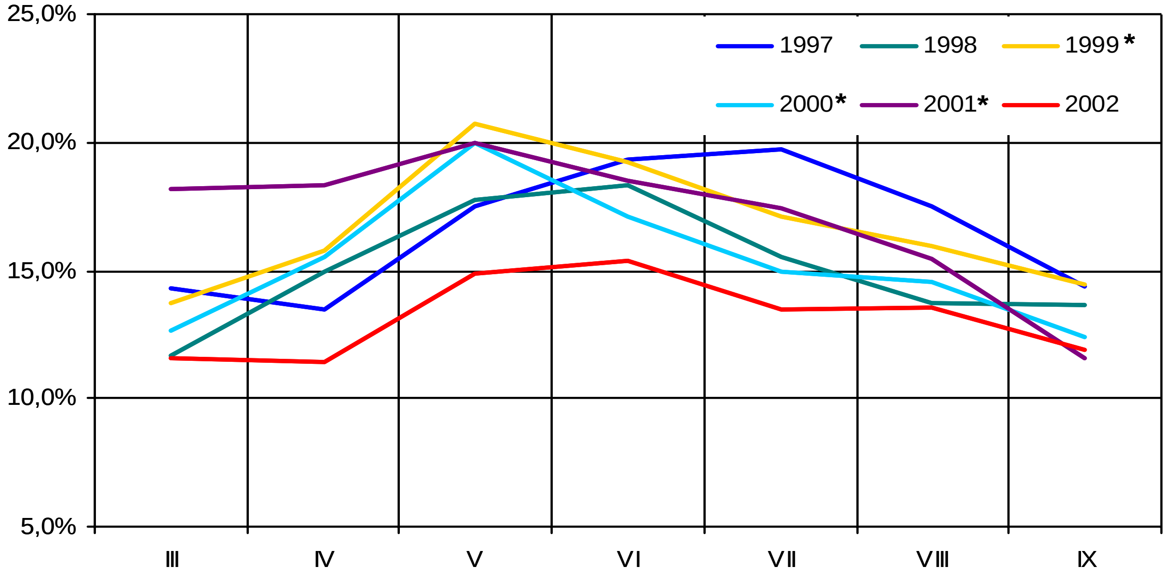
Total generation within UCTE in the period of report amounted to 1045.0 TWh (+ 1.0 %) and was made up by 13.1 % generation from hydro power, 52.8 % non-nuclear thermal generation and 34.1 % nuclear generation.

G2 Hydro power energy capability factor of all countries combined



* Including former CENTREL countries CZ, H, PL, SK

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



* Including former CENTREL countries CZ, H, PL, SK

1.4 Electricity exchanges

The total of electricity exchanges, including third countries, was 136354GWh, corresponding to an increase of 9.2% as compared to the summer period 2001.

France continues to remain the main exporting country with 38.5 TWh where as the highest imports in the period of report were recorded in Germany with 24.4 TWh.

T1 Electricity supply situation in summer

Total consumption[1]			**04/01-09/01**	**04/02-09/02**	**04/02**	**05/02**	**06/02**	**07/02**	**08/02**	**09/02**
Volume	A	**TWh**	1012,0	1023,5	176,1	171,7	168,7	174,6	161,4	171,1
Increase		**%**		1,0	1,6	0,4	2,4	2,2	-1,3	1,0
Peak load[2]	B	**GW**	294,2	294,4	293,9	277,6	294,4	284,9	260,9	284,4
Increase		**%**		0,1	-0,1	0,8	4,2	2,2	16,9	-0,4
Utilisation factor of maximum load	$C = \frac{A}{h \times B}$ [3]	**%**	78,3	79,2	83,2	83,1	79,6	82,3	83,1	83,6
Total Generation[1]										
Volume		**TWh**	1035,9	1045,0	179,8	176,2	172,6	177,5	164,8	174,2
Increase		**%**		1,0	1,3	0,7	2,3	1,7	-1,2	1,2
Hydroelectric generation	D	**TWh**	173,6	137,4	20,1	25,5	26,0	23,5	21,9	20,4
Increase		**%**		-20,8	-36,8	-25,2	-14,5	-20,8	-12,9	-8,8
Energy capability factor	E		1,11	0,96	0,86	0,97	0,99	0,88	1,01	1,04
last year					1,10	1,23	1,09	1,08	1,06	1,05
Share in consumption	$F = \frac{D}{A}$	**%**	17,2	13,4	11,4	14,9	15,4	13,5	13,6	11,9
Thermal generation[4]	T	**TWh**	862,3	907,5	159,6	150,6	146,6	154,0	142,9	153,7
Increase		**%**		5,2	9,5	6,8	5,8	6,3	0,6	2,5
Non nuclear	Tc	**TWh**	515,5	551,3	98,2	90,3	88,6	93,0	85,9	95,3
Increase		**%**		6,9	12,9	6,3	5,9	6,7	2,8	6,8
Nuclear	Tn	**GWh**	346,8	356,2	61,4	60,3	58,0	61,0	56,9	58,5
Increase		**%**		2,7	4,5	7,7	5,8	5,5	-2,6	-3,9

Electricity exchanges			**04/01-09/01**	**04/02-09/02**	**04/02**	**05/02**	**06/02**	**07/02**	**08/02**	**09/02**
Volume total	Y	**GWh**	124535	136354	23170	22809	21449	23811	21528	23587
Increase		**%**		9,5	11,2	11,4	7,3	11,2	6,4	9,3
Volume[5]		**GWh**	108940	119405	20627	19801	18725	20806	18780	20666
Increase		**%**		9,6	11,2	9,6	7,8	11,8	9,0	8,1
Share in consumption	$L = \frac{Y}{A}$	**%**	12,3	13,3	13,2	13,3	12,7	13,6	13,3	13,8
Maximum parallel power[2]	M	**GW**	308,5	306,1	306,1	290,7	305,0	292,7	268,0	294,5
Load flow **day**[6]	N	**MW**	25324	26484	24720	26484	24905	24549	23121	22894
last year		**MW**		25324	19847	22951	24715	25324	22151	23573
Load flow **night**[6]	N	**MW**	24340	26098	25500	22660	21746	23635	21567	26098
last year		**MW**		24340	23858	19864	21017	19151	17476	24340

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

	B	**D**	**E**	**F**	**GR**	**I**	**SLO**	**HR**	**JIEL**	**L**	**NL**	**A**	**P**	**CH**	**CZ**	**H**	**PL**	**SK**
Consumption	100	93	94	97	91	100	95	100	96	99	100	90	91	100	100	100	100	100
Load	100	91	94	97	91	100	95	100	96	99	90	82	87	100	100	100	100	100
Production	100	93	94	97	91	100	95	100	96	98	100	84	91	100	100	100	100	100

[2] on the 3rd Wednesday

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

[4] including deliveries from industries

[5] of 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 2002 - September 2002

T1 Electricity supply situation in summer April 2002 - September 2002

Country	Consumption[1] GWh	Cons_repr %	Increase[2] %	Load [3] MW	Load_repr %	Increase[2] %	Energy capability factor
B	9259	100	0.7	11391	100	-3.5	-
D	235196	93	1.3	69800	91	1.0	1.15
E	102754	94	2.6	30888	94	3.9	-
F	197395	97	0.1	60291	97	-1.2	-
GR	23842	91	1.8	8786	91	14.4	0.78
I	152694	100	1.8	50551	100	6.6	0.90
SLO	5774	95	15.2	1684	95	6.9	1.02
HR	6772	100	3.5	2084	100	-3.2	1.05
JIEL	18864	96	1.7	6135	96	-3.2	0.87
L	2928	99	4.3	812	99	-5.9	-
NL	53069	100	2.5	12696	90	-1.1	-
A	22871	90	-8.6	7601	82	6.6	-
P	19526	91	2.3	6132	87	5.6	0.50
CH	27005	100	1.2	8504	100	0.1	1.01
CZ	25738	100	-0.8	7741	100	-6.1	-
H	17642	100	2.3	5248	100	-0.6	-
PL	60436	100	-0.8	18329	100	-1.9	-
SK	11771	100	1.5	3500	100	-0.3	1.02
UCTE	1023536		1.0	294359		0.1	0.96

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

[2] Variation as compared to coresponding period of the previous year, all variations basedon the values representing 100% of the respective country

[3] Maximum load of each 3rd Wednesday of considered period

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

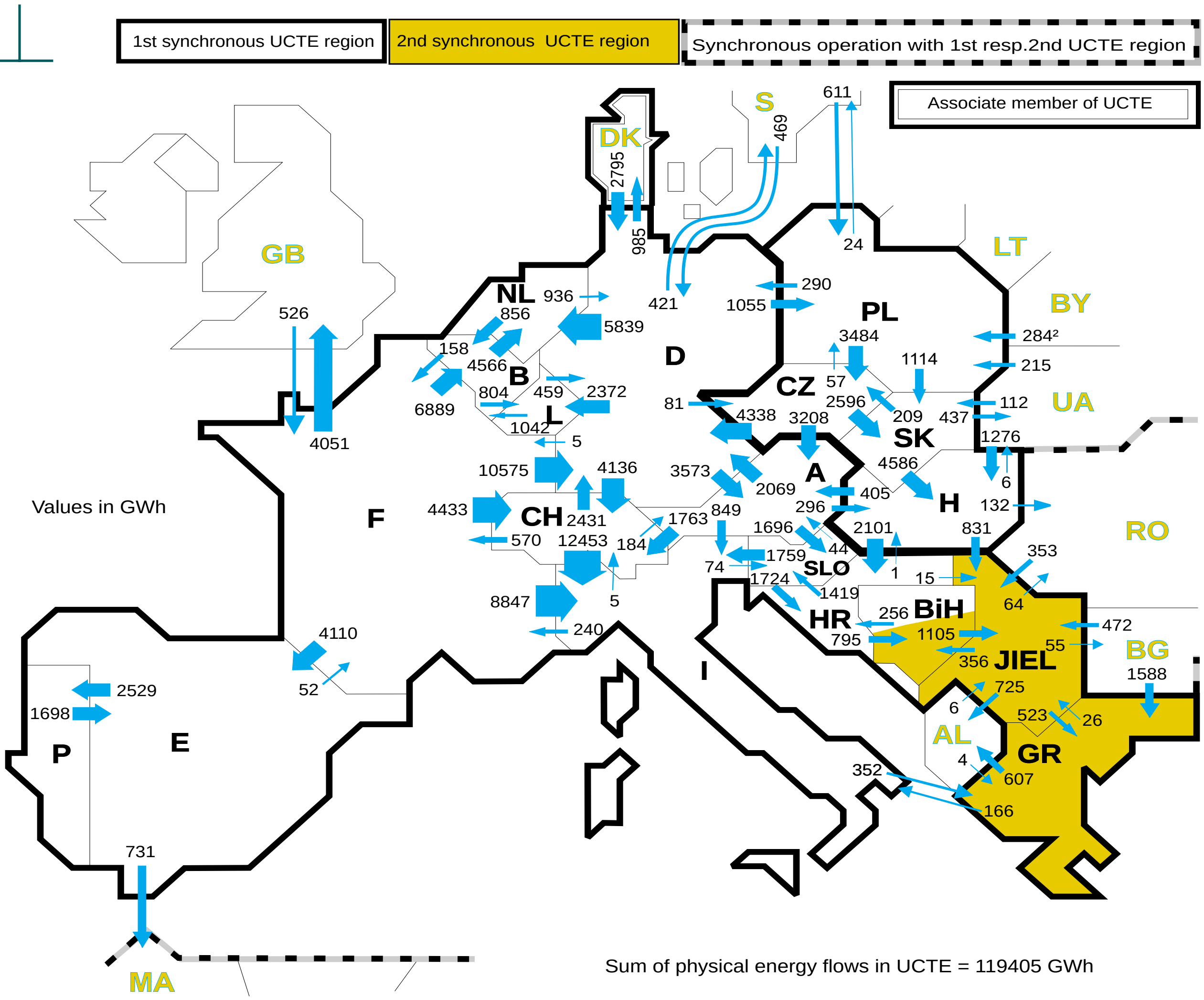
B	D	E	F	GR	I	SLO	HR	JIEL	L	NL	A	P	CH	CZ	H	PL	SK	UCTE
IV	IV	VI	IV	VII	VI	IX	IV	IV	V	IV	IV	VII	IV	IV	IX	IX	IV	IV

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 2002 - September 2002

G1



Sum of physical energy flows in UCTE = 119405 GWh

Total = 136354 GWh

T1

Importing countries

Exporting Countries

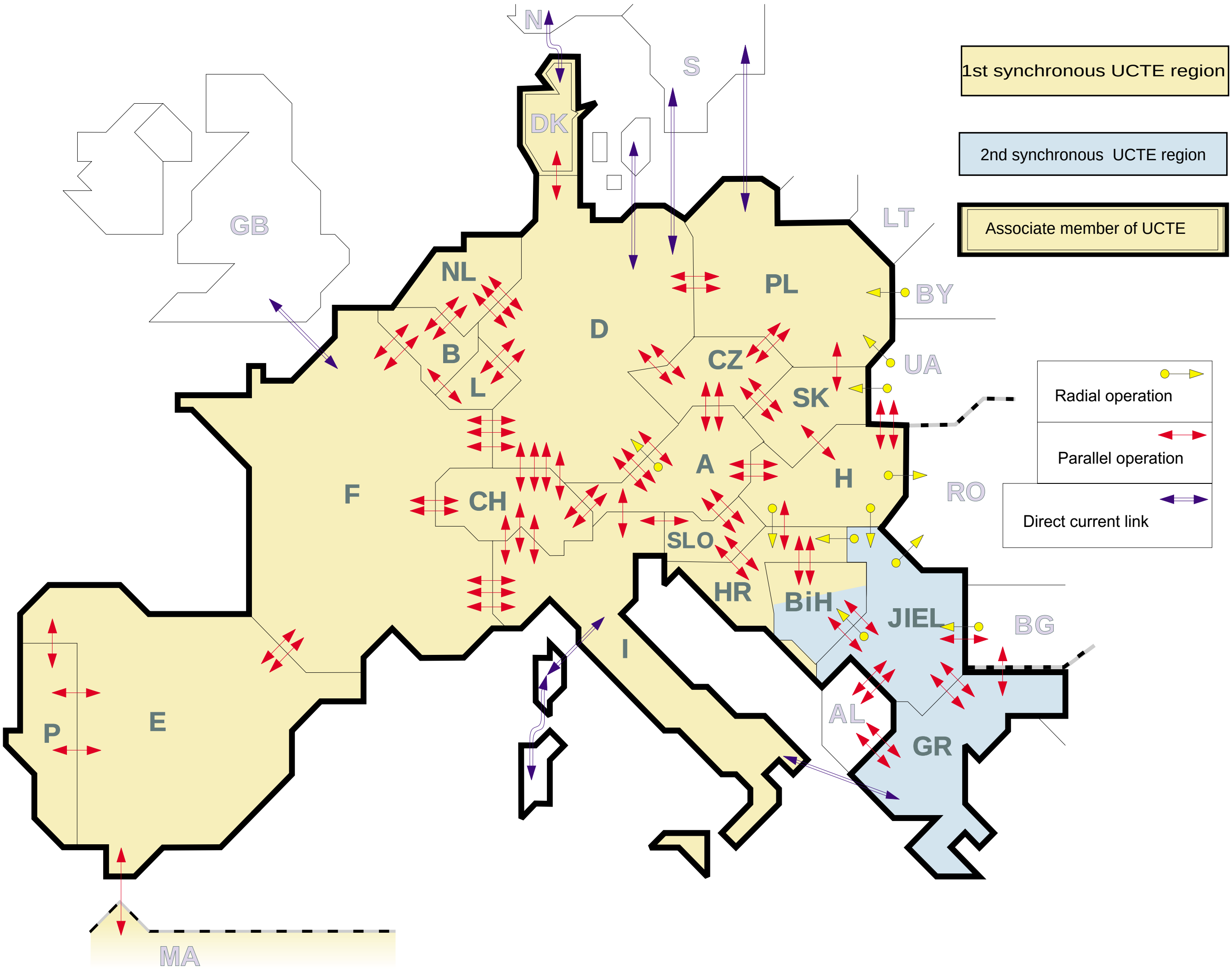
	B	D	E	F	GR	I	SLO	HR	BiH	JIEL	L	NL	A	P	CH	CZ	H	PL	SK	III²
B	-	-	-	158	-	-	-	-	-	-	804	4566	-	-	-	-	-	-	-	-
D	-	-	-	5	-	-	-	-	-	-	2372	5839	3573	-	4136	81	-	1055	-	1406
E	-	-	-	52	-	-	-	-	-	-	-	-	-	2529	-	-	-	-	-	731
F	6889	10575	4110	-	-	8847	-	-	-	-	-	-	-	-	4433	-	-	-	-	4051
GR	-	-	-	-	-	166	-	-	-	26	-	-	-	-	-	-	-	-	-	607
I	-	-	-	240	352	-	74	-	-	-	-	-	-	-	5	-	-	-	-	-
SLO	-	-	-	-	-	1759	-	1724	-	-	-	-	44	-	-	-	-	-	-	-
HR	-	-	-	-	-	-	1419	-	795	15	-	-	-	-	-	-	1	-	-	-
BiH	-	-	-	-	-	-	-	256	-	1105	-	-	-	-	-	-	-	-	-	-
JIEL	-	-	-	-	523	-	-	0	356	-	-	-	-	-	-	-	0	-	-	844
L	1042	459	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NL	856	936	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A	-	2069	-	-	-	849	1696	-	-	-	-	-	-	-	1763	0	296	-	-	-
P	-	-	1698	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CH	-	2431	-	570	-	12453	-	-	-	-	-	-	184	-	-	-	-	-	-	-
CZ	-	4338	-	-	-	-	-	-	-	-	-	-	3208	-	-	-	-	57	2596	-
H	-	-	-	-	-	-	-	2101	-	831	-	-	405	-	-	-	-	-		138
PL	-	290	-	-	-	-	-	-	-	-	-	-	-	-	-	3484	-	-	1114	24
SK	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	209	4586	0	-	437
III¹	-	3264	0	526	1592	-	-	-	-	831	-	-	-	-	-	-	1276	1110	112	-

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

[2] Third countries: Albania, Belarus, Bulgaria, Denmark, Great Britain, Morocco, Rumania, Sweden and Ukraine

Regions in parallel operation

G1 17.07.2002, 11:00 (CET*)



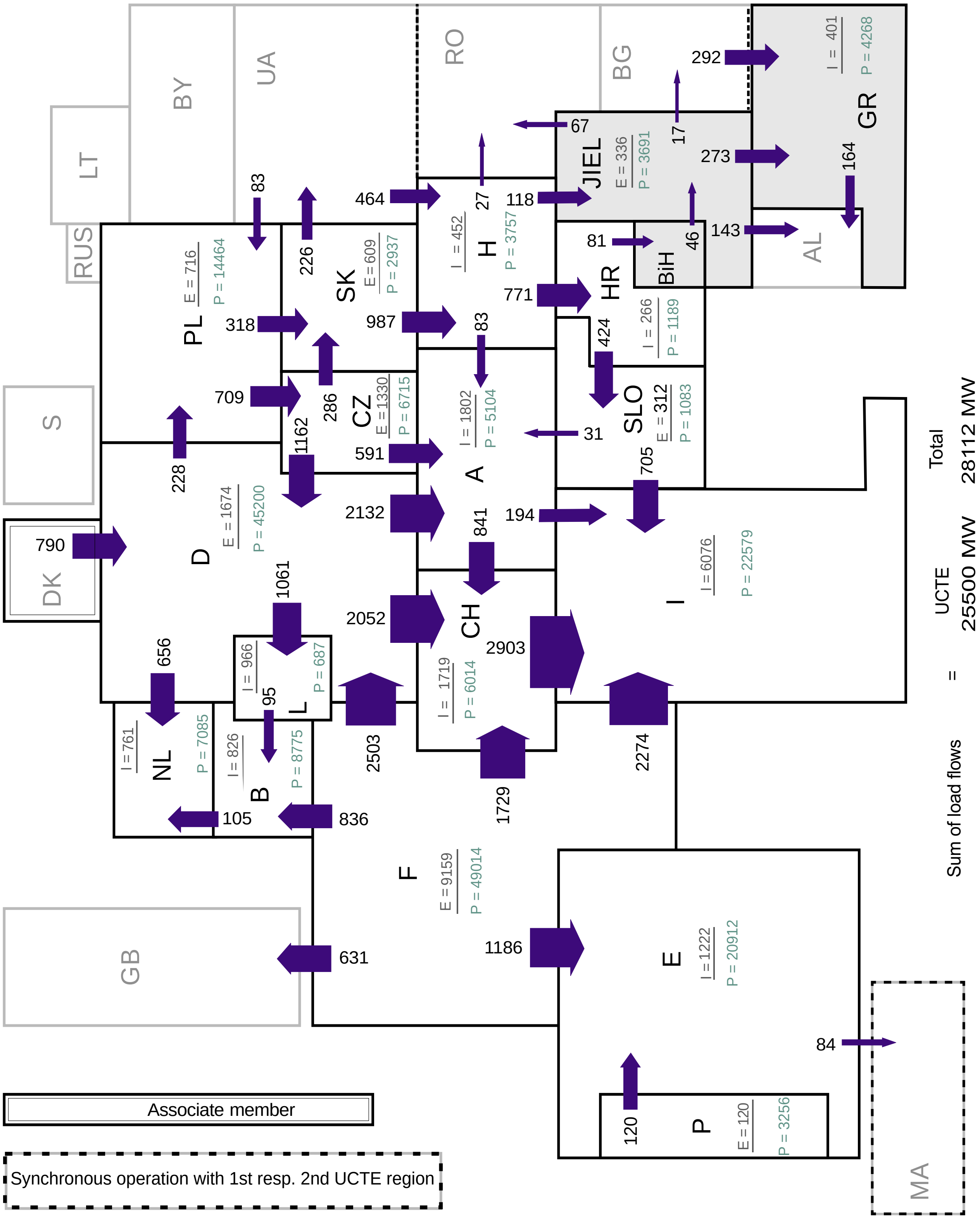
* CET - Central European Time

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

Day	B	D	E	F	GR	I	SLO	HR	JIEL	L	NL	A	P	CH	CZ	H	PL	SK	DK
17.04.02	10178	76200	26554	70462	5569	37884	1934	1913	4620	627	10370	6690	5613	10324	8730	4052	18492	3928	1930
15.05.02	10148	71400	25667	65545	5568	37785	1249	1689	4117	801	9305	6831	5047	11135	8834	4034	16857	3431	1270
19.06.02	9610	74000	28498	63649	7077	43668	2061	1861	4202	730	10408	6955	5252	11116	8805	4222	17423	3390	2055
17.07.02	9391	68100	27590	62962	7657	41103	1658	1900	4055	701	10042	5959	5586	11868	8786	4139	16753	3162	1260
21.08.02	10793	63900	25109	57347	6009	29978	1605	1852	4000	746	10309	6180	4349	11267	8820	3872	16710	3516	1600
18.09.02	9295	69900	27790	62520	5617	39516	1821	1731	3882	778	10147	6735	5141	11679	9430	4112	18607	3426	2355

P = Load

G1 17.04.2002 - 03:00 h $_{(CET)}$ (in MW)



Associate member

Synchronous operation with 1st resp. 2nd UCTE region

2nd synchronous UCTE region

* Central European Time (CET)

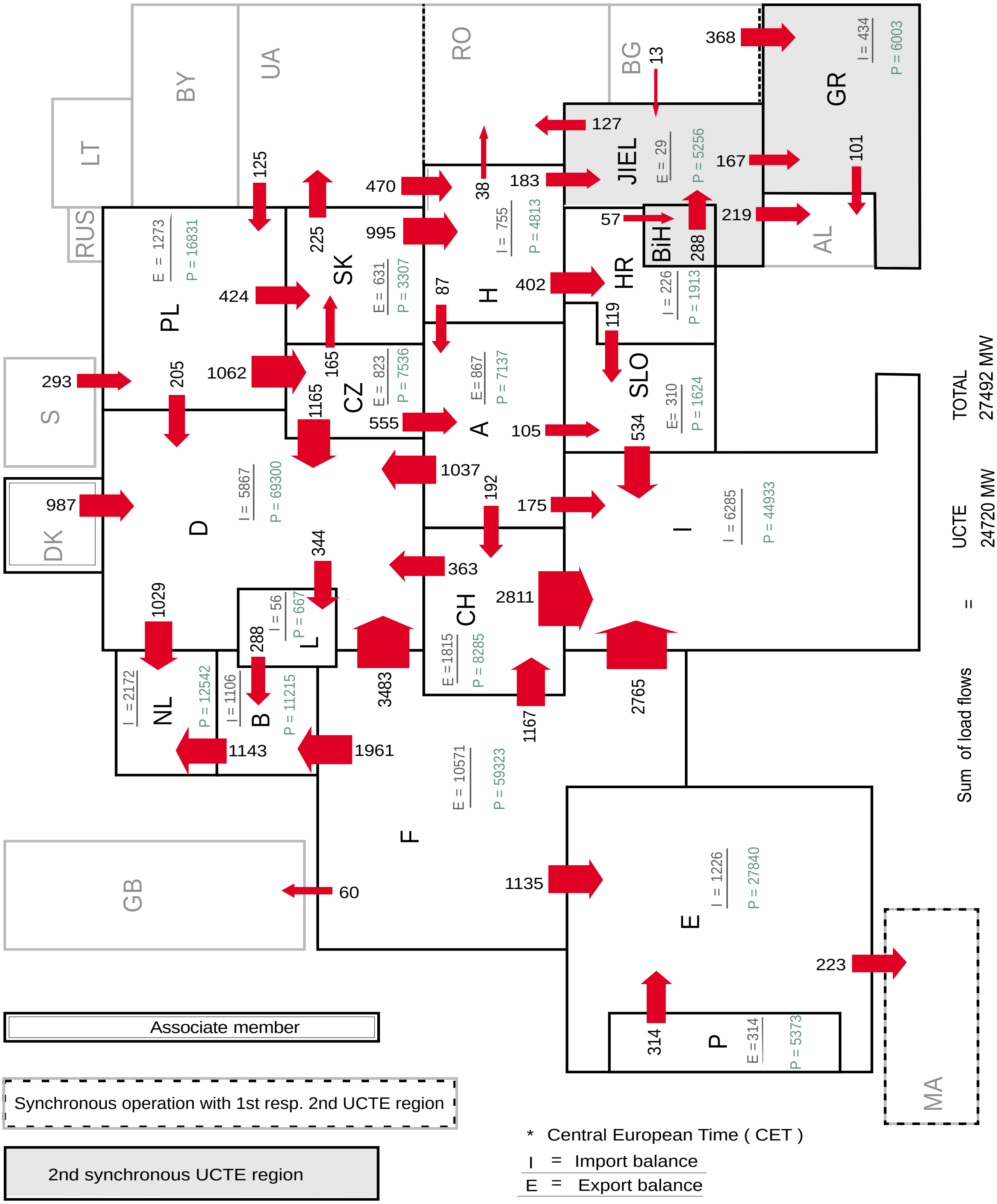
I = Import balance

E = Export balance

Load flows

P = Load

G2 17.04.2002 - 11:00 h $_{(CET)}$ (in MW)



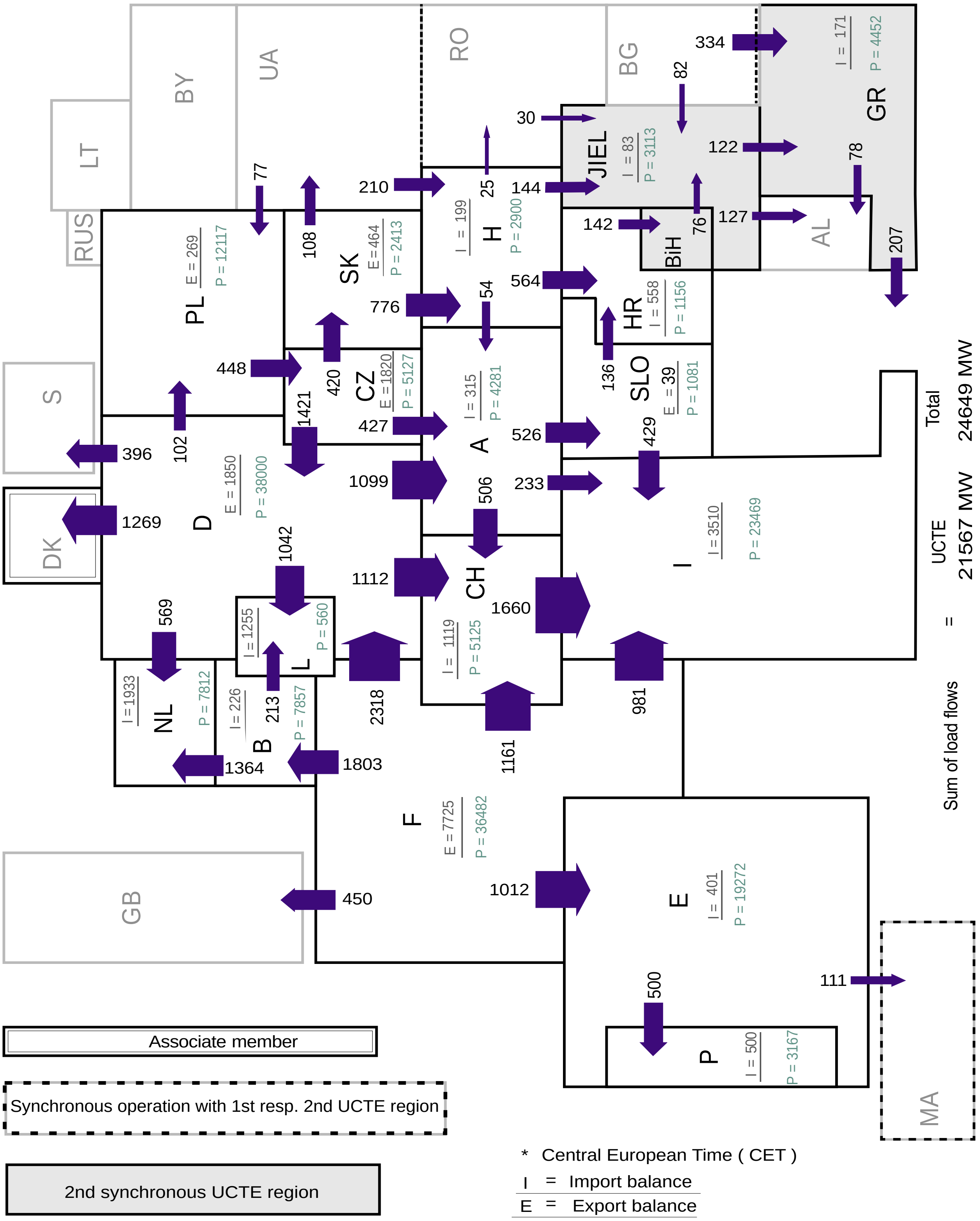
Sum of load flows = UCTE 24720 MW TOTAL 27492 MW

* Central European Time (CET)
I = Import balance
E = Export balance

Load flows

P = Load

G3 21.08.2002 - 03:00 h (CET) (in MW)



* Central European Time (CET)

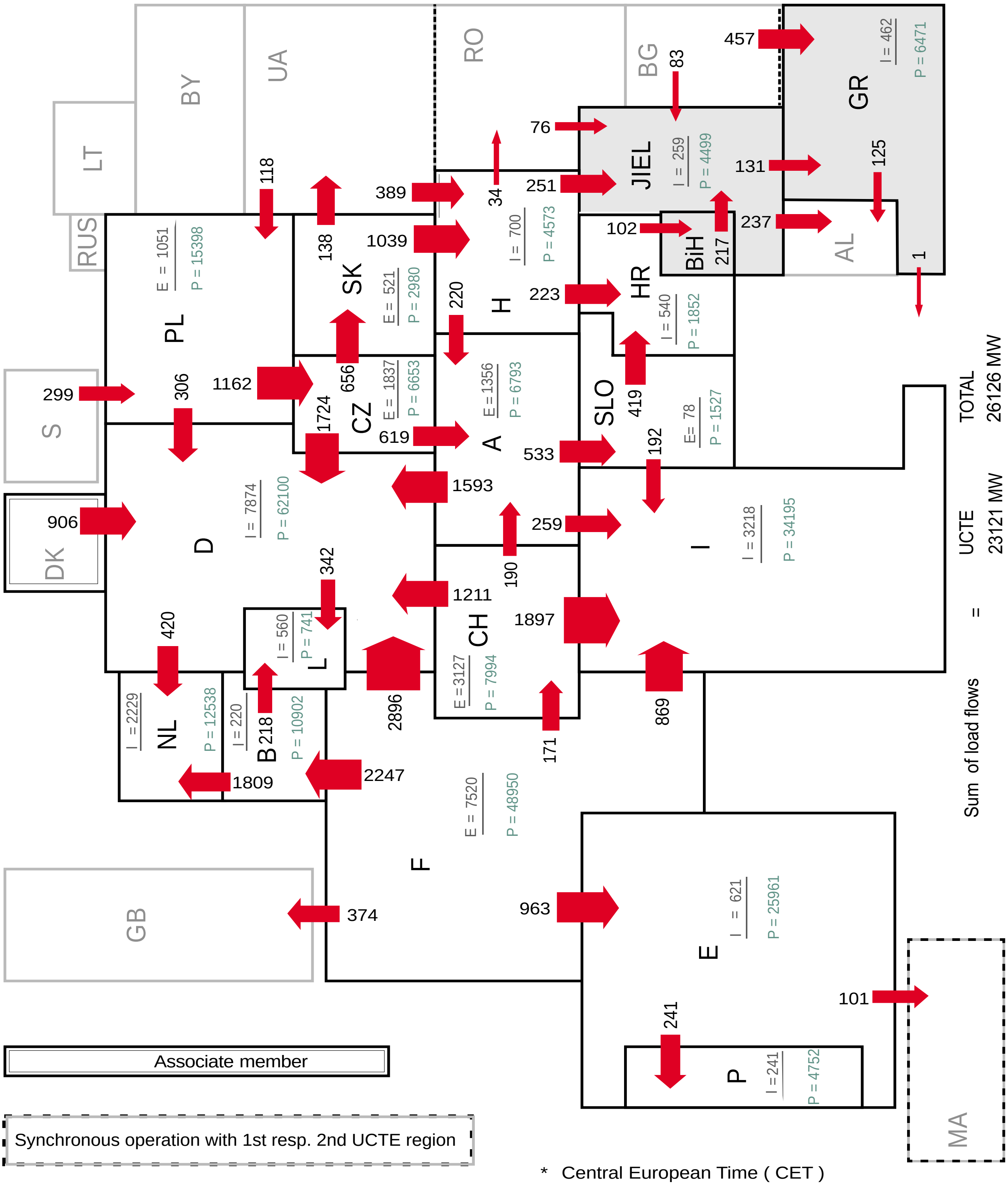
I = Import balance

E = Export balance

Load flows

P = Load

G4 21.08.2002 - 11:00 h (CET) (in MW)



Associate member

Synchronous operation with 1st resp. 2nd UCTE region

2nd synchronous UCTE region

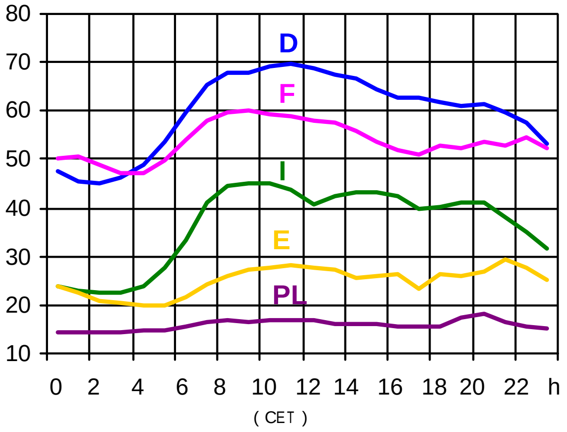
* Central European Time (CET)

I = Import balance

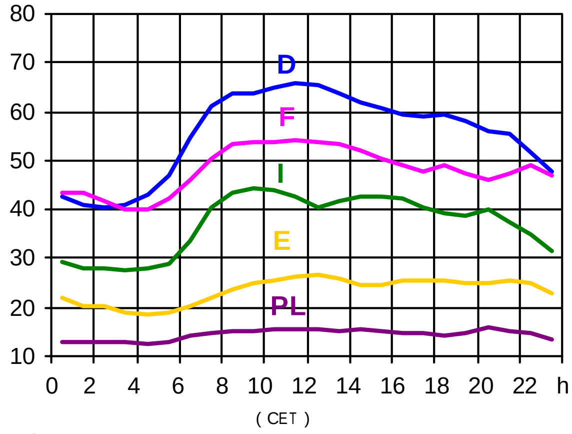
E = Export balance

Load diagrams[1]

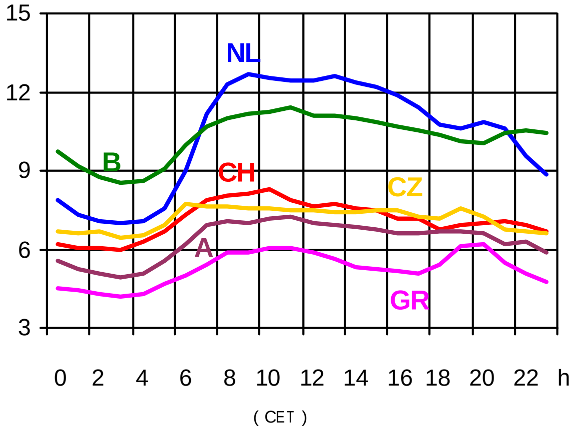
G1 **17.04.2002** (in GW)



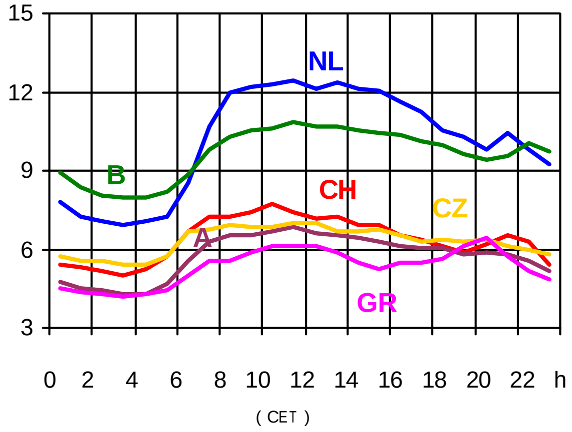
G4 **15.05.2002** (in GW)



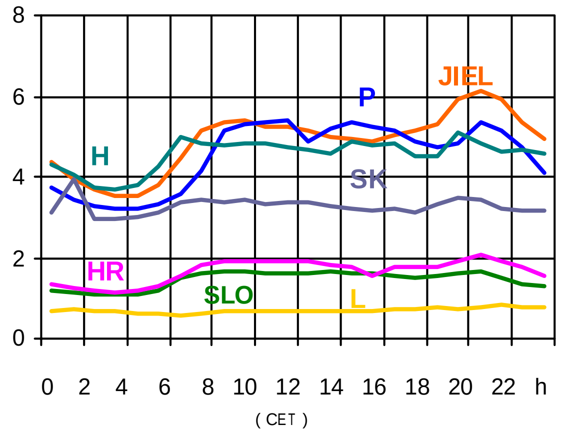
G2 **17.04.2002** (in GW)



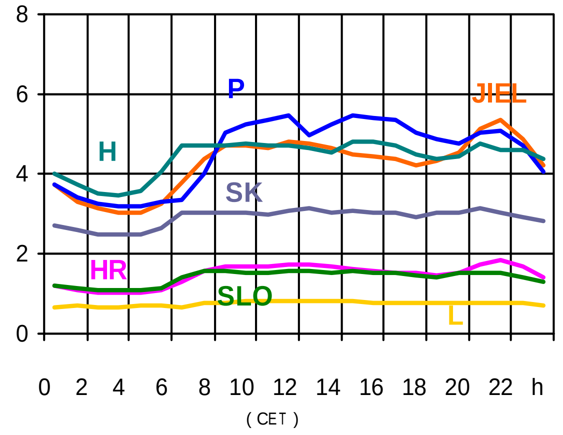
G5 **15.05.2002** (in GW)



G3 **17.04.2002** (in GW)



G6 **15.05.2002** (in GW)



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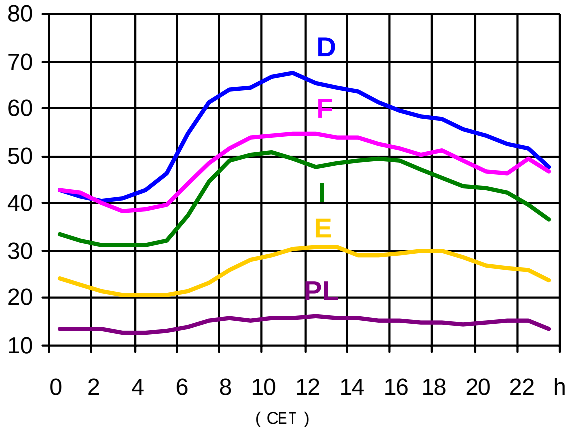
[1] Percentage as referred to total values (%)

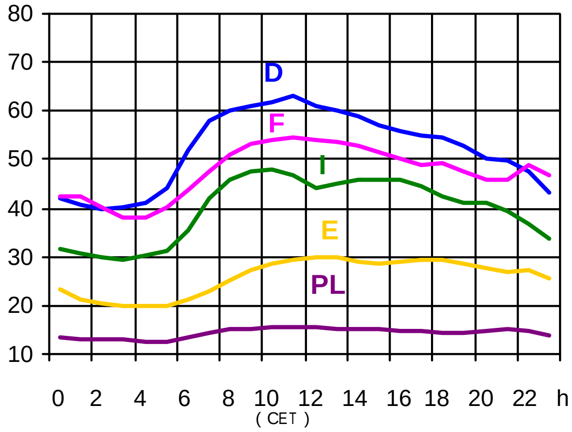
B	D	E	F	GR	I	SLO	HR	JIEL	L	NL	A	P	CH	CZ	H	PL	SK
100	91	94	98	95	100	95	100	96	99	75	82	90	100	100	100	100	100

Load diagrams[1]

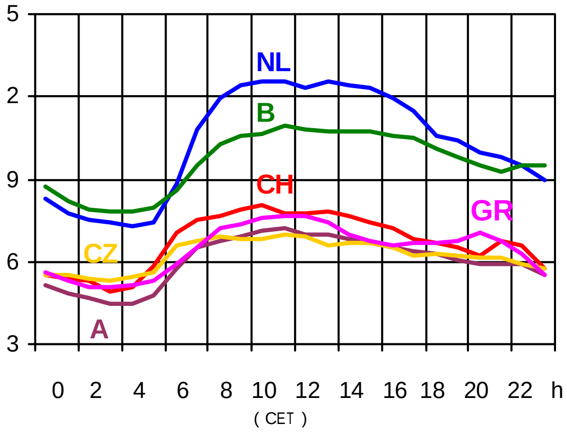
G7 19.06.2002 (in GW)



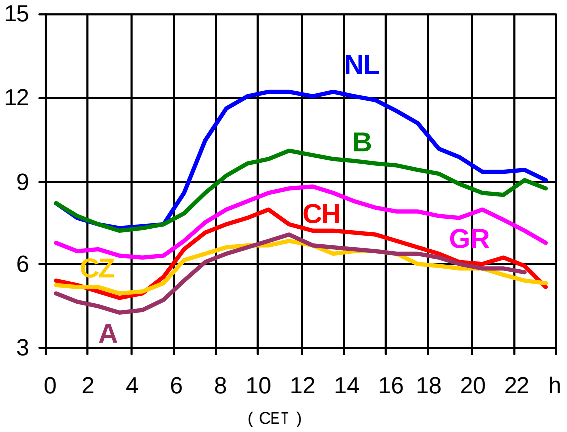
G10 17.07.2002 (in GW)



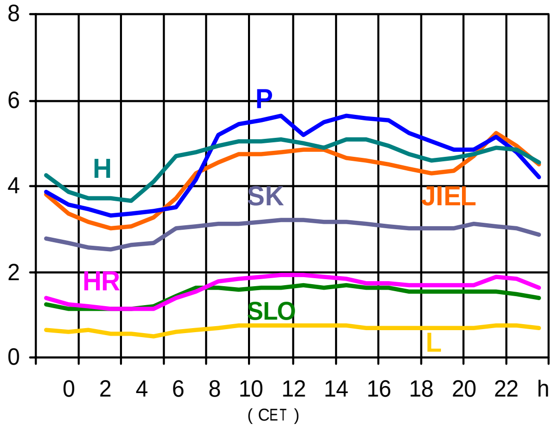
G8 19.06.2002 (in GW)



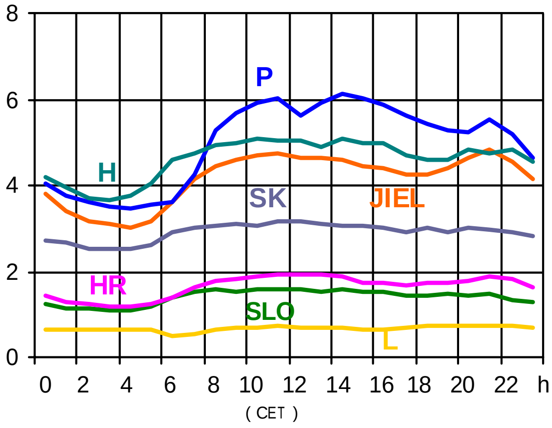
G11 17.07.2002 (in GW)



G9 19.06.2002 (in GW)



G12 17.07.2002 (in GW)



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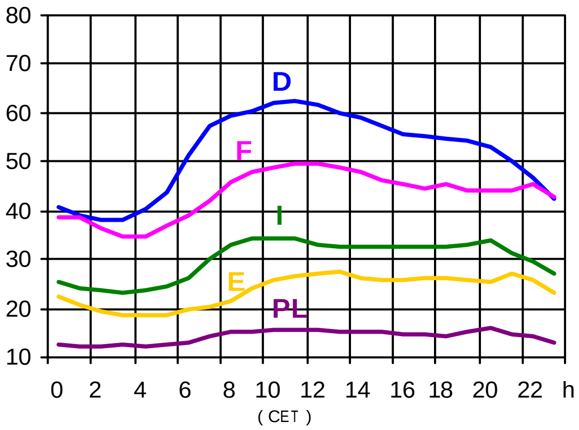
[1] Percentage as referred to total values (%)

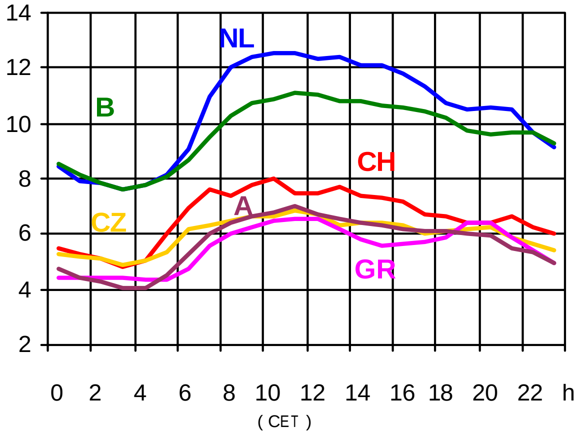
B	D	E	F	GR	I	SLO	HR	JIEL	L	NL	A	P	CH	CZ	H	PL	SK
100	91	94	98	95	100	95	100	96	99	75	82	90	100	100	100	100	100

Load diagrams[1]

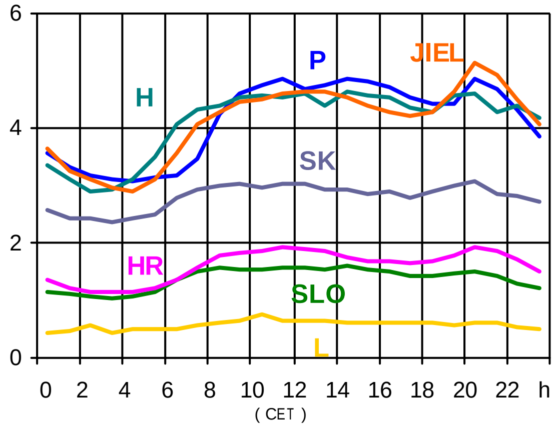
G13 **21.08.2002** (in GW)



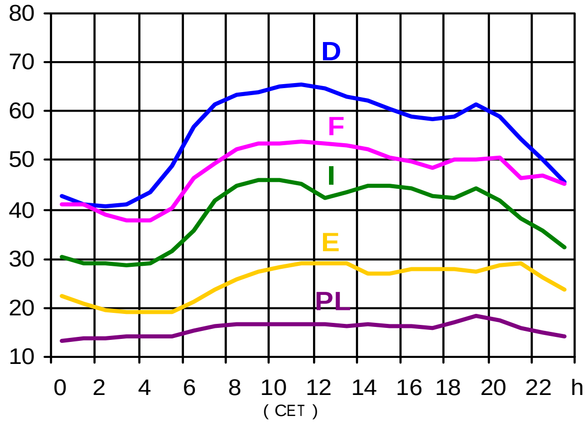
G14 **21.08.2002** (in GW)



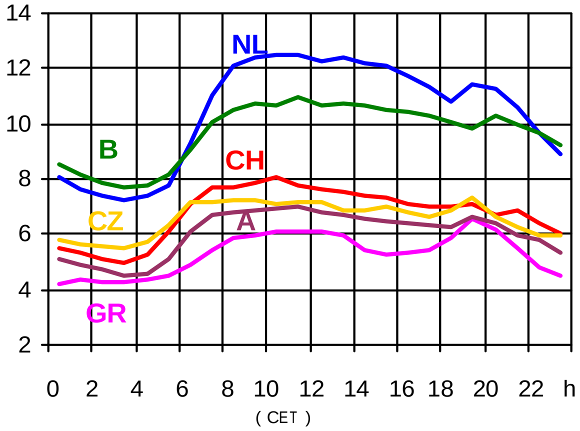
G15 **21.08.2002** (in GW)



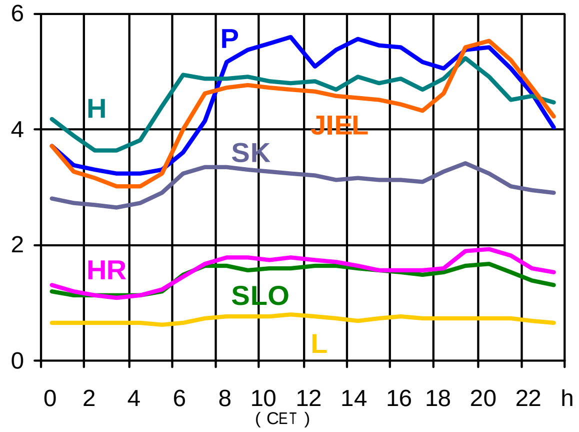
G16 **18.09.2002** (in GW)



G17 **18.09.2002** (in GW)



G18 **18.09.2002** (in GW)



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

B	D	E	F	GR	I	SLO	HR	JIEL	L	NL	A	P	CH	CZ	H	PL	SK
100	91	94	98	95	100	95	100	96	99	75	82	90	100	100	100	100	100

UCTE System Adequacy Forecast 2003 - 2005

Executive summary

UCTE System security

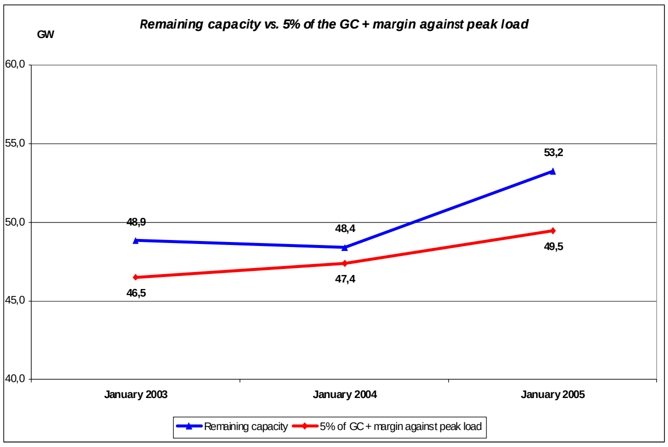
The security of the UCTE system as a whole seems to be not at risk over the period covered by this year's forecast, due to both the expected new generating capacity and the development of the national transmission grids.

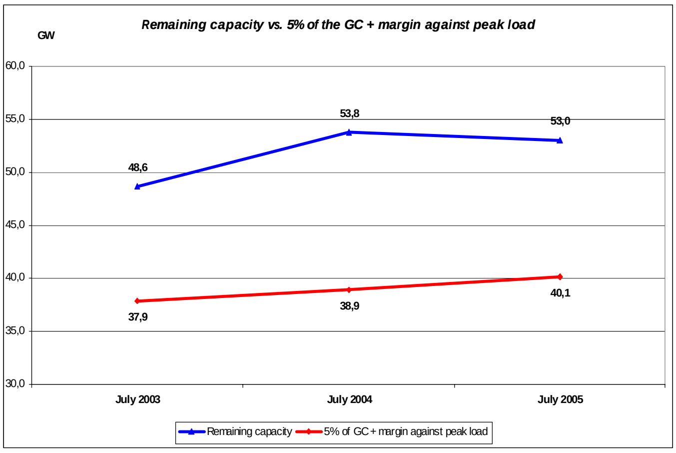
As far as transmission system adequacy is concerned, the expected development in the different grids (new lines, new substations, new equipment like phase shift transformer) in the UCTE countries shall reduce or prevent existing or foreseeable congestion on the interconnections by reducing internal constraints and/or by facilitating the energy flows. The internal energy market should take advantage of these developments.

As far as generation adequacy is concerned, the main result of the UCTE forecast is the Remaining Capa-city, which represents a pertinent indicator of the security of supply. Expected remaining capacity shows an increase over the period from 2003 to 2005 (essentially concentrated on the first semester 2004, then stable).

Remaining capacity can be interpreted as the capacity that the system needs to cover the "margin against monthly peak load" (differences between synchronous peak load and sum of non synchronous peak loads) and, at the same time, exceptional and longer-term unplanned outages which the power plant operators are responsible to cover with additional reserves (often estimated at 5% of installed capacity).

It can be concluded that this condition is respected in the UCTE system as a whole. But, for some countries this margin is not reached (see Figure here below and Figure A/3, A/6, A/7 for details on each country A/6-2, A/7-2).





For the UCTE as a whole, over the period from 2003 to 2005 the remaining capacity represents more than 8 % of the total generating capacity, but this overall potential sometimes can not be exploited by all the UCTE members due to transmission system bottlenecks. Thus it is recommended to analyse the situation region by region rather than on the continental level.

- **The main UCTE block**: the remaining capacity of the main UCTE block will be decreasing from 2003 to 2004 and be stable from 2004 on. It is expected to represent 9.7 %, 8.8 % and 8.4 % of the generating capacity in January 2003, 2004 and 2005 respectively. The "5% margin" will be met in this block, except for Germany (in summer), The Nether lands and Belgium (in winter). However, these countries consider that system security will not be at risk thanks to the use of interconnection capacity, new generating capacity and long term import contracts and participation contracts in power plants located outside the national territory.
- **Spain + Portugal**: it clearly appears that the situation for the Iberian block will be improving over the period from 2003 to 2005, from the remaining capacity point of view. The expected remaining capacity will represent 11.9 %, 14.3 % and 18 % of the national generating capacity for 2003, 2004 and 2005 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 and hydro power plants. When comparing the remaining capacity to the capacity that the system needs to cover the "margin against monthly peak load" plus 5 % of the generating capacity, it should be noticed that remaining capacity is lower than this sum (7.6 GW remaining capacity vs. 8.2 GW) for January 2003 (essentially due to the significant difference between the reference load and the peak load in Spain) and higher for July 2003 (6.5 GW remaining capacity vs. 5.4 GW).

- **Italy**: when considering the remaining capacity as a percentage of the generating capacity (with respect to the "5 % margin"), the Italian peninsula will evolve from a critical situation in 2003 to a more critical one in 2004-2005. The foreseen remaining capacity will amount to 1.4 %, 0.3 % and 0.6 % in January 2003, 2004 and 2005, respectively. When comparing the remaining capacity to the capacity that the system needs to cover the "margin against monthly peak load" plus 5 % of the generating capacity, it should be noticed that remaining capacity is significantly lower than this sum. The Italian TSO considers as necessary the amount of power plant operator reserve, when including the remaining capacity and the reserves for system services, equal to 5 % of the load and expects that in the future this reserve will be higher and the percentage will reach approximately the 7-8 %. Moreover, the expected importable capacity (6 GW) will supply a surplus of available capacity, useful to improve the security of supply.

- **JIEL + Greece**: the increase in the generating capacity for this block seems to be inadequate to match the load growth. In January 2004 the remaining capacity is equal to zero. From July 2004 on, an improvement of this situation is expected when the "5% margin" will be nearly reached.
  There will be no evolution in the JIEL generating capacity while the load will increase.
  In Greece, peak load will be covered by hydro production (considered as usable on short term) and by imported energy, especially in case of delays in the construction of the new power plants.
  Interconnections will play a key role for ensuring the security of supply. The resynchronisation of this zone will also improve the capacity for imports. So, the use of interconnection capacity (see Figure 1A), will probably relieve this system and its security will not be compromised.

- **Centrel block**: without extraordinary changes in both the generating capacity and the load, the Centrel block will reach easily the "5 % margin" with a remaining capacity growing from 16.3 % to 18.9 % of the generating capacity over the period under investigation.

Comparison with the previous forecasts

Note: it has to be retained that, for this forecast, the perimeter for the UCTE includes Bosnia and Herzegovina, which was not included in last year's UCTE perimeter. The contribution of Bosnia and Herzegovina is specified in the report when necessary, in order to make a pertinent comparison between last year's forecast and the new one.

As far as changes in generating capacity are concerned, for the period from January 2003 to July 2004, figures of the new forecast, when excluding the generating capacity for Bosnia and Herzegovina (+ 3.8 GW constant over the period), are lower than (except for July 2003, approximately 1 GW higher) in the last year's forecast. The expected UCTE load according to this year's forecast, when not taking into account data for Bosnia and Herzegovina, is 2-3 GW lower than the load of the forecast carried out in 2001. Concerning the remaining capacity, figures of the new forecast, when excluding the remaining capacity for Bosnia and Herzegovina, are 3-6 GW lower than figures of last year's report.

1.Foreword

The UCTE System Adequacy Forecast will be useful to Transmission System Operators (TSOs) for maintaining network security and supporting market operation.

The UCTE System Adequacy Forecast aims at:
- providing TSOs who co-operate within UCTE with a prospective view of supply reliability developments throughout the network;
- providing all European electricity market players with an overall view on system load evolution, as well as on the resources available to satisfy the system load;
- since this year's report, providing all European electricity market players with an overview on the main changes in the UCTE Transmission grids.

From a "Power Balance Forecast" to a "System Adequacy Forecast"

In response to developments in the European electricity market, UCTE introduced in 2000 fundamental methodology changes in the preparation of the power balance forecasts. The methodology for the 2001 Report (Forecast 2002-2004) was the same as for this year's report. Moreover, starting from this year's forecast, the "Power Balance" Sub-group

UCTE. That aims at providing a more 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).
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.
Security – a measure of power system ability to withstand sudden disturbances such as electric short circuits or unanticipated losses of system components 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.

As far as the generating capacity and the contractual exchanges are concerned, in the light of competition, the entry of new players on the market, the creation of electricity power exchanges and new contractual relationships with customers, it is no longer possible to obtain certain data regarding the management of generating facilities or future contractual exchanges with the same precision as in the past.

Moreover, some recently established TSOs, and those which still have to be established, will not have access yet to all the information they are entitled to have. Therefore the methodology is based upon the data available to TSOs. 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).

This year’s report

In this report, a comparison is drawn between the load and the guaranteed generating capacity of 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).
The resulting balance will represent, if positive, a potential capacity for exports or, if negative, a potential need for imports.

This balance will then be compared with the Net Transfer Capacity at the borders of the country concerned, as calculated by ETSO or estimated by the TSOs.

The System Adequacy forecast is based on national data available from TSO correspondents; the first analysis consists in highlighting the capacity of each country to cover its interior load with the available national capacity (remaining capacity). Nevertheless, this approach is supplemented by the analysis on the role which the internal and the interconnected networks play in terms of system security (section 5).

Because the 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.

Moreover, particular trends of development (e.g. increasing interest in renewable sources) and changes of the institutional context where TSOs operate are also stressed (section 6 of the report).

2. Objective and Structure

This report contains forecasts of the UCTE system adequacy for the period from 2003 to 2005. The overall results of the forecasts are shown in Chapters 3 and 4 of the report.
The power balance corresponds to the synchronous capacity of 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 2003 - 2005 forecast includes the balances of the following countries and electricity systems:

UCTE countries

B	Belgium	**D**	Germany
L	Luxembourg	**E**	Spain
NL	The Netherlands	**F**	France
A	Austria	**GR**	Greece
P	Portugal	**I**	Italy
CH	Switzerland	**SLO**	Slovenia
CZ	Czech Republic	**HR**	Croatia
H	Hungary	**YU**	Federal Republic of Yugoslavia
PL	Poland	**FYROM**	Former Yugoslav Republic of Macedonia
SK	Slovakia		

New countries in this year's report

BG	Bulgaria	**RO**	Romania
BI-UA	Burshtyn Island* part of Ukrainia	**BiH**	Bosnia and Herzegovina

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

Forecasts for 2003-2005 are based upon the assumption of normal climatic conditions.
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.

3.Main results of the System Adequacy

The most significant overall results of the “System Adequacy Forecast 2003-2005” 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. More detailed results of the power balance are presented in Table A/1-1.
In Tables 1 and 2, data for national generating capacities and system load in 2003 - 2005 are compared with the results of the forecasts for 2002, established last year, and with the retrospect for 2001.

Note: it has to be retained that, for this forecast, the perimeter for the UCTE includes Bosnia and Herzegovina, which was not included in last year’s UCTE perimeter. The contribution of Bosnia and Herzegovina is specified when necessary, in order to make a pertinent comparison between last year’s forecast and the new one.

It may be noticed that the 42.4 GW increase in national generating capacity over the period from January 2001 to January 2005 is more significant than the increase in load over the same period (+30.4 GW), while, in terms of percentage, the increase in generating capacity (+8.3 %) are lower than the increase in load (+9.4 %).
A significant growth of 28.6 GW in generating capacity is to be noticed over the period from January 2003 to July 2005. Over the period from January 2003 to July 2005, the remaining capacity increases by approximately +8.4 %. The increase is essentially concentrated in July 2004. Then the remaining capacity is stable up until the end of the period. The increase in remaining capacity is mainly due to a significant increase in generating capacity (approximately +28.6 GW, i.e. +5 GW new generating capacity per semester).

Table 1 | UCTE-Power balance, 2003- 2005 forecasts | Results in GW

	Situation	Forecast	Forecast	Forecast	Forecast
Month	**I/2001**	**I/2002**	**I/2003**	**I/2004**	**I/2005**
National generating capacity	513.0	517.9	531.8	541.2	555.4
Guaranteed capacity	386.4	387.3	392.4	398.2	409.0
Load at 11:00 a.m.	325.5	337.2	343.6	349.9	355.9
Remaining capacity	60.9	50.1	48.9	48.4	53.2
Month	**VII/2001**	**VII/2002**	**VII/2003**	**VII/2004**	**VII/2005**
National generating capacity	510.4	522.5	536.0	547.8	560.4
Guaranteed capacity	346.7	348.3	348.6	359.1	364.0
Load at 11:00 a.m.	280.6	293.8	300.1	305.4	311.1
Remaining capacity	66.1	54.5	48.6	53.8	53.0

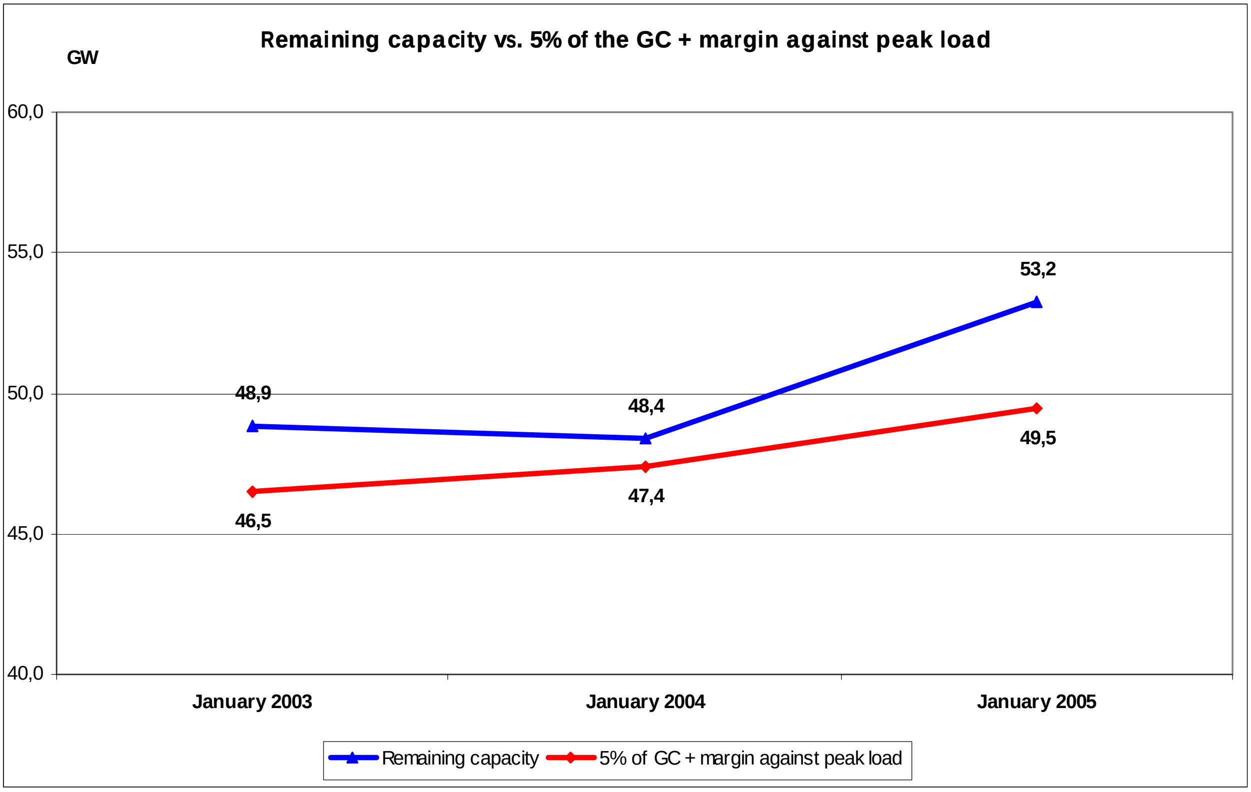
Changes in generating capacity, guaranteed capacity, remaining capacity and load are shown in Table 2.

Table 2 | UCTE-Power balance, 2003 - 2005 forecasts | Results in GW

	Forecast January	
	Variation 2001 - 2005 GW	Variation 2001 - 2005 %
	UCTE	**UCTE**
National generating capacity	42.4	8.3
Guaranteed capacity	22.6	5.9
Load at 11:00 a.m.	30.4	9.4
Remaining capacity	-7.7	-12.6
	Forecast July	
	Variation 2001 - 2005 GW	Variation 2001 - 2005 %
	UCTE	**UCTE**
National generating capacity	50.0	9.8
Guaranteed capacity	17.3	5.0
Load at 11:00 a.m.	30.5	10.9
Remaining capacity	-13.1	-19.8

For the whole UCTE, the comparison with the situation in 2001, when including data for Bosnia and Herzegovina (3.8 GW generating capacity from January 2003 on), reveals an increase in national generating capacity of 8.3 % over the period from January 2001 to January 2005.
When comparing January 2003 and 2005, the 23.6 GW additional generating capacity yields only 16.6 GW of additional guaranteed capacity; the availability ratio (16.6 / 23.6 = 70.3 %) of this increase of production equipment is lower than the same ratio for the overall production system (412.3 / 561.8 = 73.6 %). This is partly due to the effect of new renewable energy sources (essentially wind power), which represent 30 % of the newly installed generating capacity.
As far as the load is concerned, the growth is 9.4 % over the period from January 2001 and January 2005, when including data for Bosnia and Herzegovina (2.1 GW load in January 2003, 2.2 GW load in January 2004 and 2.3 GW load in January 2003). Nevertheless, the situation in January 2001 does not necessarily represent an average situation.
Moreover, expected remaining capacity shows an increase over the period from 2003 to 2005 (essentially concentrated on the first semester 2004, then stable). This is an important point concerning the security of the UCTE system.
Remaining capacity can be interpreted as the capacity that the system needs to cover the “margin against monthly peak load” (differences between synchronous peak load and sum of non synchronous peak loads) and, at the same time, exceptional and longer-term unplanned outages which the power plant operators are responsible to cover with additional reserves (often estimated at 5% of installed capacity).
It can be concluded that this condition is respected in the UCTE system as a whole. But, for some countries this margin is not reached (see Figure here below and Figure A/3, A/6, A/7 for details on each country A/6-2, A/7-2).

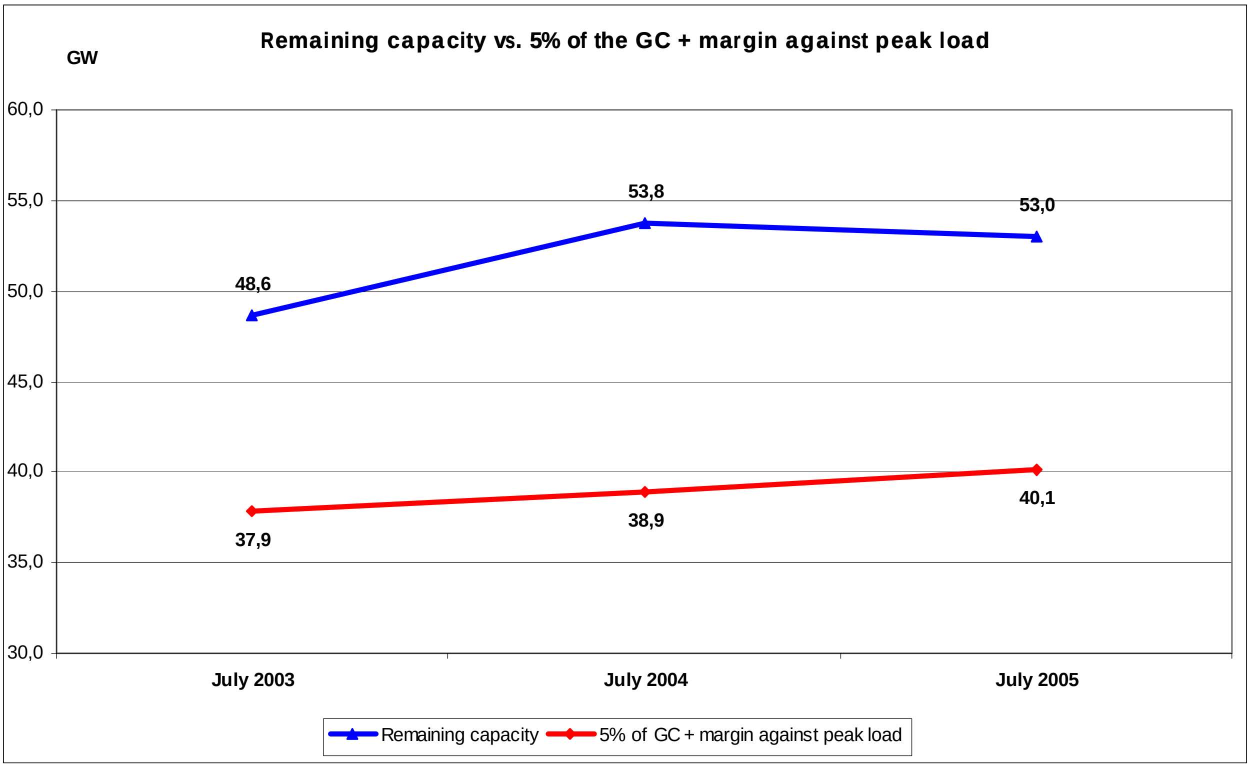
Figure A / 6-2 | **Remaining capacity vs. 5% of NGC and margin against peak load**



However, these countries consider that system security will not be at risk thanks to the use of interconnection capacity, new generating capacity and long term import contracts and participation contracts in power plants located outside the national territory. Indeed, if taking into account imports and exports is not relevant when analysing the whole UCTE system, this is not the case when analysing countries one by one.
Several countries consider that an additional reserve of approximately 5 % of the national generating capacity has to be maintained by power plant operators in order to assure system security.

For the UCTE as a whole, over the period from 2003 to 2005 the remaining capacity represents more than 8 % of the total generating capacity, but this overall potential sometimes can not be exploited by all the UCTE members due to transmission system bottlenecks. Thus it is recommended to analyse the situation region by region rather than on the continental level (see Geographical blocks).

Figure A / 7-2 | Remaining capacity vs. 5% of NGC and margin against peak load



A / 1-1 | UCTE Power balance forecasts 2003-2005 on the 3rd Wednesday | Results in GW

	2003		2004		2005	
	January	July	January	July	January	July
National generating capacity	GW	GW	GW	GW	GW	GW
1. Hydro power stations	121.8	122.0	122.8	123.5	123.8	123.8
2. Nuclear power stations	108.0	109.2	108.5	108.5	108.6	108.6
3. Conventional thermal power stations	272.9	274.0	276.1	279.8	284.2	287.4
4. Renewable energy sources	21.2	22.8	25.4	27.7	30.3	32.0
5. Not clearly identifiable energy sources	7.9	7.9	8.3	8.3	8.5	8.5
6. National generating capacity (6 = 1+2+3+4+5)	**531.8**	**536.0**	**541.2**	**547.8**	**555.4**	**560.4**
7. Non-usable capacity	74.8	87.2	78.4	90.5	80.7	93.1
8. Overhauls (thermal power stations)	10.6	48.1	10.1	45.5	10.4	49.5
9. Outages (thermal power stations)	23.9	22.9	24.1	23.2	24.8	23.6
10. System services reserve	30.1	29.3	30.4	29.5	30.4	30.1
11. Guaranteed capacity (11 = 6-(7+8+9+10))	**392.4**	**348.6**	**399.2**	**359.1**	**409.0**	**364.0**
12. Load	343.6	300.1	349.9	305.4	355.9	311.1
13. Margin against monthly peak load	19.9	11.1	20.3	11.5	21.7	12.1
14. Remaining capacity (14 = 11-12)	**48.9**	**48.6**	**48.4**	**53.8**	**53.2**	**53.0**

Over the period from January 2003 and January 2005, the expected increase of 4.4 % in generating capacity is more significant than the expected variation of 3.6 % in load. As far as the remaining capacity is concerned, a drop from January 2001 to January 2003 (-12.3 GW) can be noticed. The value for January 2003 represents a minimum. After this minimum, the expected increase in remaining capacity is significant (mainly due to the new generating capacity installed from July 2004 on) but insufficient to reach the value of 2001.

However, it should be noticed that, while forecasts on the commissioning of new capacity have to be established sufficiently in advance (often at least two or three year in advance) according to the requirements of TSOs (because of the conditions required for connection), the same does not apply to decommissioning. Decommissioning dates may sometimes be notified to TSOs only few months in advance. It is therefore possible that generating capacity may be overestimated.

4. Detailed analysis of the power balance elements

Changes in national generating capacities of UCTE countries are shown in Table 3. 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 3 | **National generating capacity on the 3rd Wednesday[1]** | **Results in GW**

	2003		**2004**		**2005**		**Variation 2003/2005**
	January	**July**	**January**	**July**	**January**	**July**	**January**
Country	GW	GW	GW	GW	GW	GW	%
B	15.6	15.6	15.8	15.8	16.5	16.5	5.4
D	108.3	109.1	111.0	111.9	112.6	112.7	4.0
E	54.4	55.8	57.2	59.3	61.3	63.7	12.7
F	111.2	111.5	111.5	111.7	111.4	112.1	0.2
GR	10.1	10.4	10.5	12.0	12.4	12.6	23.5
I	79.6	80.0	80.6	81.6	83.4	84.8	4.8
SLO	2.7	2.7	2.7	2.7	2.8	2.8	3.3
HR	3.7	3.7	3.7	3.7	3.7	3.7	0.0
JIEL System*	10.6	10.6	10.6	10.6	10.6	10.6	0.0
BiH	3.8	3.8	3.8	3.8	3.8	3.8	0,0
L	1.6	1.6	1.6	1.6	1.6	1.6	2.3
NL	20.1	20.1	20.2	20.2	21.2	21.2	5.8
A**	16.9	16.8	16.9	16.9	16.5	16.5	0.5
P	9.6	9.7	10.7	11.0	11.1	11.2	15.4
CH	18.1	18.1	18.2	18.2	18.2	18.2	0.3
CZ	15.3	16.3	16.3	16.3	16.3	16.3	6.0
H	7.8	7.8	7.8	7.8	8.0	8.0	1.7
PL***	34.2	34.2	34.3	34.6	35.4	35.4	3.4
SK	8.0	8.0	8.0	8.0	8.0	8.0	-0.4
UCTE	**531.8**	**536.0**	**541.2**	**547.8**	**555.4**	**560.4**	**4.4**

***** JIEL System = Federal Republic of Yugoslavia and Former Republic of Macedonia
** Some reserves for the German control block are included in the installed generating capacity of Austrian hydro power stations
*** gross values

[1] Note: as specified 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” compprise the following energies:
1. wind energy
2. photovoltaic/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 2003 to July 2005, the increases in generating capacity for the UCTE are mainly related to conventional thermal power plants (+14.4 GW) and renewable energy power plants (+ 10.9 GW, i.e. approximately +50 % between January 2003 and July 2005).
In fact, with regard to new power plants commissioning, the most significant trends concern renewable energy (promoted by regulatory mechanisms in several countries) and conventional power plants (essentially combined cycle power plants). Among renewable energies, wind power plants represent the most important part.

Significant developments can be noticed in several countries:

- in **Spain**, 9300 MW new thermal power plants will be commissioned from 2003 to 2005 (1 GW will be shut down between 2004 and 2005); more than 1 GW per year of renewable energy sources (1 GW per year of new wind power plants) will be connected to the system over the same period;
- in **Greece,** it is expected that the newly commissioned generating capacity will amount to 540MW in 2003, 1500 MW in 2004 and 640 MW in 2005; the newly installed generating capacity will essentially include thermal power plants, but hydro and renewable energy will also be significant. This forecast is based on the terms and deadlines determined by the Electricity Generation Licences issued for every new power plan installation. Nevertheless, the date of commercial operation for some of these new power plants is uncertain due to possible delays in their construction;
- In **Portugal**, more than 400 MW of new hydro power plants will be commissioned over the period taken into account; over the same period, 950 MW of new thermal power plants will be connected to the grid and 200 MW shut down in 2003; as far as renewable sources are concerned, 80 MW wind power per year will be added;
- In **Italy**, an increase of 820 MW, 1740 MW and 1870 MW in thermal generating capacity is expected for 2003, 2004 and 2005, respectively; the newly commissioned renewable energy sources (essentially wind power) will represent an additional generating capacity of 960 MW for 2004 and 910 MW for 2005;
- In **Germany**, during the period from 2003 to 2005, the installed generating capacity will increase by approx. 8 GW in wind power stations, and by approx. 1 GW in hydro power stations due to the commissioning of a pumped-storage plant; also it will be reduced by approx. 0.6 GW (shutdown) in nuclear power stations.
- 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.
- As far as nuclear power is concerned, the main development will be the commissioning of the Temelin 2 nuclear power unit (920 MW) in May 2003 in the **Czech Republic**.

As far as changes in generating capacity are concerned, for the period from January 2003 to July 2004, figures of the new forecast, when excluding the generating capacity for Bosnia and Herzegovina (+ 3.8 GW constant over the period), are lower than (except for July 2003, approximately 1 GW higher) in the last year's forecast. Italy follows the general trend with expected values significantly lower than in last year's forecast. As far as France is concerned, lower values are due to the change in representativity of the figures, including for this year's forecast only generating capacity directly connected to the transmission grid.

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..
In UCTE, the non-usable capacity accounts for approximately 15 % of generating capacity in winter and 17 % of generating capacity in summer. 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 concern Slovakia, countries like Austria, Switzerland, JIEL, Spain (where hydro is a relevant part of generating capacity) and France (especially for July because of limitations in combined heat/power plants and hydroelectric constraints in summer).
Non-usable capacity for the whole UCTE shows an increase over the period covered by the forecasts (+5.9 GW in winter and in summer).

Table 4 | **Non-usable capacity on the 3rd Wednesday** | **Results in GW**

	2003		**2004**		**2005**	
	January	**July**	**January**	**July**	**January**	**July**
Country	GW	GW	GW	GW	GW	GW
B	0.5	0.9	0.5	0.9	0.6	1.0
D	16.7	17.9	19.0	20.0	20.4	21.1
E	10.2	13.6	10.4	13.9	10.6	14.3
F	14.9	20.4	15.2	20.8	15.3	21.4
GR	2.0	1.2	2.0	1.5	2.0	1.7
I	12.8	12.3	12.7	12.5	13.3	13.0
SLO	0.1	0.2	0.1	0.2	0.1	0.2
HR	0.0	0.0	0.0	0.0	0.0	0.0
JIEL	1.0	2.0	1.0	2.0	1.0	2.0
BiH	0.7	0.8	0.7	0.9	0.6	0.7
L	0.1	0.1	0.1	0.1	0.1	0.1
NL	0.8	1.4	0.8	1.4	0.8	1.4
A	2.8	2.0	2.9	2.0	2.9	2.0
P	0.6	1.6	0.7	1.7	0.8	1.8
CH	4.1	2.5	4.2	2.5	4.3	2.5
CZ	1.8	2.3	1.8	1.8	1.8	1.8
H	0.7	1.1	1.1	1.3	1.1	1.3
PL	3.6	5.2	3.8	5.3	3.6	4.9
SK	1.4	1.8	1.4	1.9	1.4	1.9
UCTE	**74.8**	**87.2**	**78.4**	**90.5**	**80.7**	**93.1**

The major contribution to this growth comes from countries in which the new commissioning of renewable energy, particularly wind power, and co-generation is most significant.

On average, 75 % of installed wind power capacity (e.g. 85-90 % in Germany, 70 % for Austria, 100 % in France, 50 % in Luxembourg, 75 % in the Netherlands, 75 % in Portugal, 75 % in Spain, 75 % for Italy, 60-75 % for Poland) 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.

With regard to forecasts carried out in 2001 for 2003 and 2004, table 2 shows values 2-6 % (depending on the observed month) lower than values in last’s year report.

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 4.5 %. With regard to expected outages, the data are essentially based on estimations from past statistical values.

Both for outages and overhauls, the new expected values are comparable to the values of the forecast carried out last year for 2002 and 2003, except for outages in summer, which are 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.

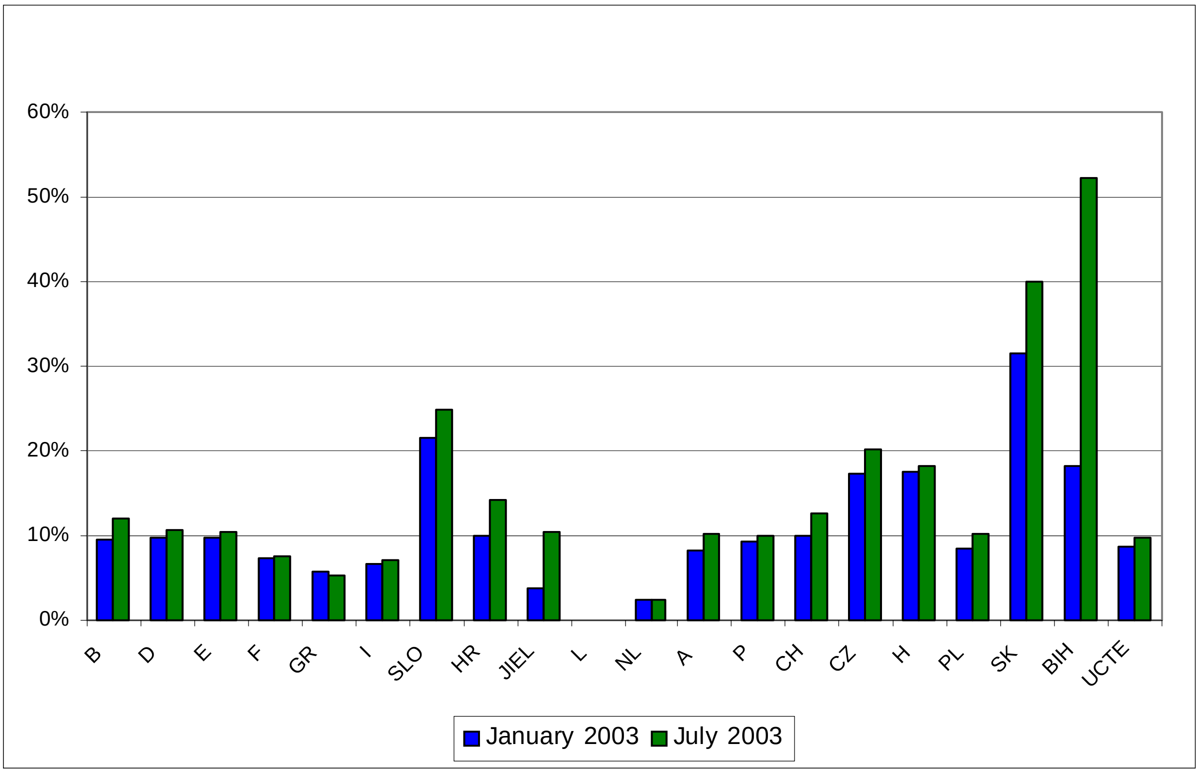
However, the reserve for system services does not include reserves for long-term outages, which are to be covered by power plant operators.

Table 5 Reserve for system services on the 3rd Wednesday Results in GW

	2003		2004		2005	
	January	July	January	July	January	July
Country	GW	GW	GW	GW	GW	GW
B	1.2	1.2	1.2	1.2	1.2	1.2
D	7.2	7.1	7.2	7.1	7.3	7.1
E	3.3	3.3	3.5	3.5	3.9	3.9
F	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
I	3.4	3.6	3.6	3.8	3.7	3.9
SLO	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
JIEL	0.3	0.5	0.3	0.5	0.3	0.5
BiH	0.3	0.6	0.4	0.6	0.4	0.6
L	0.0	0.0	0.0	0.0	0.0	0.0
NL	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
P	0.7	0.7	0.8	0.8	0.8	0.8
CH	0.9	0.9	0.9	0.9	0.9	0.9
CZ	1.5	1.4	1.5	1.4	1.5	1.4
H	0.9	0.8	0.8	0.7	0.2	0.7
PL	1.8	1.6	1.8	1.6	1.8	1.6
SK	1.3	1.3	1.1	1.1	1.1	1.1
UCTE	**30.1**	**29.3**	**30.4**	**29.5**	**30.4**	**30.1**

The reserve capacity for system services is approximately 30 GW for the period observed. This accounts for approximately 8.8 % and 9.7 % of the UCTE load, in winter and in summer respectively. Countryspecific data are shown in Figure A/1 for January and July 2003.

Figure A / 1 System services reserve versus load



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, Slovakia and Hungary: 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 7 % and 9 % of the load. With regard to forecasts carried out in 2001, a low increase (+2-4 %) of the expected total reserve values for system services can be noticed, for 2003 and 2004.

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 privatelaw 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.
- With regard to Austria, as far as the seconds reserve is concerned, values in Table 5 are valid for the control area APG; for the control area TIWAG the current value is 70 MW.

- 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.

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.
The guaranteed capacity within the UCTE shows an increase of 16.6 GW from January 2003 to January 2005. This value can be compared with the increase in the national generating capacity over the same period (+23.6 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 2003 and 2004 show a decrease of 3 GW and 4.6 GW, respectively, compared to the forecasts carried out last year. Concerning July, the decrease is 6.7 GW for 2003 and 4.8 GW for 2004. New figures include data for Bosnia and Herzegovina (+2.1 GW and +2.2 in January 2003 and 2004 respectively, +1.4 GW and +1.6 GW in July 2003 and July 2004 respectively).

Table 6 Guaranteed capacity on the 3rd Wednesday Results in GW

Country	2003 January GW	2003 July GW	2004 January GW	2004 July GW	2005 January GW	2005 July GW
B	12.9	11.5	13.0	11.6	13.4	12.0
D	79.3	70.1	79.7	70.5	79.8	69.8
E	39.9	37.5	42.3	40.3	45.8	44.0
F	83.1	67.3	83.0	70.5	82.6	66.7
GR	7.0	8.4	7.4	9.6	9.1	9.9
I	52.3	52.5	52.8	53.3	54.5	55.3
SLO	2.2	1.8	2.2	1.9	2.3	1.9
HR	3.4	3.1	3.4	3.1	3.4	3.1
JIEL	8.3	6.1	8.3	6.1	8.3	6.1
BiH	2.1	1.4	2.2	1.6	2.3	1.6
L	1.5	1.5	1.5	1.5	1.5	1.5
NL	17.1	16.5	17.2	16.6	18.2	17.6
A	12.4	10.7	12.3	10.8	12.5	11.0
P	8.2	7.0	8.7	8.0	9.3	8.1
CH	13.1	14.3	13.1	14.4	13.0	14.4
CZ	10.5	9.0	12.3	9.2	12.3	9.2
H	6.0	4.7	5.8	4.5	6.6	4.7
PL	27.9	21.7	27.6	21.7	28.7	22.8
SK	5.1	3.4	5.4	3.8	5.4	4.2
UCTE	**392.4**	**348.6**	**398.2**	**359.1**	**409.0**	**364.0**

Load

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

Table 7 Load at 11:00 a.m. on the 3rd Wednesday Results in GW

Country	2003 January GW	2003 July GW	2004 January GW	2004 July GW	2005 January GW	2005 July GW	Variation 2003/2005 January %
B	12.3	9.7	12.5	9.9	12.8	10.1	4.0
D	73.4	66.5	74.1	66.9	74.6	67.8	1.6
E	33.4	31.4	34.0	32.0	34.5	32.4	3.3
F	71.1	56.2	72.0	57.0	72.8	57.7	2.4
GR	7.5	8.9	7.8	9.4	8.3	9.9	11.1
I	51.2	51.0	52.6	52.3	54.0	53.8	5.5
SLO	1.8	1.5	1.9	1.5	1.9	1.6	9.7
HR	3.0	2.1	3.1	2.2	3.2	2.3	6.7
JIEL	7.8	4.8	7.9	4.9	8.0	5.0	2.6
BiH	1.7	1.2	1.7	1.2	1.8	1.3	6.1
L	0.8	0.8	0.8	0.8	0.8	0.8	2.0
NL	16.4	15.7	16.9	16.2	17.4	16.7	6.1
A	8.4	6.9	8.6	7.0	8.8	7.2	4.8
P	7.0	6.0	7.3	6.9	7.6	7.2	8.2
CH	9.1	7.1	9.2	7.2	9.3	7.3	2.2
CZ	8.8	6.9	9.0	7.0	9.1	7.1	3.1
H	5.1	4.4	5.1	4.4	5.3	4.4	3.9
PL	20.8	15.3	21.2	15.6	21.5	15.6	3.4
SK	4.1	3.2	4.2	3.1	4.3	3.1	4.3
UCTE	**343.6**	**300.1**	**349.9**	**305.4**	**355.9**	**311.1**	**3.6**

The load in the UCTE countries shows an increase of 12.3 GW between January 2003 and January 2005, as well as an increase of 11 GW between July 2003 and July 2005. This represents, in winter, a growth of 1.8 % from 2003 to 2004 and of 1.7 % from 2004 to 2005. In summer, the increase is approximately 1.8 % from July 2003 to July 2004, and 1.9 % from July 2004 to July 2005. When including data for Bosnia and Herzegovina, these values show a decrease compared to forecasts carried out last year: the expected load values decrease from 344.7 GW to 343.2 GW for the January 2003 forecast, and from 300.8 GW to 300.1 GW for the July 2003 forecast.

The global trend hides differences between countries (e.g. there is significant growth in the forecast for 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, 4-5 GW in Spain, approximately 2-3 GW in France and Poland. This factor must be taken into account when analysing the results for the capacity available in each country.

Remaining capacity

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

As specified in chapter 3, several countries consider that power plant operators should maintain an additional reserve of approximately 5 % of the national generating capacity. This “security margin” – “5 % margin” - is in general met in the UCTE countries over the period from 2003 to 2005. The system security seems not to be degraded over the three next years. A surplus, after the deduction of this additional reserve capacity for power plant operators, represents a potential capacity for export. Long-term export contracts must be deducted from the surplus of available capacity in order to determine the capacity which is really available to power plant operators and electricity traders. Conversely, in case of long-term import contracts, power plant operators and traders dispose of a larger surplus of available capacity.

However, market conditions can change this approach. Remaining capacity will be increasing for the UCTE as a whole system in July 2004, then stable over the period until July 2005. It accounts for approximately 14-15 % and 16-18 % of the reference load for January and July, respectively, over the pe-riod from 2003 to 2005.

Table 8 **Remaining capacity on the 3rd Wednesday** **Results in GW**

	2003		**2004**		**2005**	
Country	January GW	July GW	January GW	July GW	January GW	July GW
B	0.6	1.8	0.5	1.7	0.7	1.9
D	5.9	3.6	5.6	3.6	5.2	2.0
E	6.5	6.1	8.3	8.4	11.3	11.6
F	12.0	11.1	11.0	13.5	9.8	9.0
GR	-0.4	-0.5	-0.5	0.2	0.8	0.1
I	1.1	1.5	0.2	1.0	0.5	1.5
SLO	0.5	0.4	0.4	0.4	0.4	0.4
HR	0.4	1.0	0.3	0.9	0.2	0.8
JIEL	0.5	1.3	0.4	1.2	0.3	1.1
BiH	0.5	0.2	0.5	0.4	0.5	0.4
L	0.8	0.8	0.8	0.8	0.8	0.8
NL	0.7	0.8	0.3	0.4	0.8	0.9
A	4.0	3.8	3.7	3.8	3.7	3.8
P	1.1	0.4	1.4	1.2	1.7	0.9
CH	4.0	7.2	3.9	7.2	3.7	7.1
CZ	1.7	2.2	3.3	2.2	3.2	2.1
H	0.9	0.3	0.7	0.1	1.3	0.3
PL	7.1	6.4	6.4	6.1	7.2	7.2
SK	1.0	0.2	1.2	0.7	1.1	1.1
UCTE	**48.9**	**48.6**	**48.4**	**53.8**	**53.2**	**53.0**

Figures for CENTREL countries as a whole are different, however: in these countries remaining capacity represents 28-32 % of the load (see geographical representation, Figures 1A, 1B and 1C hereafter).
For the whole UCTE system (including CENTREL), remaining capacity also represents 9-10 % of the total generating capacity (16-19 % and 13-16 % in CENTREL in January and July, respectively).

Percentages for each country in 2003 are shown in Figures A/2 and A/3 here below.

Figure A / 2 **Remaining capacity / Load** **Results in GW**

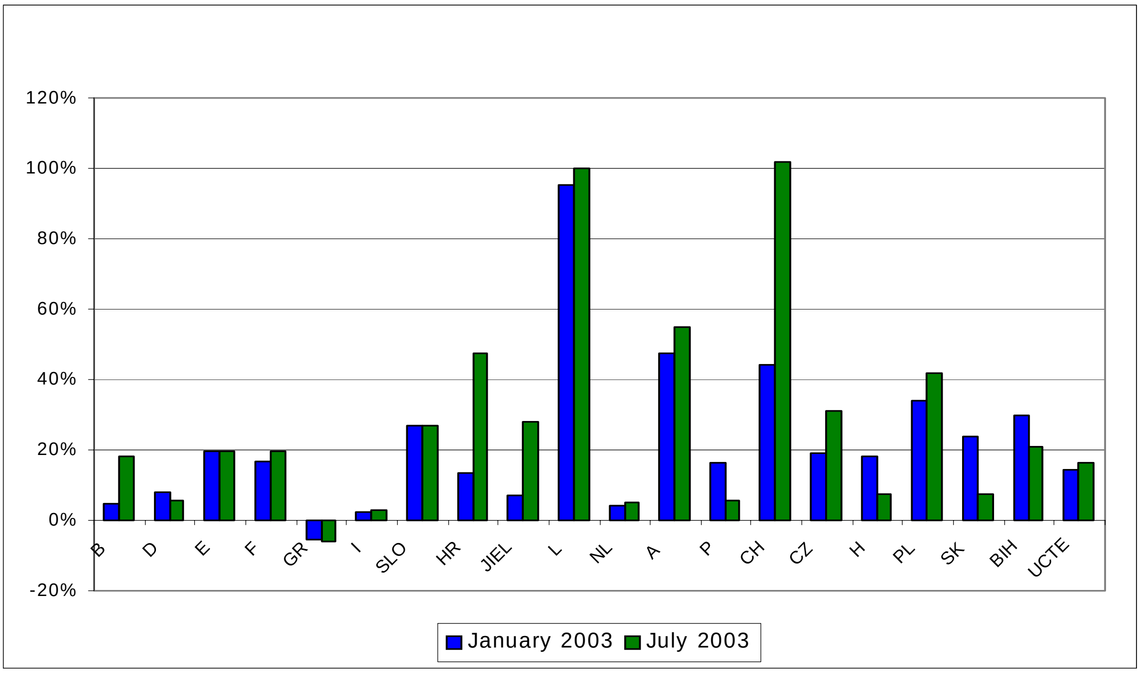
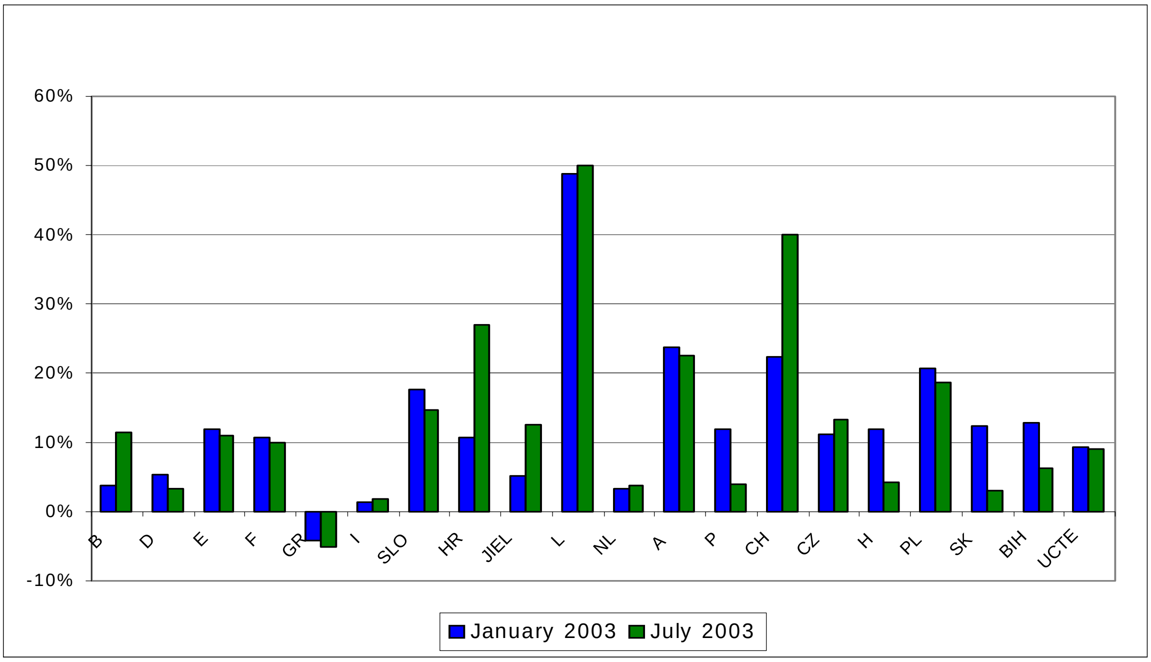


Figure A / 3 **Remaining capacity / National generating capacity**



Figures A/6 and A/7 show the remaining capacity compared to the sum of 5% of the generating capacity and the margin against peak load, for January and July 2003 respectively.

Figure A / 6 Remaining capacity vs. 5% of generating capacity and margin

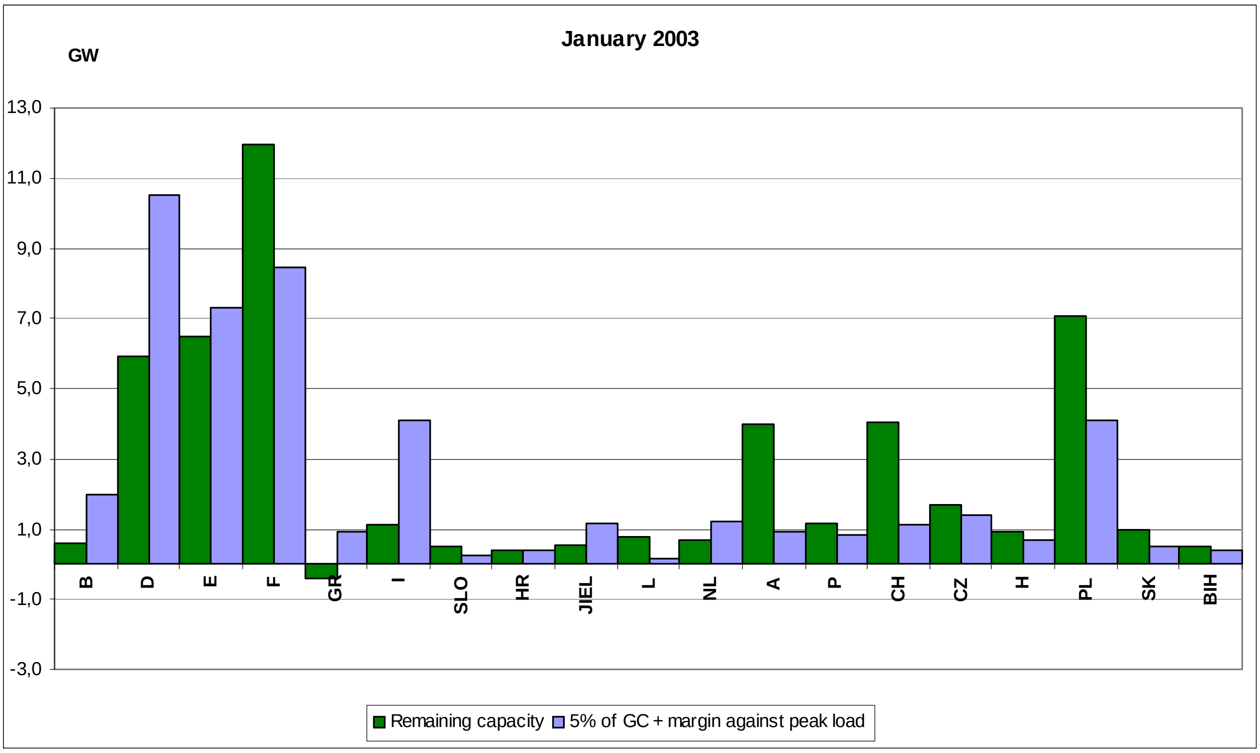
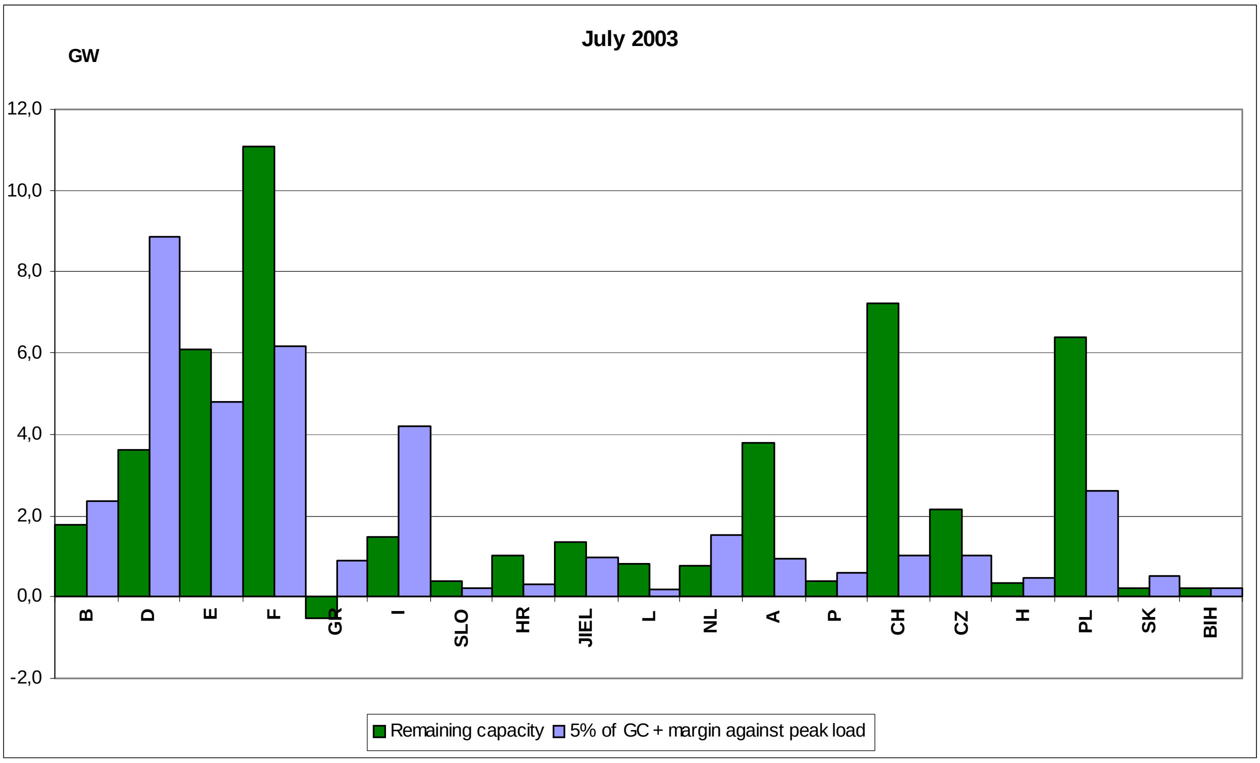


Figure A / 7 Remaining capacity vs. 5% of generating capacity and margin



Usually, remaining capacity represents more than 5 % of the national generating capacity, except for Belgium (in winter), Germany (in summer), Greece (with negative values), for Italy, JIEL from January 2004 on in winter, for the Netherlands and for Hungary in summer.

Several countries present particular situations:

- In **Germany**, in this year's forecast for 2003-2005, values vary between 6 and 3 %; 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 8-12 % of the national generating capacity.

- 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.

- **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.

With regard to forecasts carried out in 2001, a general decrease in the expected values of remaining capacity for 2003 and 2004 can be noticed, except for July 2004.

Geographical blocks

It is interesting to look at the situations for different geographical blocks represented in Figures 1A, 1B and 1C for 2003, 2004 and 2005, respectively.

- **The main UCTE block**: the remaining capacity of the main UCTE block will be decreasing from 2003 to 2004 and be stable from 2004 on. It is expected to represent 9.7 %, 8.8 % and 8.4 % of the generating capacity in January 2003, 2004 and 2005 respectively. The "5% margin" will be met in this block, except for Germany (in summer), the Netherlands and Belgium (in winter). However, these countries consider that system security will not be at risk thanks to the use of interconnection capacity, new generating capacity and long term import contracts and participation contracts in power plants located outside the national territory.

- **Spain + Portugal**: it clearly appears that the situation for the Iberian block will be improving over the period from 2003 to 2005, from the remaining capacity point of view. The expected remaining capacity will represent 11.9 %, 14.3 % and 18 % of the national generating capacity for 2003, 2004 and 2005 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 and hydro power plants. When comparing the remaining capacity to the capacity that the system needs to cover the "margin against monthly peak load" plus 5 % of the generating capacity, it should be noticed that remaining capacity is lower than this sum (7.6 GW remaining capacity vs. 8.2 GW) for January 2003 (essentially due to the significant difference between the reference load and the peak load in Spain) and higher for July 2003 (6.5 GW remaining capacity vs. 5.4 GW). Moreover, in terms of variation, the increase in generating capacity (+8.4 GW) can also be compared to the increase in guaranteed capacity (+7.0 GW): an availability ratio of 83 % (7/8.4=0.83) can be noticed, higher than the present availability ratio between generating capacity and guaranteed capacity (75 %). This is partly due to the type of the new generating capacity which will be commissioned.

- **Italy**: when considering the remaining capacity as a percentage of the generating capacity (with respect to the “5 % margin”), the Italian peninsula will evolve from a critical situation in 2003 to a more critical one in 2004-2005. The foreseen remaining capacity will amount to 1.4 %, 0.3 % and 0.6 % in January 2003, 2004 and 2005, respectively. When comparing the remaining capacity to the capacity that the system needs to cover the “margin against monthly peak load” plus 5 % of the generating capacity, it should be noticed that remaining capacity is significantly lower than this sum. The Italian TSO considers as necessary the amount of power plant operator reserve, when including the remaining capacity and the reserves for system services, equal to 5 % of the load and expects that in the future this reserve will be higher and the percentage will reach approximately the 7-8 %. Moreover, the expected importable capacity (6 GW) will supply a surplus of available capacity, useful to improve the security of supply.

- **JIEL + Greece**: the increase in the generating capacity for this block seems to be inadequate to match the load growth. In January 2004 the remaining capacity is equal to zero. From July 2004 on, an improvement of this situation is expected when the “5% margin” will be nearly reached.
  There will be no evolution in the JIEL generating capacity while the load will increase. In Greece, peak load will be covered by hydro production (considered as usable on short term) and by imported energy, especially in case of delays in the construction of the new power plants. Interconnections will play a key role for ensuring the security of supply. The resynchronisation of this zone will also improve the capacity for imports. So, the use of interconnection capacity (see Figure 1A), will probably relieve this system and its security will not be compromised.

- **Centrel block**: without extraordinary changes in both the generating capacity and the load, the Centrel block will reach easily the “5 % margin” with a remaining capacity growing from 16.3 % to 18.9 % of the generating capacity over the period under investigation.

Power data associated countries on the 3rd Wednesday **Net values in GW**

Romania	**2003**		**2004**		**2005**	
	January	**July**	**January**	**July**	**January**	**July**
National generating capacity (6 = 1+2+3+4+5)	15.8	15.8	15.4	15.4	15.1	15.1
Guaranteed capacity (11 = 6-(7+8+9+10)	10.3	10.6	10.2	10.5	9.9	10.1
Load	7.4	6.4	7.4	6.7	7.6	6.8
Remaining capacity (14 = 11-12)	2.9	4.1	2.9	3.8	2.2	3.3
Importable capacity	1.3	2.0	2.4	2.5	2.4	2.5
Exportable capacity	1.3	1.6	2.3	2.4	2.3	2.4

Bulgaria	**2003**		**2004**		**2005**	
	January	**July**	**January**	**July**	**January**	**July**
National generating capacity (6 = 1+2+3+4+5)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Guaranteed capacity (11 = 6-(7+8+9+10)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Load	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Remaining capacity (14 = 11-12)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Importable capacity	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Exportable capacity	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Burshtyn Island	**2003**		**2004**		**2005**	
	January	**July**	**January**	**July**	**January**	**July**
National generating capacity (6 = 1+2+3+4+5)	2.6	2.6	2.6	2.6	2.6	2.6
Guaranteed capacity (11 = 6-(7+8+9+10)	1.4	1.1	1.4	1.1	1.5	1.1
Load	0.9	0.6	0.9	0.6	0.9	0.6
Remaining capacity (14 = 11-12)	0.5	0.5	0.5	0.5	0.6	0.5
Importable capacity	1.3	2.0	2.4	2.5	2.4	2.5
Exportable capacity	1.3	1.6	2.3	2.4	2.3	2.4

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.

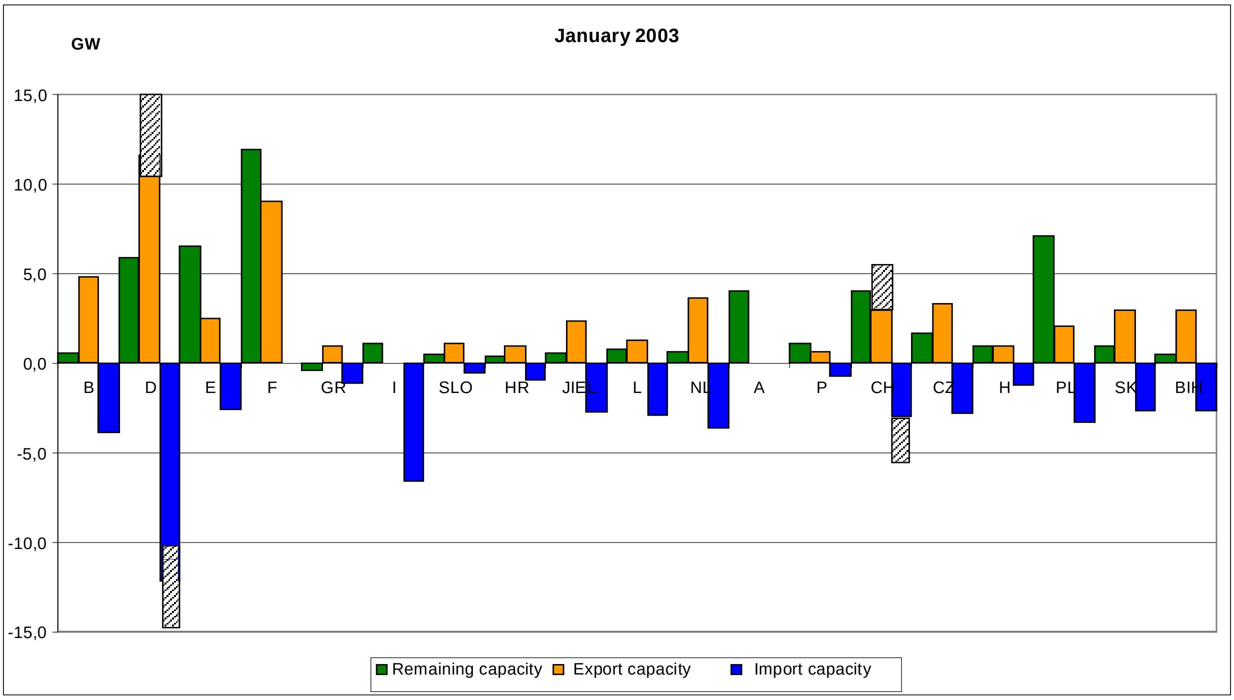
Country	Deterministic or probalistic	Mandatory standards on generation adequacy
B	Probalistic, (LOLE, 16 hours/year)	No mandatory standards
D	Deterministic for primary control power; Probalistic approach used by the TSOs	"Grid Code" requirements
E	Deterministic	"Operation procedures" requirements
F	Probalistic, (10% of probability of lossof load within one year, fairly consistent with a LOLE of 4/year)	Mandatory standard not re-defined since TSO's creation
GR	Deterministic for te short term, probalistic for the long term	Operation code, Power Exchange Code and the "Authorisations Regulation for Generation and Supply" requirements
I	Probalistic	
SLO	Deterministic	"System Operating Instructions for The Electricity Transmission Network" requirements
HR	Probalistic, LOLE	No mandatory standards
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	None	No mandatory standards
CZ	None	No mandatory standards
H		
PL	Deterministic	"Polish Grid Code" requirements
SK	Deterministic	No mandatory standards
RO	Deterministic for short term ("largest unit"), probalistic for medium and long term (LOLE and LOLP)	"Grid Technical Code" requirements

Transportable Capacity

Because of the fact that the UCTE Power Balance forecasts have been established without taking exchanges into account, the remaining capacity will be useful as an 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 A/4 and A/5 show a comparison of the remaining capacity in various countries in January and July 2003 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 and Poland. 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 abroad electricity sources.

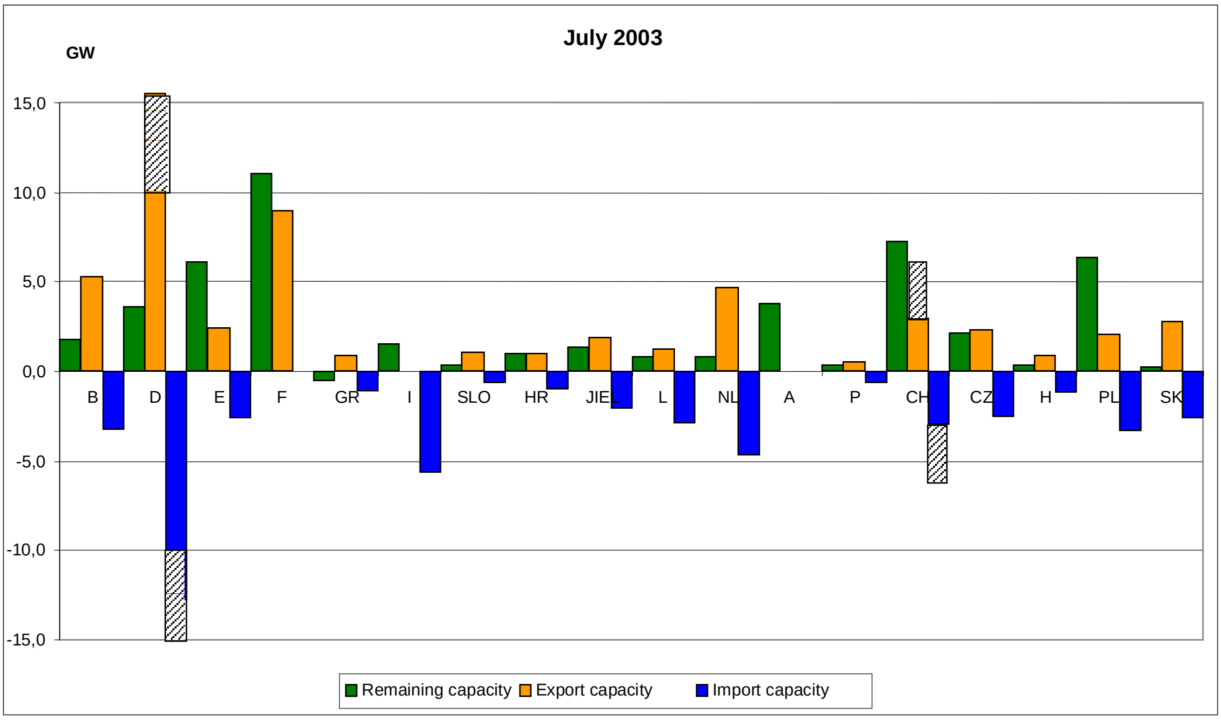
Figures 1A, 1B and 1C summarise the results of the power balance forecasts in different regions of the UCTE synchronous area for the 3rd Wednesdays in January, 2003, 2004 and 2005, respectively.

Figure A / 4 **Net Transfer capacity, January 2003**



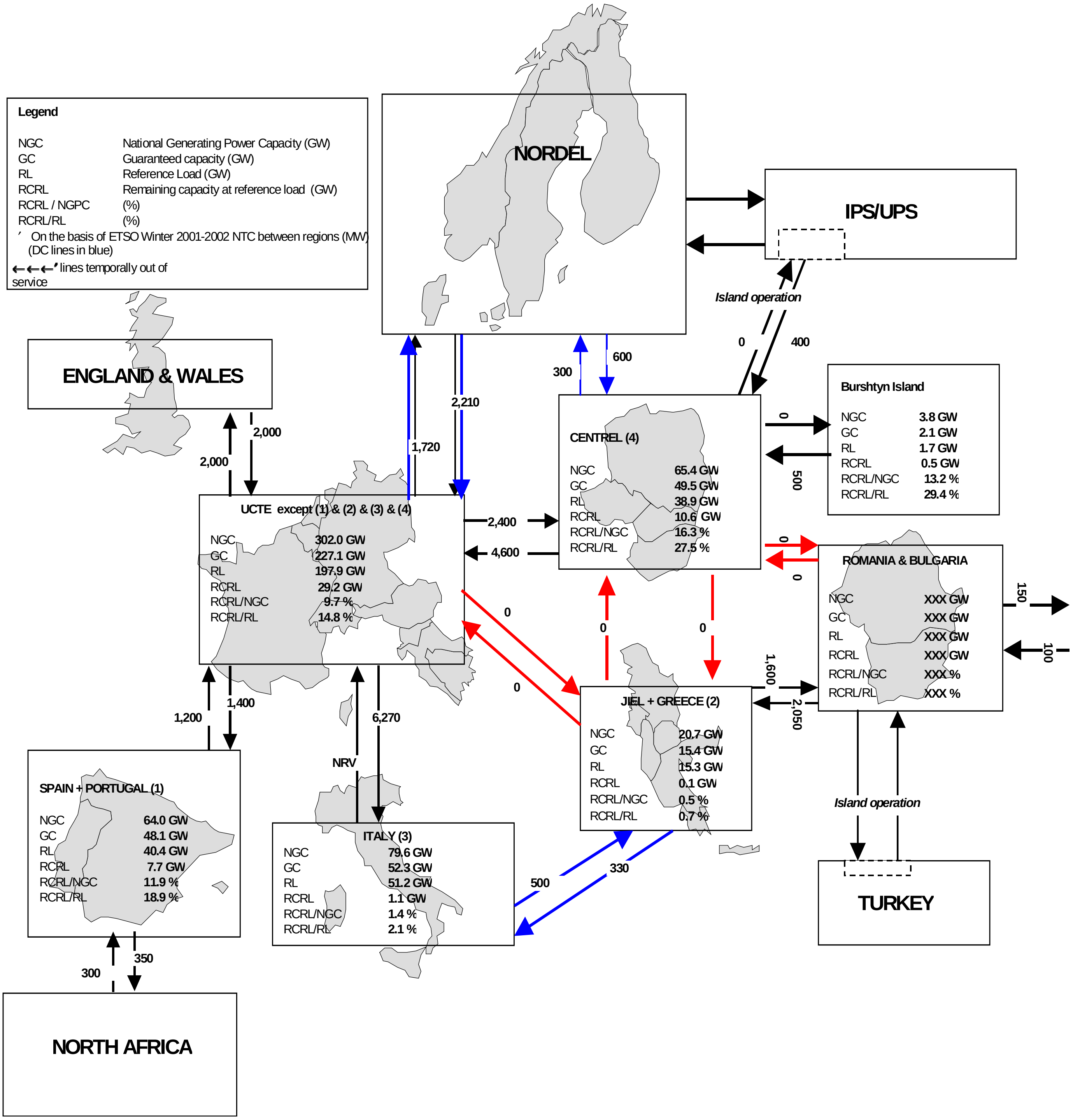
CH: Importable and exportable capacity fall within a range of +3GW to +6GW; these are indicative values
D: The estimated importable and exportable capacity for Germany varies between 10 and 15 GW

Figure A / 5 **Net Transfer capacity, July 2003**



CH: Importable and exportable capacity fall within a range of +3GW to +6GW; these are indicative values
D: The estimated importable and exportable capacity for Germany varies between 10 and 15 GW

Figure 1A[2] **Data for January 2003**



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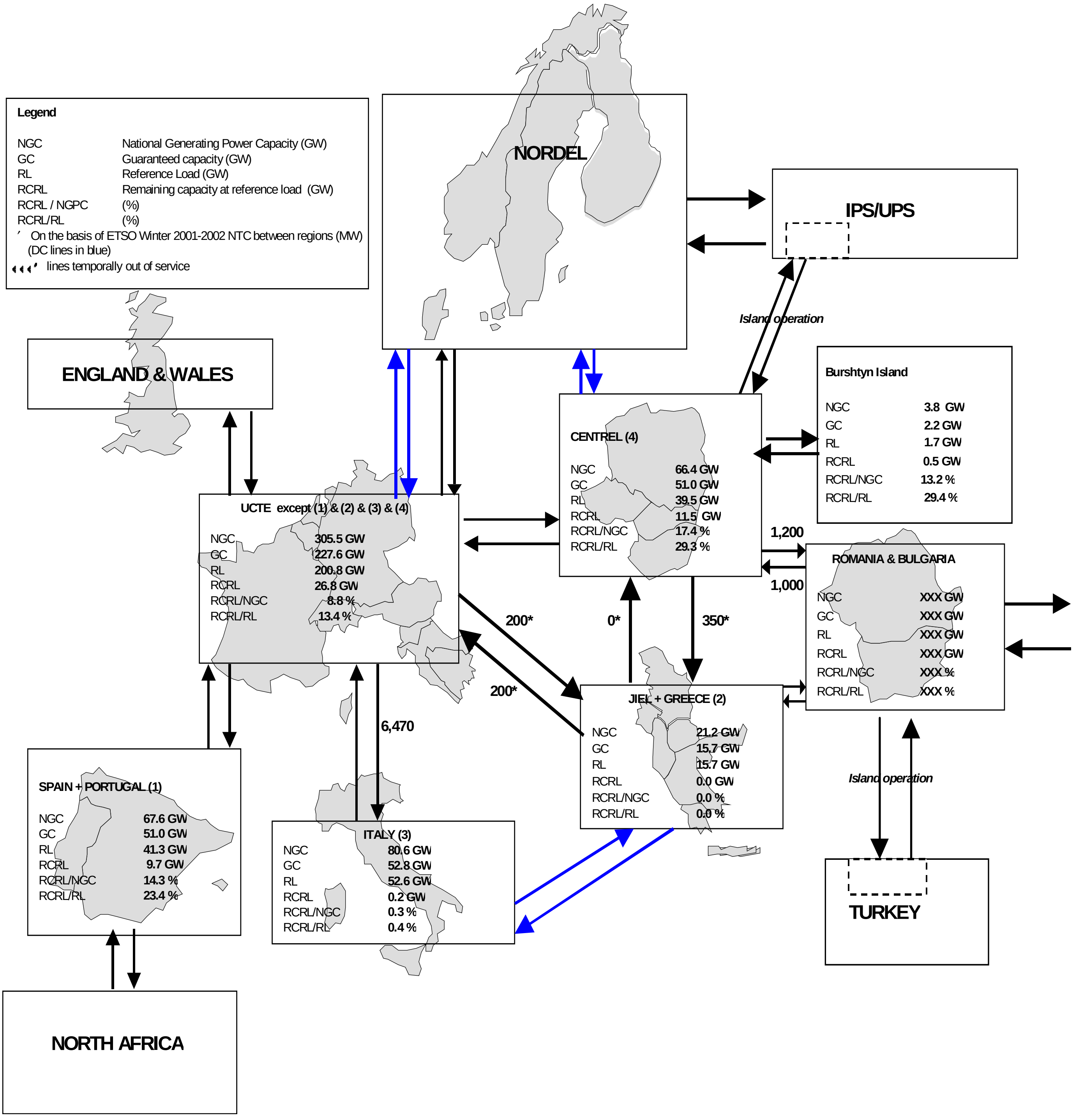
[2] Remarks:
- The resynchronisation of UCTE zone II (JIEL and Greece) has been not considered while preparing this figure.
- The Burshtyn Island is operated synchronously with the UCTE since July 1st, 2002

Figure 1B[3] Data for January 2004



Only changes in transportable capacity through interconnections are indicated

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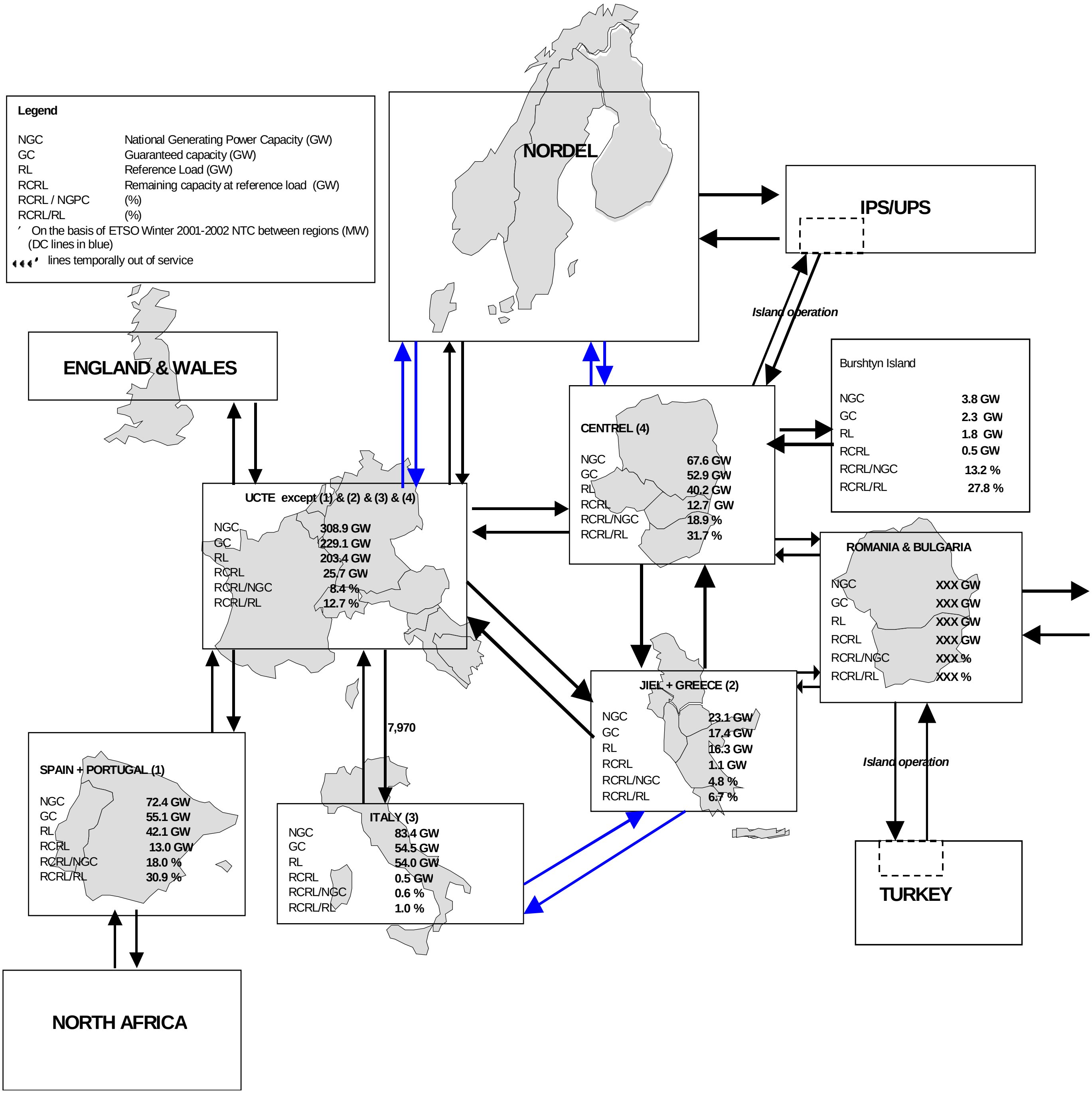
[3] Remarks:
- Minimum values to be refined by calculation on the interconnected system
- The Burshtyn Island is operated synchronously with the UCTE since July 1st, 2002

Figure 1C[4] Data for January 2005



Only changes in transportable capacity through interconnections are indicated

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[4] Remark:

- The Burshtyn Island is operated synchronously with the UCTE since July 1st, 2002

5. Transmission System Adequacy

The table in Appendix A shows the details on grid developments in the UCTE countries. Supplementary transmission system adequacy information is also reported in Appendix A. Generally speaking, the expected development in the different grids (new lines, new substations, new equipment like phase shift transformer) in the UCTE countries shall reduce or prevent existing or foreseeable congestions on the interconnections; that, by reducing internal constraints and/ or by facilitating the energy flows. The internal energy market should take advantage of these developments.

Note on Bosnia and Herzegovina transmission system
As far as Bosnia and Herzegovina is concerned, the following has to be taken into consideration: the transmission system adequacy situation will dramatically change after reconnection of the two UCTE zones (by the end of 2003). After reconstruction of HV lines through BiH (400KV lines Konjsko(Croatia) – Mostar – Gacko – Podgorica (Montenegro) and Mostar – Sarajevo – Tuzla – Ugljevik – Ernestinovo (Croatia) – Mladost (Serbia) and other 220KV HV lines), NTC values for Bosnia will be significant for Southeaster Europe. For the time being BiH has only three 220KV power lines as connection to the main UCTE zone (all three with Croatia: Tuzlla – Djakovo, Mostar – Zakucac and Mostar – Konjsko) with maximal capacity around 900MW, but due to congestion in Croatia, the real capacity is around 700MW. With the second UCTE zone BiH has three 220KV power lines(Trebinje – Perucica, Visegrad – Pozega and Lukavica – Piva) and one 400KV line (Trebinje – Podgorica) with theoretically large capacity but, because of congestion, for the BiH region connected to the second UCTE zone, the real capacity is small.

The following table shows the clearly identified main developments on interconnections over the period from 2003 to 2005:

Line or equipment	Voltage level	Date of commissioning	Cross-boarder
Uchtelfangen - Vigy line: rebuilding	400 kV	End of 2002	D - F
Cartelle - Lindoso (2nd circuit) line	400kV	2003	E - P
Estrecho - Fardioua (2nd circuit) line	400 kV	2004	E - MA
Balboa - Alqueva line	400 kV	2004	E - P
Phase shifting transformer in La Praz	400 kV	mid-2002	F - I
Capacity optimisation: lines Cantegrit - Argia - Hernani	400 kV	2002	F - E
Florina - Bitola 150 kV line upgrading	400 kV	2003	GR - FYROM
Phase shifters in Meeden	380 kV	2002/2003	NL - D
Meiningen - Montlingen Sarelli line	220 kV	2003	A - CH
Phase shifter transformer in Nosovice	400 kV	2004	PL - CZ
OHL Isaccea - Dobroudja line	400 kV	June 2003	RO - BG
OHL Isaccea - Vulkanesti line	400 kV	June 2003	RO - MD

6. Supplementary 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, enacted two 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 in 2004. 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 values by adding up the individual values of the TSOs. In order to obtain a realistic representation of renewable energies, the German data on the UCTE System Adequacy Forecast 2003-2005 comprise estimated and forecast values of TSOs for plants (especially renewable) also less than 1 MW, which were largely not included in the German power balance data dating back more than 2 years. This means that the general coherence of data about the generating capacity and peak load with official statistics does not longer exist, as plants less than 1 MW were not (or only insufficiently) taken into consideration by these statistics. This should be noted when making comparisons with former power balances.

- **France**: A national debate will be held in the course of 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%.

- **Slovak Republic**: On January 21st, 2002 the company ´Slovenske elektrarne´ was split into three companies: ´Slovenske elektrarne´ as the major producer of electricity, ´Slovenska elektrizacna prenosova sustava´ as TSO and ´Teplaren Kosice´ - the heating plant in Kosice.

- **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 Euro pean 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**: the Associations' Agreement II +, adopted on 13 December 2001, refines the successful concept of the Associations' Agreement II of 13 December 1999. Both Agreements determine the rules for calculating use-of-system charges as well as system access conditions for electricity network operators and users. The following associations were involved: ARE (Federation of regional energy utilities), VDEW (Association of the electricity industry), VDN (Association of system operators), VKU (Association of municipal utilities), as well as BDI (Federal Association of the German industry) and VIK (Association of the industrial energy and power industry). Both Agreements are based on the point model used for pricing, i. e. the use-of-system charge of each customer depends on his voltage level, his load profile (or the peak-load utilisation period) or his system operator, but not on his supplier; within Germany, everyelectricity customer is free to choose his supplier without his use-of-system charges being influenced by the origin

of the electrical energy. The charge includes the following system services: frequency control, voltage control, network restoration after major disturbances, and system management. The Associations' Agreement II + maintains the balancing group model of the Associations' Agreement II. Accordingly, all power plant in-feeds, customer withdrawals, imports and exports of a supplier or trader are netted out in each of the four large German control areas; schedules need not be registered for feed-in and extraction but only for imports and exports with other balancing groups.
The Associations' Agreement II + comprises essential refinements, such as:

  - Improved price transparency and comparability through formation of 18 structural categories which will be published by VDN in summer 2002, classified according to population or load density, cable rate and old/new Federal Länder;
  - A new guide for the calculation of use-of-system charges that was renegotiated between the parties to the Associations' Agreement in April 2002;
  - New rules on information unbundling concerning the use of information of system operators in vertically integrated companies;
  - Pricing guides for atypical loads which cannot be represented through standard pricing (utilisation period);
  - Easier conditions for domestic customers' change of supplier which had been strongly advocated by consumer associations participating in the Associations' Agreement II + negotiations, concerning in particular the charges to be paid for the switch and the contractual handling of changes;
  - Intra-day trading: As from April 2002, schedules between the balancing groups and with selected neighbouring countries can be adjusted three times a day within two large control areas to developments not yet foreseeable the day before, when schedules are normally registered.

- **Greece**: Almost one year after the formal initiation of the electricity market liberalisation in Greece, the Regulatory Authority "RAE" has proposed corrective actions and new market mechanisms in order to facilitate the opening of the market to actual competition. The existing Law (2773/99) is going to change. The new Law will take into account theproposal of RAE. The basic elements of this proposal are the following:
  - From 1/1/2004 all consumers (excluding those of the non-interconnected islands) will be eligible customers except those who purchase electrical energy exclusively for domestic use.
  - The proposed electricity market includes generators, suppliers, eligible and non-eligible customers, the HTSO and the DSO. Financial transactions and contracts are performed between generators and suppliers or customers directly, between suppliers and customers and between suppliers and generators on the one hand and the HTSO on the other. Organised transactions of electricity, contracts and other titles referring to the underlying electricity market are taking place in the Energy Exchange which is established as an extension of the existing Derivatives Stock Exchange.
  - The role of the HTSO is upgraded. The HTSO becomes the supplier of last resort.
  - Introduction of Capacity Availability Certificates (CACs). They are issued by generators and are tradable with a parallel obligation for suppliers to possess such certificates according to the sales of electricity, which they carry out.
  - The HTSO undertakes the obligation to purchase in advance a regulated percentage of such certificates corresponding to new generating units.
  - Introduction of an Organised Daily Electricity Market. The Organised Daily Electricity Market will concern supply and demand for each hour of the next day. Generators and importers will offer their electricity production to the daily market while suppliers and exporters will purchase electricity from the daily market. Trading in the daily market will result in a marginal price for every hour of the next day, which is paid by all suppliers who purchase energy from the market. The generators offering energy on the market are also remunerated by this marginal price.
  - Introduction of a Forward Electricity Market. It is expected that generators will enter into contracts of a financial nature with suppliers or customers to settle financially the eventual imbalances between the fixed electricity prices pursued by consumers and the fluctuating prices settled in the daily market. These contracts, which may also take the form of stock exchange derivatives, (options, futures etc) will be tradable in the Forward Electricity Market, which will also be developed as an extension of the Derivatives Stock Exchange. In the same context, t there will be trading of the CACs.

- **Portugal**: with the implementation of Iberian Power Market probably during 2003, the responsibility of the Portuguese TSO, REN, will become very different. However significant modifications in the Portuguese power balance are not expected.

- **Switzerland**: only an energy tax on non-renewable energy sources could have an impact on the energy consumption in Switzerland. The reduction of energy consumption would be minor. The liberalisation of the electricity market in 2003 should not have major influence. The citizens of Switzerland voted on 22 September 2002 on the referendum on the market opening law. The law has been rejected.

- **Czech Republic**: The "Intraday Market" with electricity will be opened in 2003.

- **Poland**: the Polish Parliament adopted the 2nd National Environmental Policy in August 2001. It incorporates the principles of the EU 5th and 6th Environmental Action Programmes. Poland has adopted the strategy for sustainable development: “Poland 2025 – Long-term Strategy for sustainable Development”.The Act on Environmental Impact Assessment and on Access to Information entered into force in January 2001. The Environmental Protection Law was adopted by the Parliament in April 2001 and entered into force in October 2001. In July 2001 the Minister of Environ ment issued a new ordinance on the air pollution by substances from technological processes and technical opera tions which replaced the ordinance from 1998. The new ordinance introduces new emission limits for combustion processes, which are in line with Council Directive 88/609/EEC. In course of accession negotiations with the EU Poland provisionally closed Chapter 14 “Energy” in July 2001, two months prior to the Chapter 22 “Environment”. PSE SA was granted by the associate membership in ETSO. The process of implementing of the competitive electricity market in Poland was largely advanced by launching the day-ahead hourly balancing mechanism on September 1st, 2001 as the most important step. Today, the electricity market consists of three segments: bilateral, power exchange and balancing one.

- **Romania**: at present, the Romanian power supply industry is being organised according to the provisions of Government Decision No. 627/2000 into a number of separate companies, owned directly by the state. They are co-ordinated by the Ministry of Industries and Resources and regulated by the Romanian Electricity and Heat Regulatory Authority (ANRE). The most important companies which emerged on the Romanian electricity market further to the restructuring process are:
    - TRANSELECTRICA - The national power grid company, acting as the Transmission System Operator (TSO) of the entire Romanian power system, also including electricity market management functions (through the Power Market Operator, OPCOM - a wholly owned subsidiary of Transelectrica) and interconnection management functions with the neighbouring power systems. TRANSELECTRICA SA is completely independent from other utilities in the sector, insuring a non-discriminatory operation of the system. According to its operation license, TRANSELECTRICA SA does not have the right to trade electricity, the only allowed transactions being the acquisition of electricity for system services. TERMOELECTRICA – A generating company owning and operating most of the Romanian thermal power plants. It has 20 branches. The branches were organised as cost and profit centres since October 2001.On the electricity market operate also 21 power station were separated from Termoelectrica, out of which 16 were transferred to the local public administration management and 5 were transformed in independent state owned companies, co-ordinated by the Ministry of Industry and Resources.
    - HIDROELECTRICA - A generating company which owns and operates almost all Romanian hydropower plants. It has 10 branches.
    - NUCLEARELECTRICA - A generating company owning and operating the Cernavoda nuclear power plants.
    - ELECTRICA – a distribution and supply company owning and operating the distribution network (110 kV and below). It has 8 subsidiary legal companies. According to the National Strategy for Energy Development the Government approved to start the privatisation of this subsidiary.

  The Romanian Government policy is focused on liberalization of the electricity market, particularly by promoting competition and market – based levies in generation and supply businesses. Romania has already made a significant progress in its transition towards a liberalized electricity sector and is in a strong position to achieve EU targets. The mid-run regulatory directions aim (by 2004) at supporting the privatisation of (thermal) generation and distribution/ supply businesses. The domestic primary legislation for the Romanian electricity industry is made up of Law No. 99/ 2000 (Energy Regulation), Government Emergency Ordinance (GEO) No. 63/1998 (Energy Act), and a number of Government Decisions (GD). 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 include:
    - 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, GEOs and GDs, with a view to setting out correct, transparent and market-driven relationships among market participants. Introduction of competition started by creating the wholesale electricity market and 10 % competitive retail market. Currently, the share of eligible consumers is 33% by February 2002. 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 SA is the administrator of the electricity market, trough its legal subsidiary - the market operator OPCOM.
The Romanian electricity market is based on:

- bilateral contracts;
- regulated contracts(67% of the market - 2002), the main players being generators, suppliers and captive customers;
- negotiated contracts (33% of the market-2002),representing the competitive segment and the first pillar of the market; the main players of the negotiated contracts are generators, suppliers and contestable customers;
- daily offer (a day ahead offer), according to which the market operator carries out the power system scheduling for the following day, daily payments, according to the specific procedures approved by ANRE, that regulated these payment which are in strict conformity the regulate contracts and the accepted offers.

The wholesale market consists of wholesale trade arrangements among participants for electricity and associated services. CN Transelectrica SA is in charge of substantiating the portfolio selling/purchasing contracts established between the generation companies and supply companies. This is made using 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 discounting interval of electricity load curve. Electricity trade arrangements are mostly represented by bilateral contracts. Spot market trades are meant to cover only the differences between the contract provisions and the actually traded volumes. Both the old and the new participants on the electricity market are equally treated on transparent and non-discriminatory basis, which also include the regulated access to the transmission and distribution networks. In this respect, connection to the grids is a compulsory public service. Generating tariffs for the regulated market, on behalf of the captive consumers, are also regulated. Eligible consumers, power suppliers and even ELECTRICA have the opportunity to trade electricity in the competitive market, where prices are directly negotiated according to bilateral contracts or settled on the spot market.

- **Bosnia and Herzegovina**: Three vertical integrated power companies (three EPs) were established 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 ad 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 Coordination 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 changed very soon and because of this fact above mentioned “Book of rules” will be very soon replaced by Grid and commercial codes.

The table below gives the information about the opening degree (eligibility for consumers) in electricity markets in UCTE countries:

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 [5]	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%)	

[5] 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 February 2001	by February 2001, HV/MV consumers (market opening of about 34%)	It is expected from January 1st, 2004 for all consumers other than householders	
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 by January 1st, 2001: consumers > 20 GWh	by January 1st, 2003: consumers > 20 GWh and distributers > 90 GWh	by January 1st, 2003: consumers > 1 GWh and distributers > 1 GWh
NL	Electricity Law, July 1998	by January 1999: big consumers > 2 MW (i.e. market opening of about 30%)	ba 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%)
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
CZ	Law 458/2000 January 1st, 2002	by January 2002: consumers > 40 GWh/year/site	by January 2003: consumers > 9 GWh/year/site	by January 2005: consumers > 100MWh/year/site by January 2006: 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	

Country	Date of beginning of deregulation process	1st threshold	2nd threshold	other threshold
P	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

Appendix A: Transmssion grid development

Germany				
Line or Equipment name	**Voltage Level**	**Commissioning Date**	**Main Characteristics** (single or double circuit line, length, AC lines or DC lines,...)	**Comments, Impact on the interconnections and on congestions** (increasing the NTC, by reducing or increasing constraints, by decreasing congestion costs, ...)
Between the networks of Germany (E.ON) and The Netherlands (TenneT) the erection of a quad booster is planned with a view to increasing the NTC value. Its capacity is still under investigation. The quad booster will become a constituent part of the transmission system.	400 kV			The measures mentioned shall reduce or prevent existing or foreseeable congestion.
Between France and Germany (RWE Net) the existing 400 kV link Uchtelfingen -Vigy will be upgraded by an additional circuit (commissioning before the end of 2002). The effects on NTC-values between The Netherlands and Germany or Germany and France will be published on the ETSO website.				
Further needs of the system: due to the wind energy development, there will be further needs in terms of grid development.				

Spain

Line or Equipment name	**Voltage Level**	**Commissioning Date**	**Main Characteristics** (single or double circuit line, length, AC lines or DC lines,...)	**Comments, Impact on the interconnections and on congestions** (increasing the NTC, by reducing or increasing constraints, by decreasing congestion costs, ...)
Litorial - Rocamora (2nd circuit)	400 kV	2003	1685 MVA	
Cartelle - Trives (2nd circuit)	400 kV	2003	1685 MVA	
Cartelle - Lindoso (2nd circuit) Interconnection E - P	400 kV	2003	1660 MVA	
PTO de la Cruz - Pinar (double circuit)	400 kV	2003		
PTO de la Cruz - Tarifa (double circuit)	400 kV	2003		
Aguayo - Penagos	400 kV	2004	1685 MVA	
La Eliana - La Plana (3rd 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	
Estrecho - Fardioua (2nd 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**	**Commissioning Date**	**Main Characteristics** (single or double circuit line, length, AC lines or DC lines,...)	**Comments, Impact on the interconnections and on congestions** (increasing the NTC, by reducing or increasing constraints, by decreasing congestion costs, ...)
Rebuilding of the Vigy- Uchtel-Uchtelfingen (F - D)	400 kV	End of 2002	AC line, double circuit, 4x570 mm^2 AM, 63 km	Argoeuves- Chevalet-Gravelle: by reducing the constraints in France and easing future power exchanges with Belgium
Phase shifting transformer commissioning in La Praz (Interconnection F - I, Albertville- La Praz-Villarodin-Venaus	400 kV	mid-2002	300 MVA, +/-15°, Imax 2300MVA	
Capacity organisation: lines Cantegrit-Argia-Hernani (F - E)	400 kV	2002	AC line, single circuit, 2x617 mm^2 AA, 135 km 110 F / 24 E)	
New line Tavel - Tricastin: congestion reduction in the Rhone valley	400 kV	2002-2003	45 km, double circuit	
Line reinforcement/renewal in the northern region on the French grid: Argoeuves-Chevalet-Gravelle (replacement existing single circuit line)	400 kV	2004	AC line, double circuit, 3x570 mm^2 AM, 72 km	
New line in the French grid: Vigy-Marlenheim	400 kV	2005	AC line, double circuit (one of them operated at 225 kV), 3x570 mm^2 , 115 km	
Phase shifting transformer commissioning in Launay	225 kV	2002	270 MVA, +/-10°, Imax 1200A	

Further needs of the system: after the new commissioning and upgrading above, the further needs concern interconnection between France and Spain (in order to improve the transportable capacity to 2600 MW) and between France and Belgium.

Greece

Line or Equipment name	**Voltage Level**	**Commissioning Date**	**Main Characteristics** (single or double circuit line, length, AC lines or DC lines,...)	**Comments, Impact on the interconnections and on congestions** (increasing the NTC, by reducing or increasing constraints, by decreasing congestion costs, ...)
Tie line Florina - Bitola (upgrade of the 150 kV line)	400 kV	2003	AC line, single circuit, 35 km	The upgrade of the 150 kV tie-line Amyndeo - Bitola will increase the total NTC value
Line Florina - Amyndeo	400 kV	2003	AC, double circuit, 26 km	
Line Argyroupoli -Lavrio	400 kV	2003	AC, single circuit, 38 km	
Line Lagada - Bulgaria	400 kV	2005	AC, single circuit, 10 km	
Transmission lines	150 kV	2003	542 km	
Transmission lines	150 kV	2004	229 km	
Transmission lines	150 kV	2005	336 km	
Transformer 400/150 kV		2003-2005	No 12 (280 MVAeach)	

Further needs of the system: The 400 kV grid extension to the north-eastern part of th country.

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, ...)
Substation	any	2003-2005	10.000 MVA (+)	A direct impact on the interconnection limits and on congestions is the development of the length in the transmission lines. This allow to answer at the new increasing demand eliminating the bottlenecks in the network.
Transmission line	380 kV	2003-2005	1160 km (+)	
Transmission line	220 kV	2003-2005	900 km (-)	
Foreign transmission line	380 kV	2003-2005	230 km double circuit	
(+) increase, (-) decrease				

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, ...)
				Till 2005 no new interconnection devices (or internal lines) will be put into the operation.
Further needs of the system:	In the future there are three projects for new lines or transmission devices: - Internal line 400 kV Krško - Beri (will strengthen the internal network) - interconnection line Heviz - Cirovce 400 kV between Hungary and Slovenia - Interconnection line Udine - Okrogle 400 kV between Italy and Slovenia			

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, ...)
400 kV Ernestinovo line	400 kV	2004		Lines from 400 kV substation Ernestinovo to Serbia and Bosnia-Herzegovina will increase the NTC.
Further needs of the system: new 400 kV line between Croatia and Hungary				

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	2003	220 kV cable	The new line, CentraleTGV-SOTEL, can have a direct impact on the interconnection with Belgium.
Schifflange - CFL Berchem	220 kV	2004	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	2002-2003	2 x 1000 MVA	- The phase shifters in Meeden are built to upgrade the NTC of the cross 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 transformer in Borssele is now directly connected to the line. -The static-VAR equipment will be better the performance of the entire 380 kV network under varying import/export conditions.
Substation in Borssele	380 kV	2004-2005		
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	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, ...)
Meiningen (A) - Montlingen Sarelli (CH)	220 kV	2003	second 220 kV line - AC	
Transformer in Kainachtal	380/220	2003	300 MVA	
Transformer in Malta	220/110	2003-2004	200 MVA	
Further needs of the system:	Within Austria: - 380 kV transmission line fromSüdburgenland to Kainachtal (AC-Double) - 380 kV transmission line from St.Peter to Salzach (AC-Double) - 380 kV transmission line from Westtirol to Zell/Ziller (AC-Double) Interconnections: - 380 kV interconnection line from Lienz (A) to Cordignano (I), AC-Double - 380 kV interconnection line from St.Peter (A) to Isar (I), AC-Double - 380 kV transmission line from Bisamberg to Gyor (AC-Single)			

Portugal

Line or Equipment name	**Voltage Level**	**Commissioning Date**	**Main Characteristics** (single or double circuit line, length, AC lines or DC lines,...)	**Comments, Impact on the interconnections 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 be reduce internal constrains and will facilitate the international energy flows. - The new Petralva substation, equipped with phase-shifters autotransformers, will be allow a better use of existing 400 kV network, with subsequent increase on import regimes. - The new 400 kV lineValdigem-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 sustation will increase system reliability nearby the consumption area of Lisbon, overcoming some difficulties of the south-north transmission capacity in dry situations.
Alqueva-Balboa (Spain)	400 kV	2004	AC, double circuit, one circuit equipped, 2x75 km	
Valdigem-Viseu-Anadia	400 kV	2005 and 2006	AC, single circuit, 1x120 km (initially operating at 220 kV)	
Petralva (new substation)	400/150	2005	Phase-Shifter Autotransformer, 400/150 kV, 360 MVA	
Valdigem (upgrading)	400/220	2005	Phase-Shifter Autotransformer, 400/220 kV, 450 MVA	
Ribatejo	400 kV	2004	Nearby Lisbon on a south-north 400 kV corridor	
Sines-Mexilhoeira	400 kV	2005	AC, single circuit, 1x97 km (initially operating at 150 kV)	

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, 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 the very 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**	**Commissioning Date**	**Main Characteristics** (single or double circuit line, length, AC lines or DC lines,...)	**Comments, Impact on the interconnections and on congestions** (increasing the NTC, by reducing or increasing constraints, by decreasing congestion costs, ...)
Mettlen-Gösgen Line	380 kV	2005	Double circuit 2(600AD), 45 km	None

Further needs of the system:
to increase the transmission capacity of the lines between Switzerland and Italy would further grid improvements are desirable.

Czech Republic

Line or Equipment name	**Voltage Level**	**Commissioning Date**	**Main Characteristics** (single or double circuit line, length, AC lines or DC lines,...)	**Comments, Impact on the interconnections and on congestions** (increasing the NTC, by reducing or increasing constraints, by decreasing congestion costs, ...)
Békéscsaba-Sandorfalva line	400 kV	2003	AC, single circuit, 90 km	
Paks-Pécs	400 kV	2003	AC, double circuit, ca.50 km	

Hungary

Line or Equipment name	**Voltage Level**	**Commissioning Date**	**Main Characteristics** (single or double circuit line, length, AC lines or DC lines,...)	**Comments, Impact on the interconnections and on congestions** (increasing the NTC, by reducing or increasing constraints, by decreasing congestion costs, ...)
Phase shifter transformer in Nosovice, on the “PL – CZ” crossborder	400 kV	2004		

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 concrete: to construct the 400 kV line between the substations Cechy Stred and Bezdecin; supposed commissioning about 2007).

Poland

Line or Equipment name	**Voltage Level**	**Commissioning Date**	**Main Characteristics** (single or double circuit line, length, AC lines or DC lines,...)	**Comments, Impact on the interconnections and on congestions** (increasing the NTC, by reducing or increasing constraints, by decreasing congestion costs, ...)
Dobrzen-Wielopole	400 kV	2003	AC, double circuit, 105 km	Both lines will relieve some internal transmission constraints thus facilitating market trade within Poland. Line Dobrzen - Wielopole will also positively influence the NTC on PL - CZ border.
Ostrow-Pleweska	400 kV	2005	AC, double circuit, 150 km	

Further needs of the system:
further needs will be related among others to the rapid development of the wind power in the north of Poland and to the future transit needs through Polish system.
+ many modernisation projects on existing lines.

Slovak Republic

Line **or Equipment name**	**Voltage Level**	**Commissioning Date**	**Main Characteristics** (single or double circuit line, length, AC lines or DC lines,...)	**Comments, Impact on the interconnections and on congestions** (increasing the NTC, by reducing or increasing constraints, by decreasing congestion costs, ...)
Transformer T402 in the substation Horná •dana	400/110	June 2003		
reconstruction of Kri•ovany substation - exchange of the control system - building of 2 new transformers 400/110 kV - renewal od fields connection from Mal•enice	400 kV	2002-2010		
compensation of Stupava	10.5 kV	2003		
compensation of Lemešany	34 kV			
Upgrading of the Dispatch control center		2002-2004		

Romania

Line **or Equipment name**	**Voltage Level**	**Commissioning Date**	**Main Characteristics** (single or double circuit line, length, AC lines or DC lines,...)	**Comments, Impact on the interconnections and on congestions** (increasing the NTC, by reducing or increasing constraints, by decreasing congestion costs, ...)
OHL Isaccea (Romania) - Dobroudja (Bulgaria) *)	400 kV	June 2003	AC, single circuit, 234 km	The new OHL Isaccea – Dobroudja and the of 400 lines in the south-east part of Romania will increase operation security and NTC values between Romanian and Bulgarian power systems.
OHL Isaccea(Romania) - Vulkanesti (MD) *)	400 kV	June 2003	AC, single circuit, 94 km	

*) The 2 lines will result from the sectioning of the present 400 kV line Vulkanesti (MD) –Dobroudja (BG).
There will also be a reorganisation of 400 kV lines in the south-east part of Romania.
The 750 kV Isaccea-Varna will operate at 400 kV between Isaccea and Varna.

Further needs of the system:
The following objectives are in different stages of analysis and approval:
- 400 kV back-to back substation Isaccea;
- 400 kV tie-line Oradea (RO) – Bekescsaba (H);
- 400 kV line Arad (RO) – Oradea (RO).

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Existing lines with towers for lines with 2 circuits [illegible]

	B	D	E	F	GR	I	SLO	HR	BiH	YU	L	NL	A	P	CH	CZ	H	PL	SK	UCTE
2001	8940	-52	3800	-67311	2509	48479	-1787	3200	-1566	4231	5525	17288	140	150	-9394	-9535	3175	-7384	-3681	-3273
2000	4207	1558	4767	-68843	185	44456	-1349	4607	-1605	3110	5671	18919	-1575	832	-5722	-10018	3438	-6518	-2671	-8550

The above values have been harmonised between the countries concerned and may therefore differ from the official national statistics

400 million customers served
35 Transmission System Operators
516 GW installed capacity

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