UCTE

1 / 2003

Half-yearly Report

union for the co-ordination of transmission of electricity

WHAT IS THE UCTE ?

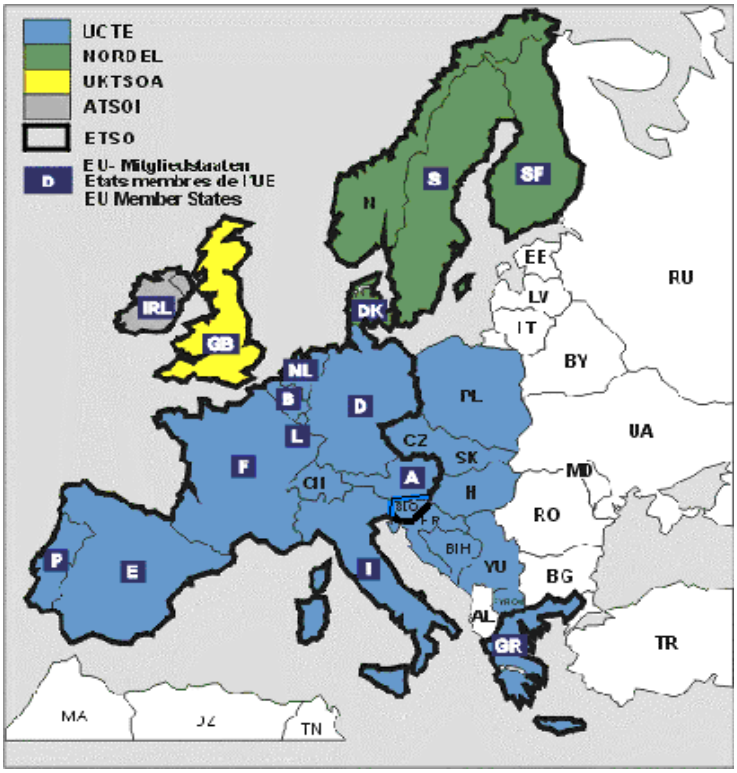
The Union for the Co-ordination of Transmission of Electricity (UCTE) co-ordinates the interests of transmission system operators in 20 European countries. Their common objective is to maintain the security of operation of the interconnected power system. 50 years of joint activities laid the basis for a leading position in the world which the UCTE holds in terms of the quality of synchronous operation of interconnected power systems. Through the networks of the UCTE, 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:

Belgium (B)
Germany (D)
Spain (E)
France (F)
Greece (GR)
Italy (I)
Slovenia (SLO)
Croatia (HR)
Federal Republic of Yugoslavia (YU)
(new name Serbia and Montenegro)
Former Yugoslav Republic of Macedonia (FYROM)

Bosnia-Herzegovina (BIH)
Luxembourg (L)
The Netherlands (NL)
Austria (A)
Portugal (P)
Switzerland (CH)
Czech Republic (CZ)
Hungary (H)
Poland (PL)

Slovak Republic (SK)

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



Optimal co-operation requires joint action

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

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

From the very outset of liberalisation in the European electricity markets, the UCTE has intensively pursued the development of schemes for the promotion of competition in the electricity sector. The aim is to support the electricity market without accepting restrictions in the security of supply. The liberalisation of electricity markets cannot be implemented without a transparent and nondiscriminatory 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 I - 2003

Table of contents

Chapter I -VI are based on values from the UCTE database from 29 July 2003

1.1 Introduction

This half-yearly report deals with the electricity supply situation, exchanges and load curves during the winter period 2003, i.e. from 1 October 2002 to 31 March 2003.

The electricity consumption values in this report are gross values unadjusted for climatic factors and seasonal variations.

1.2 Electricity supply situation and peak load

The consumption of electricity on the UCTE interconnected system amounted to **1177.7 TWh** during this winter period, an increase of 2.3 % in comparison with the same period in 2002.

The highest consumption increase in the period of report was registered in February with 9.7 %, the lowest was registered in November with - 1.6 %.

The peak load from all UCTE countries in the period of report amounted to 346.7 GW in February, this was 8.1% below the February 2002.

The highest utilisation factor of maximum load was reported in March with 85.5 %, while it reached 78.8 % last December.

1.3 Generation and hydraulicity

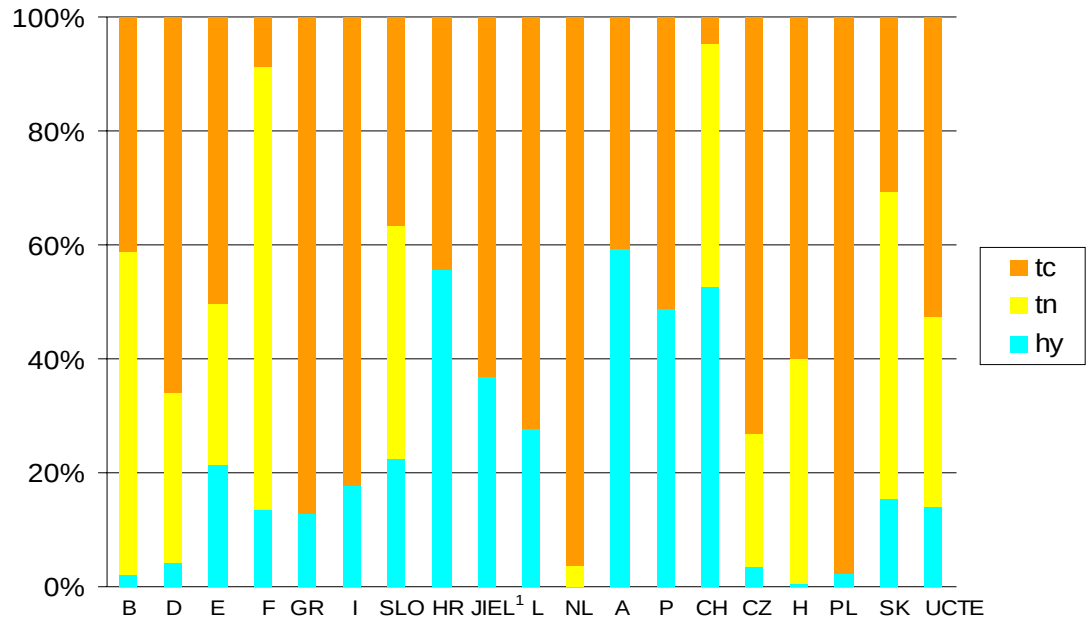
Total generation within UCTE in the period of report amounted to 1203.7 TWh (+ 2.9%) and was made up by 14.0% generation from hydro power, 52.4% non-nuclear thermal generation and 33.6% nuclear generation.

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

	B	D	E	F	GR	I	SLO	HR	JIEL*	L	NL	A	P	CH	CZ	H	PL	SK	UCTE
National production [TWh]	41,0	276,0	111,8	286,9	23,2	136,9	7,0	7,1	23,8	1,7	48,6	29,4	20,8	32,8	39,4	18,1	82,2	17,3	1203,7
Hydro power [%]	2	4	22	13	13	18	22	56	37	28	0	60	49	53	4	0	2	16	14
Nuclear power [%]	57	30	28	78	0	0	41	0	0	0	4	0	0	43	23	40	0	54	34
Convent. power [%]	41	66	50	9	87	82	37	44	63	72	96	40	51	4	73	60	98	30	52

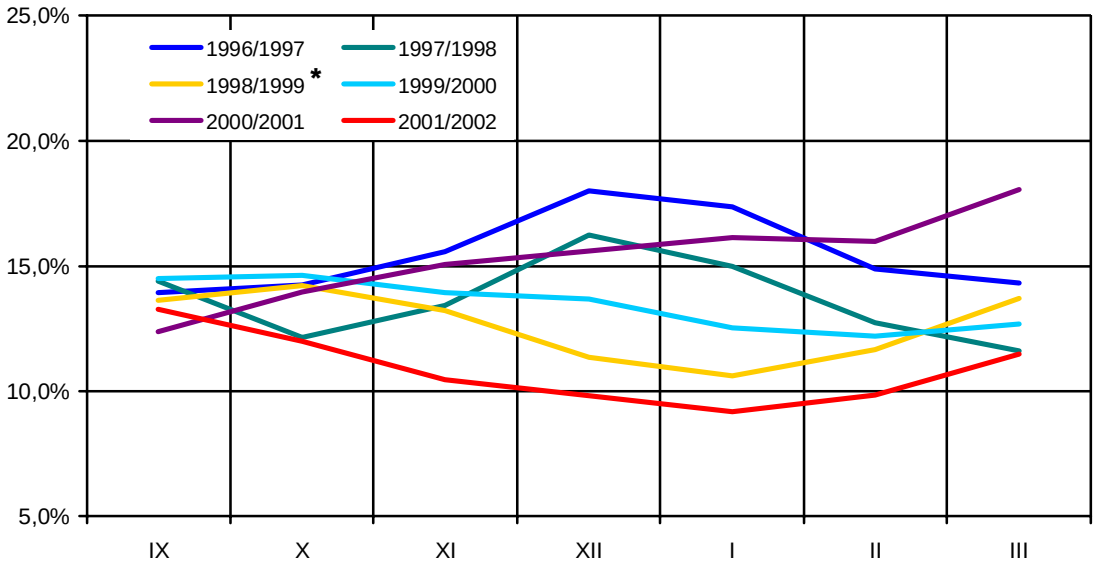
* JIEL = FRY + FYROM (Federal Republic of Yugoslavia and former Yugoslav Republic of Macedonia)

G2 Structure of generation within UCTE in the winter period



[1] JIEL = FRY + FYROM (Federal Republic of Yugoslavia and former Yugoslav Republic of Macedonia)

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 130825 GWh, corresponding to a decrease of -0. 6% as compared to the winter period 2002.

France continues to remain the main exporting country with 41.2 TWh where as the highest imports in the period of report were recorded in Italy with 28.2 TWh.

T1 Balance[1] of exchanges within UCTE winter period

	B	D	E	F	GR	I	SLO	HR	BiH	JIEL[3]	L	NL	A	P	CH	CZ	H	PL	SK	III[2]
2002																				
GWh	3705	-6144	3236	-35038	1466	26845	-770	2401	-354	3117	2175	8430	2619	95	2388	-4558	1224	-4248	-2353	4236
2003																				
GWh	4446	-3262	1662	-39484	1062	27931	-727	1077	-876	3345	1968	7835	632	1221	508	-5534	1860	-5424	-2505	-4265

[1] Balance = Import - Export
[2] Third countries : Albania, Bulgaria, Belarus, Denmark, Great Britain, Morocco, Romania, Sweden and Ukraine
[3] JIEL = FRY + FYROM (Federal Republic of Yugoslavia and former Yugoslav Republic of Macedonia)

1.5 Power stations and maximum generating capacity

T2 Maximum output capacity as of 31.12.2002 [1]

	Thermal conventional		Thermal nuclear		Hydropower		Other sources[2]	Total	
Country	MW	%	MW	%	MW	%	MW	MW	%
B	8226	-0.3	5761	0.4	1413	0.7	223	15623	-0.2
D	68200	0.3	20700	0.0	8500	0.0	4000	101400	0.7
E	26355	11.7	7566	1.0	18054	1.4	5259	57234	11.5
F	23533	-0.2	63273	0.1	23864	0.0	424	111094	0.0
GR	6776	7.6			3060	-1.0	174	10010	4.9
I	55100	1.0			20439	0.0	1411	76950	1.0
SLO	1074	60.3	685	-44.8	774	-0.5		2533	-5.8
HR	1631	0.0			2075	0.0		3706	0.0
JIEL[3]	6753	0.0			3893	0.0		10646	0.0
L	466	1.3			1128	0.0	20	1614	0.4
NL	17954	3.5	449	0.0	37	0.0	1901	20341	4.8
A	5900	-4.5			11700	-4.0	260	16860	-3.6
P	5095	0.6			4430	0.5	271	9796	1.3
CH	305	3.4	3220	0.6	13295	0.1	515	17335	0.1
CZ	10503	-1.2	2567	56.8	2123	-0.1	6	15199	5.6
H	5421	-3.3	1772	0.0	46	0.0	387	7626	-2.5
PL	31686	1.6			2156	-1.3	59	33901	1.5
SK	2296	0.1	2640	0.0	2430	0.1	696	8062	0.1
UCTE	**277274**	**1.8**	**108633**	**0.5**	**119417**	**-0.3**	**15606**	**520930**	**1.8**

[1] Representativity

B	D	E	F	GR	I	SLO	HR	JIEL[3]	L	NL	A	P	CH	CZ	H	PL	SK
99	91	100	97	89	100	100	100	96	99	100	100	91	100	100	100	100	100

[2] Sum of renewable energy sources and not clearly identified energy sources
[3] JIEL = FRY + FYROM (Federal Republic of Yugoslavia and former Yugoslav Republic of Macedonia)

Total consumption[1]			**10/01-03/02**	**10/02-03/03**	**10/02**	**11/02**	**12/02**	**01/03**	**02/03**	**03/03**
Volume	A	**TWh**	1151,6	1177,7	186,0	189,0	200,1	212,4	196,7	193,6
Increase		**%**		2,3	3,1	-1,6	-1,6	1,8	9,8	2,8
Peak load[2]	B	**GW**	342,9	346,7	295,9	321,9	341,1	344,6	346,7	303,3
Increase		**%**		1,1	3,5	-1,3	-0,5	3,0	8,1	3,6
Utilisation factor of maximum load	$C = \frac{A}{h \times B}$ [3]	**%**	76,9	77,8	84,5	81,6	78,8	82,8	84,4	85,8
Total Generation[1]										
Volume		**TWh**	1170,0	1203,7	190,2	193,7	205,3	217,1	200,0	197,4
Increase		**%**		2,9	3,6	-0,2	-0,3	2,5	9,5	2,8
Hydroelectric generation	D	**TWh**	119,7	168,2	22,9	26,5	30,5	34,0	28,1	26,1
Increase		**%**		18,4	6,9	32,7	52,8	78,9	58,8	20,9
Thermal generation[4]	T	**TWh**	1050,3	1035,5	167,3	167,2	174,7	183,1	171,8	171,3
Increase		**%**		-1,4	3,1	-4,0	-5,9	-5,0	4,2	0,5
Non nuclear	Tc	**TWh**	648,1	631,3	102,0	101,4	104,0	110,9	106,9	106,1
Increase		**%**		-2,6	4,9	-6,2	-9,3	-7,3	4,7	-0,3
Nuclear	Tn	**GWh**	402,2	404,2	65,3	65,8	70,7	72,2	65,0	65,2
Increase		**%**		0,5	0,4	-0,5	-0,5	-1,1	3,3	1,9

Electricity exchanges			**10/01-03/02**	**10/02-03/03**	**10/02**	**11/02**	**12/02**	**01/03**	**02/03**	**03/03**
Volume total	Y	**GWh**	151301	0	0	24591	24538	26303	25845	23312
Increase		**%**		-100,0	0,0	0,8	-1,1	0,9	-1,3	-2,0
Volume[5]		**GWh**	21418	0	0	21347	21096	22505	22790	20363
Increase		**%**		-100,0	0,0	-0,3	-3,4	-1,8	-2,7	-4,8
Share in consumption	$L = \frac{Y}{A}$	**%**	13,1	0,0	0,0	13,0	12,3	12,4	13,1	12,0
Maximum parallel power[2]	M	**GW**	341,1	351,1	301,5	324,8	342,3	343,8	351,1	312,0
Load flow **day**[b]	N	**MW**	29943	31420	28859	30242	31420	27741	27621	30401
last year		**MW**		29943	29913	28765	27000	28192	29175	29943
Load flow **night**[6]	N	**MW**	32167	33212	27611	26593	31528	31921	27805	33212
last year		**MW**		32167	27748	31288	32167	31333	31309	27528

[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	94	94	97	91	100	95	100	96	99	100	90	91	100	100	100	100	100
Load	100	91	94	97	93	100	95	100	96	99	90	82	91	100	100	100	100	100
Production	100	94	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 winter October 2002 - March 2003

T1 Electricity supply situation in winter October 2002 - March 2003

Country	Consumption[1] GWh	Increase[2] %	Load[1] max MW	Increase[2] %
B	44712	2.2	13128	5.6
D	269396	2.7	75800	1.1
E	109985	2.7	37163	-2.6
F	243088	1.4	76656	2.3
GR	24018	2.9	7711	-0.3
I	159485	2.2	51030	-0.5
SLO	6320	9.2	1855	3.7
HR	8123	-0.3	2618	-3.5
JIEL[3]	26541	1.3	7763	-6.4
L	3164	1.3	918	2.9
NL	56418	0.5	14925	8.5
A	28671	0.3	8589	3.6
P	21792	3.4	8043	14.6
CH	31855	1.4	9346	-1.2
CZ	33942	4.3	9763	3.8
H	19915	1.7	5852	-0.4
PL	75693	3.9	22627	2.9
SK	14602	2.5	4174	-2.1
UCTE	1177756	2.2	346650	1.1

[1] Percentage as referred to total values (%)
[2] Variation as compared to corresponding period of the previous year
[3] JIEL = FRY + FYROM (Federal Republic of Yugoslavia and former Yugoslav Republic of Macedonia)

	B	D	E	F	GR	I	SLO	HR	JIEL[3]	L	NL	A	P	CH	CZ	H	PL	SK
Consumption	100	94	94	97	91	100	95	100	96	99	100	90	91	100	100	100	100	100
Load	100	91	94	97	93	100	95	100	96	99	90	82	91	100	100	100	100	100

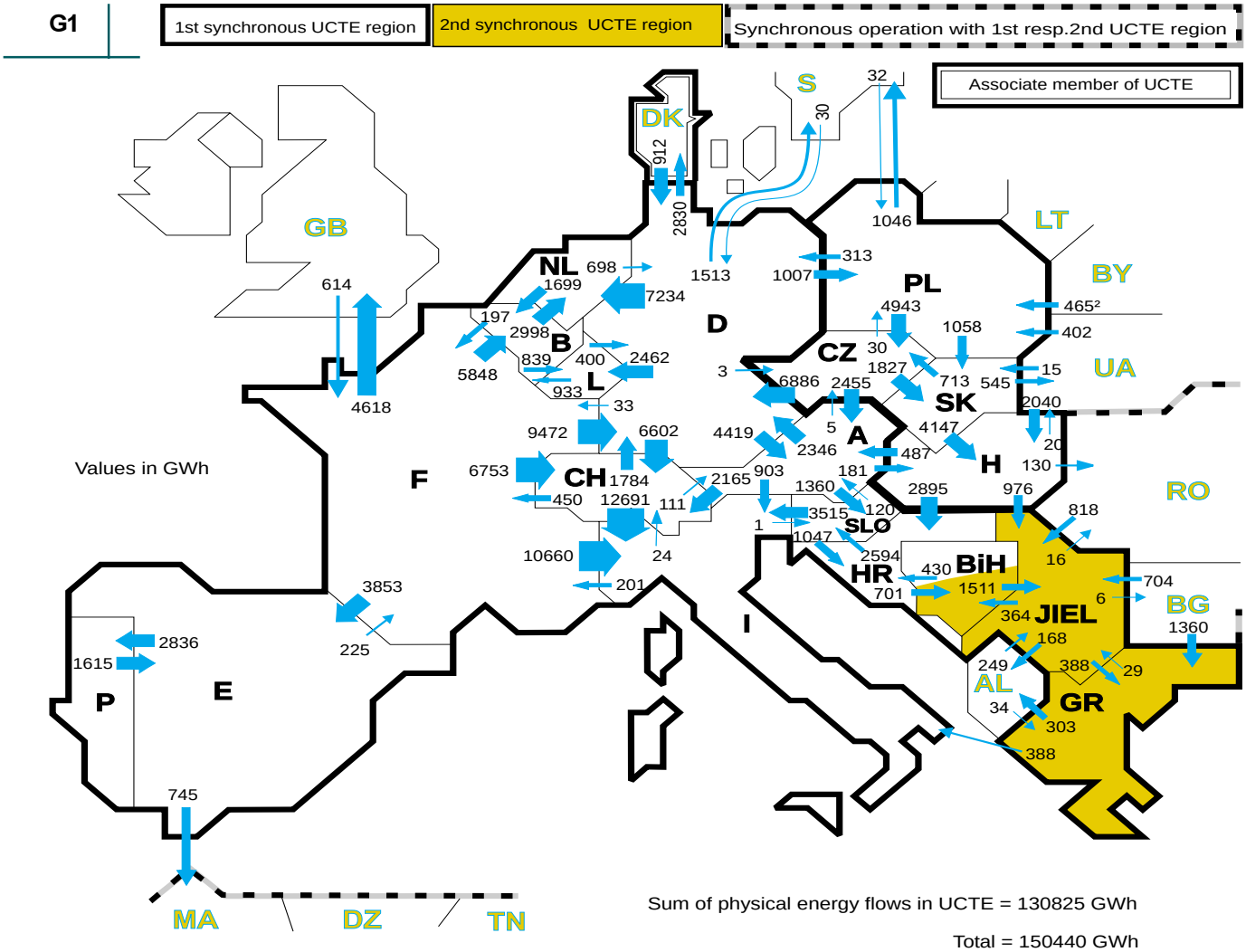
The annual peak load on the third Wednesday was registered by the various countries in the following months:

B	D	E	F	GR	I	SLO	HR	JIEL*	L	NL	A	P	CH	CZ	H	PL	SK	UCTE
XII	XII	I	II	I	I	I	II	XII	I	XII	XII	I	I	XII	I	XII	XII	II

* JIEL = FRY + FYROM (Federal Republic of Yugoslavia and former Yugoslav Republic of Macedonia)

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.

G1



T1

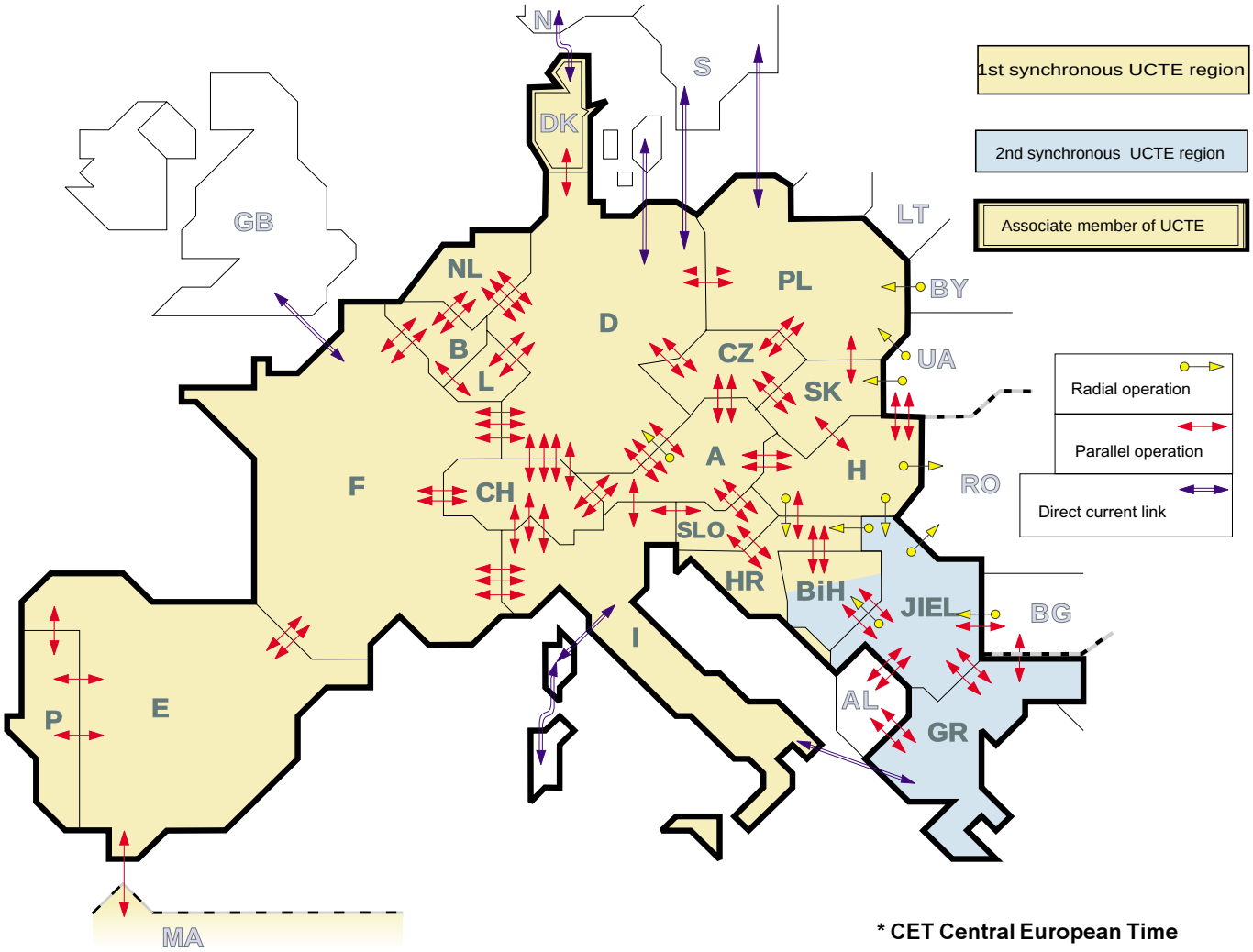
Exporting Countries \ Importing countries	B	D	E	F	GR	I	SLO	HR	BiH	JIEL	L	NL	A	P	CH	CZ	H	PL	SK	III²
B	-	-	-	197	-	-	-	-	-	-	839	2998	-	-	-	-	-	-	-	-
D	-	-	-	33	-	-	-	-	-	-	2462	7234	4419	-	6602	3	-	1007	-	4343
E	-	-	-	225	-	-	-	-	-	-	-	-	-	2836	-	-	-	-	-	745
F	5848	9472	3853	-	-	10660	-	-	-	-	-	-	-	-	6753	-	-	-	-	4618
GR	-	-	-	-	-	388	-	-	-	29	-	-	-	-	-	-	-	-	-	303
I	-	-	-	201	0	-	1	-	-	-	-	-	-	-	24	-	-	-	-	-
SLO	-	-	-	-	-	3515	-	1047	-	-	-	-	120	-	-	-	-	-	-	-
HR	-	-	-	-	-	-	2594	-	701	0	-	-	-	-	-	-	0	-	-	-
BiH	-	-	-	-	-	-	-	430	-	1511	-	-	-	-	-	-	-	-	-	-
JIEL	-	-	-	-	388	-	-	0	364	-	-	-	-	-	-	-	-	-	-	190
L	933	400	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NL	1699	698	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A	-	2346	-	-	-	903	1360	-	-	-	-	-	-	-	2165	5	181	-	-	-
P	-	-	1615	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CH	-	1784	-	450	-	12691	-	-	-	-	-	-	111	-	-	-	-	-	-	-
CZ	-	6886	-	-	-	-	-	-	-	-	-	-	2455	-	-	-	-	30	1827	-
H	-	-	-	-	-	-	-	2895	-	976	-	-	487	-	-	-	-	-		150
PL	-	313	-	-	-	-	-	-	-	-	-	-	-	-	-	4943	-	-	1058	1046
SK	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	713	4147	0	-	545
III¹	-	942	0	614	1394	-	-	-	-	1771	-	-	-	-	-	-	2040	899	15	-

[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

15.01.2003, 11:00 a.m. (CET*)



* CET Central European Time

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

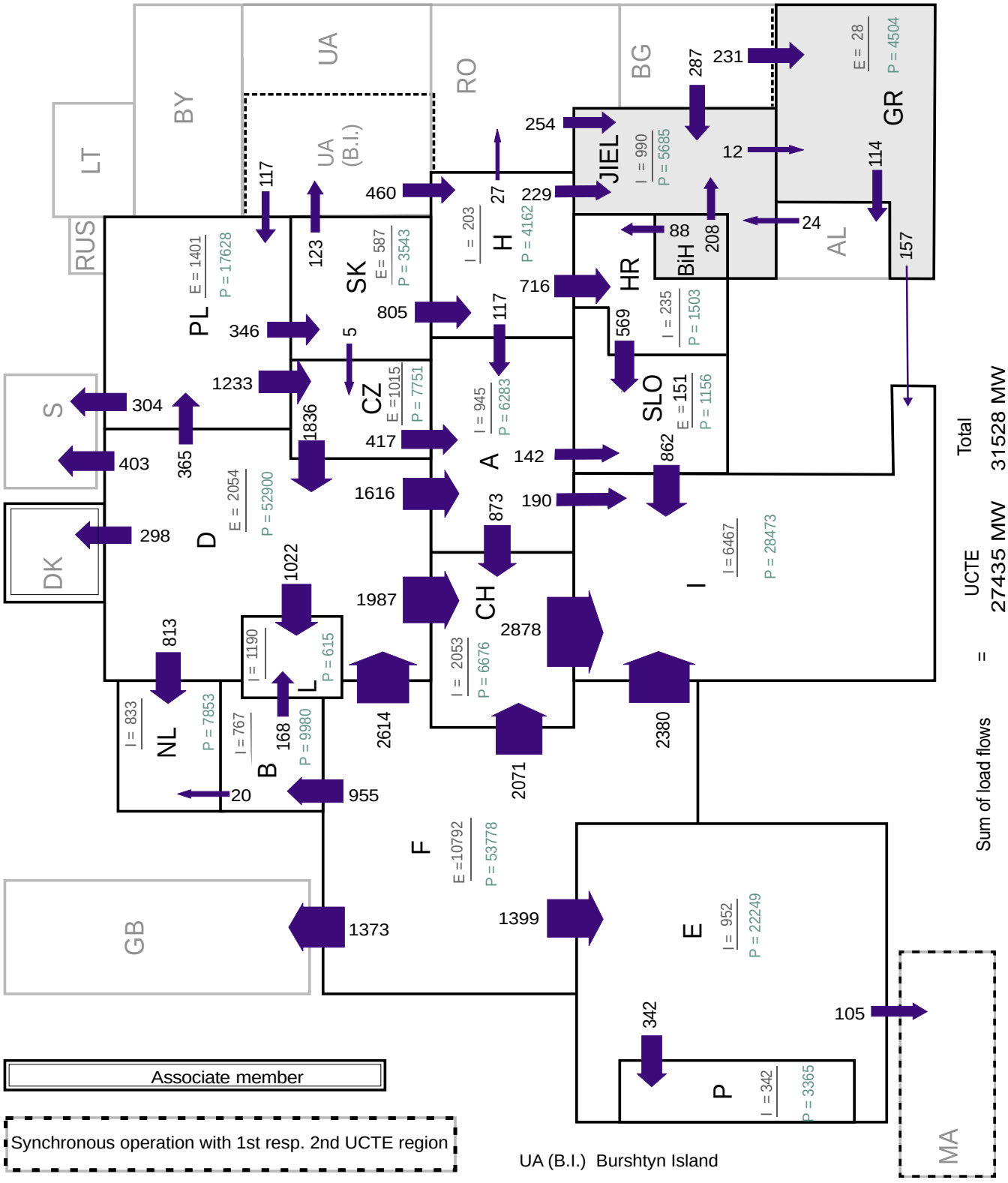
Day	B	D	E	F	GR	I	SLO	HR	JIEL	L	NL	A	P	CH	CZ	H	PL	SK	DK
16.10.02	9792	73800	26938	66845	5584	39050	1821	1818	4763	736	10316	6924	5034	9178	9644	4621	20256	4357	2345
20.11.02	10120	80100	28807	74409	5621	42599	2015	1820	4294	718	10475	6640	5199	11328	10511	4639	21101	4357	2530
18.12.02	10832	81000	30809	80886	6610	43379	2072	2327	5716	766	11761	6426	5372	11802	10090	5050	22828	4558	2155
15.01.03	10700	77200	33478	81805	6307	44005	1762	2349	5970	864	11037	7260	7097	10972	11043	5012	22283	4672	1850
19.02.03	10414	78400	34452	83343	7141	43195	1767	2453	7062	754	11683	9131	6953	11808	10632	5012	22285	4578	2640
19.03.03	9679	76300	26339	70472	6174	40379	1890	2063	6179	704	10283	8515	5064	9538	10059	4346	20274	3758	2805

[1] JIEL = FRY + FYROM (Federal Republic of Yugoslavia and former Yugoslav Republic of Macedonia)

Load flows

P = Load

G1 | 18.12.2002 - 03:00 a.m. (CET) (in MW)



Associate member

Synchronous operation with 1st resp. 2nd UCTE region

2nd synchronous UCTE region

UA (B.I.) Burshtyn Island

CET Central European Time

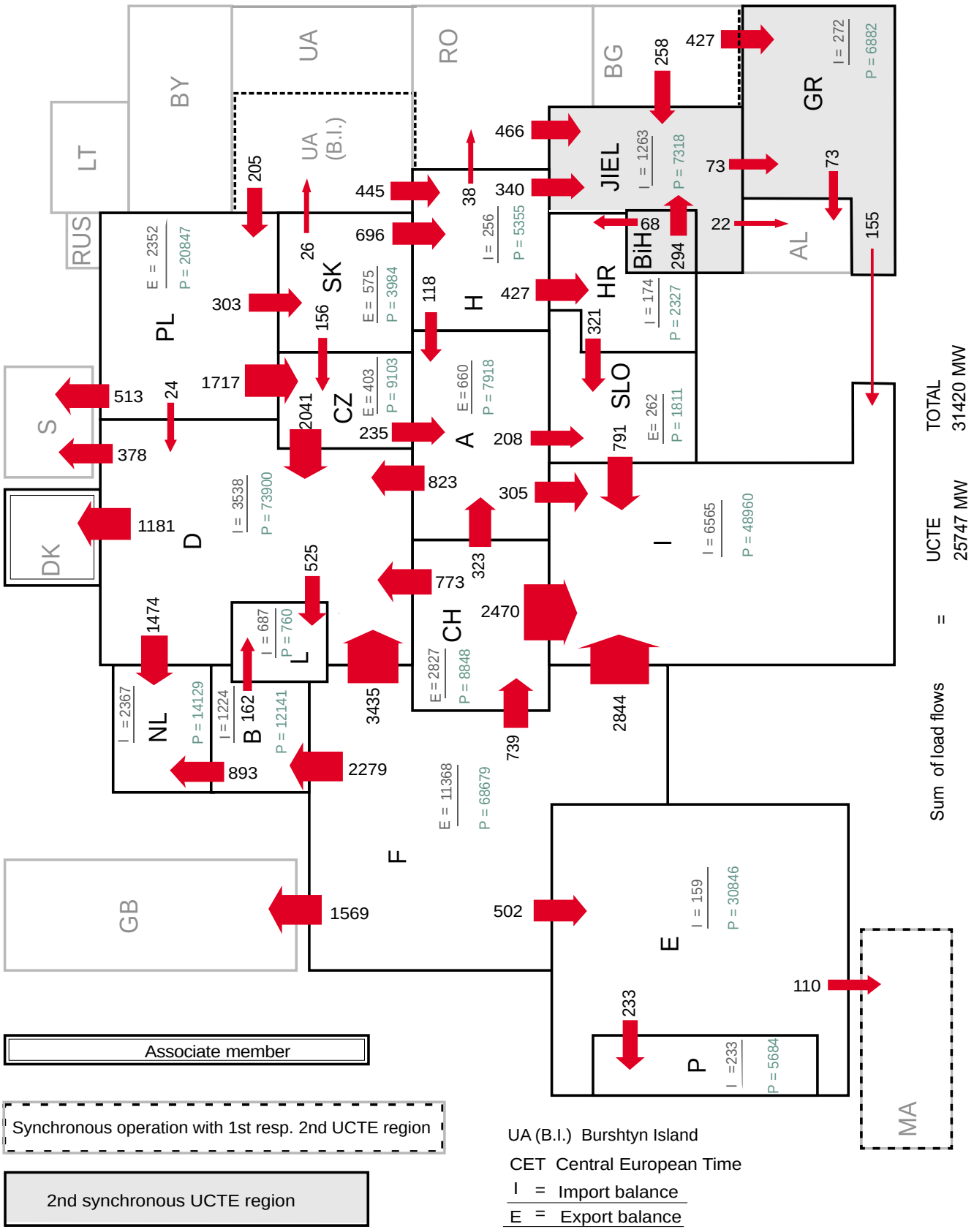
I = Import balance

E = Export balance

Load flows

P = Load

G2 18.12.2002 - 11:00 a.m. (CET) **(in MW)**



Associate member

Synchronous operation with 1st resp. 2nd UCTE region

2nd synchronous UCTE region

UA (B.I.) Burshtyn Island

CET Central European Time

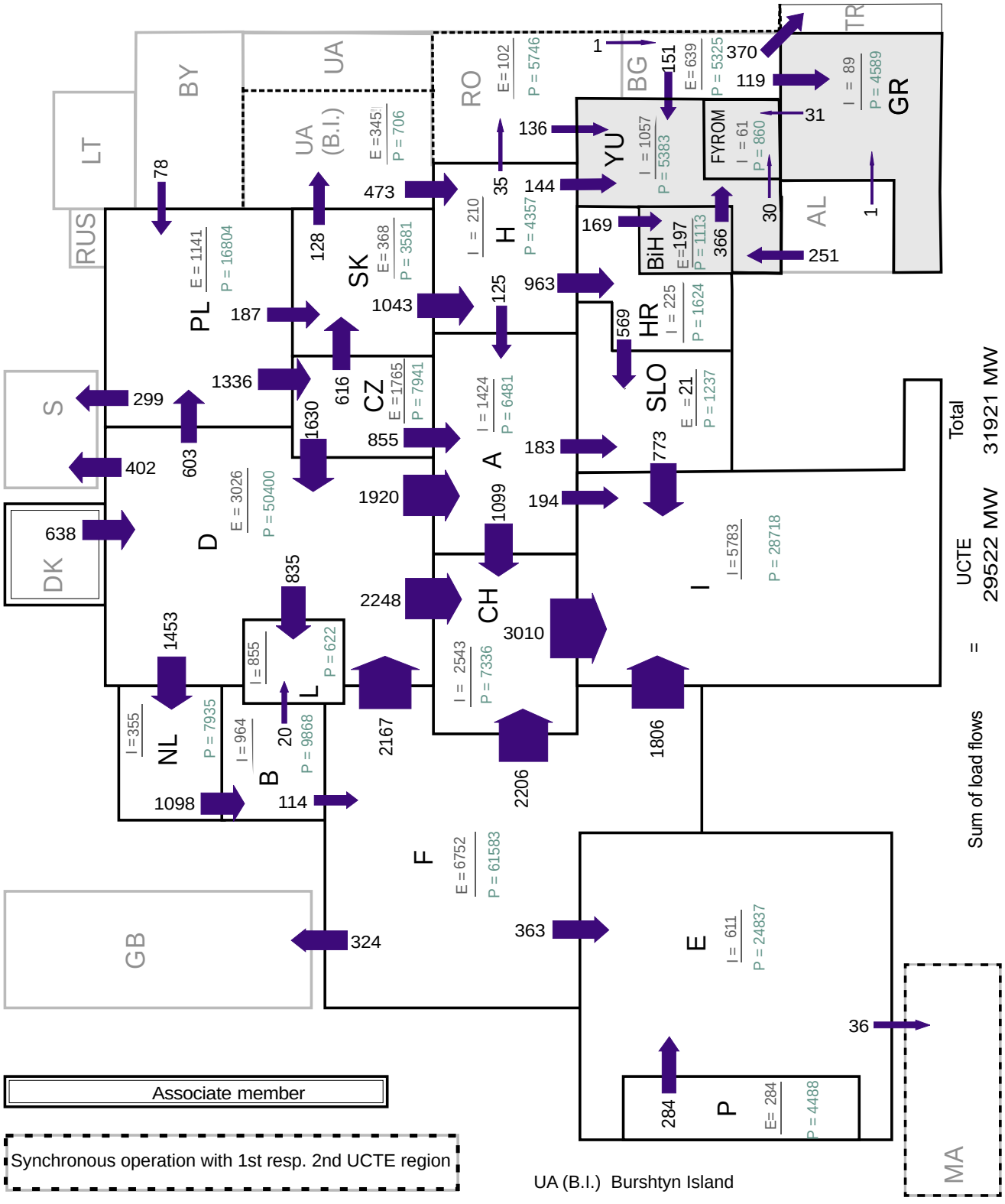
I = Import balance

E = Export balance

Load flows

P = Load

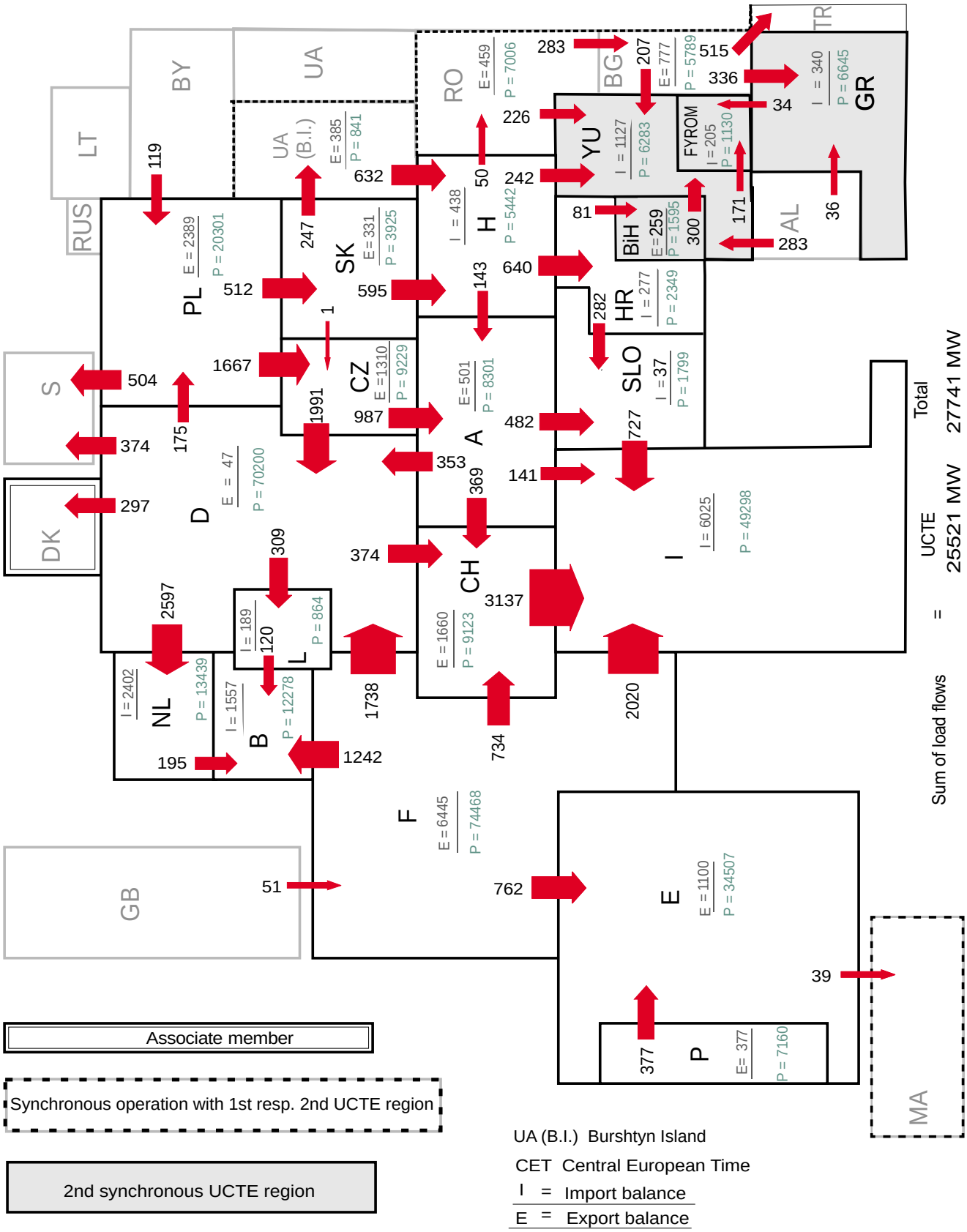
G3 15.01.2003 - 03:00 a.m. (CET) **(in MW)**



Load flows

P = Load

G4 15.01.2003 - 11:00 a.m. (CET) **(in MW)**



Associate member

Synchronous operation with 1st resp. 2nd UCTE region

2nd synchronous UCTE region

UA (B.I.) Burshtyn Island

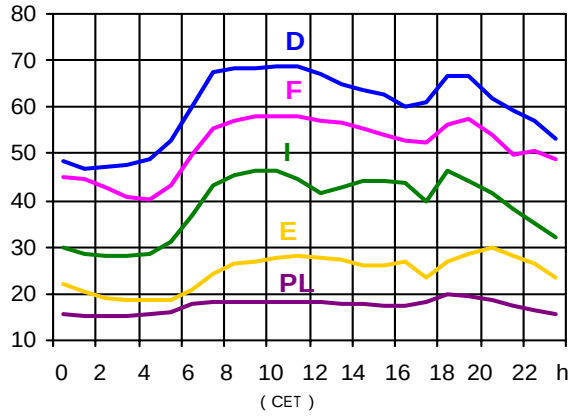
CET Central European Time

I = Import balance

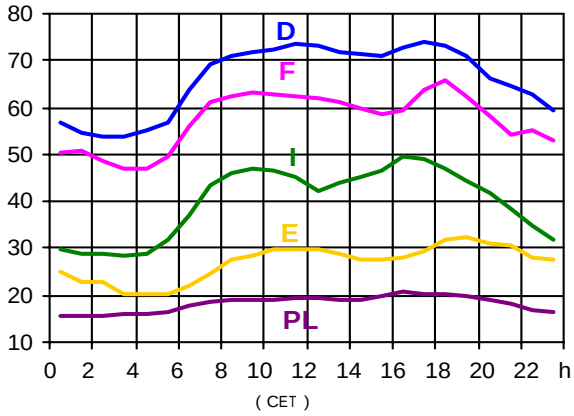
E = Export balance

Load diagrams[1]

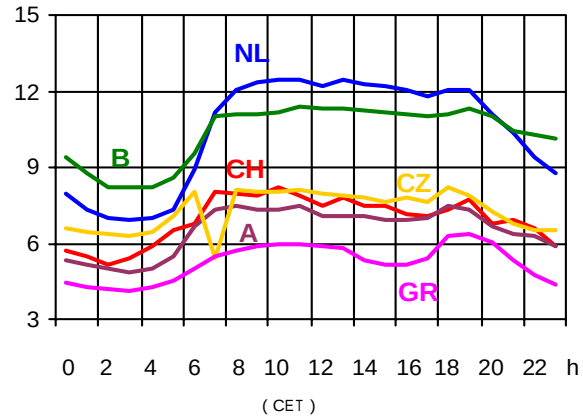
G1 16.10.2002 (in GW)



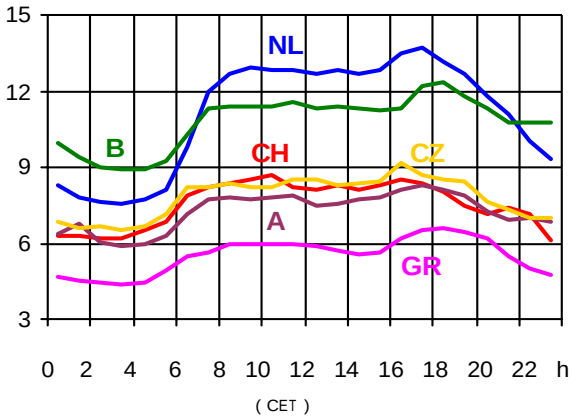
G4 20.11.2002 (in GW)



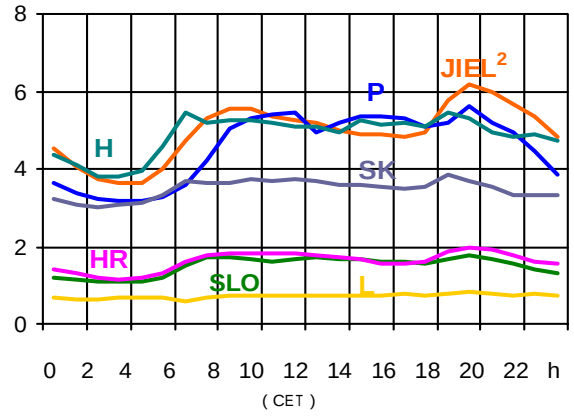
G2 16.10.2002 (in GW)



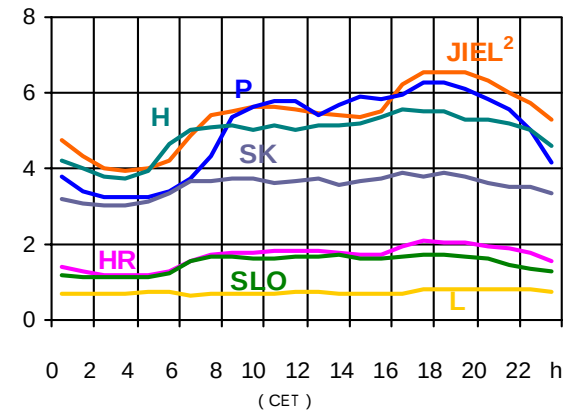
G5 20.11.2002 (in GW)



G3 16.10.2002 (in GW)



G6 20.11.2002 (in GW)



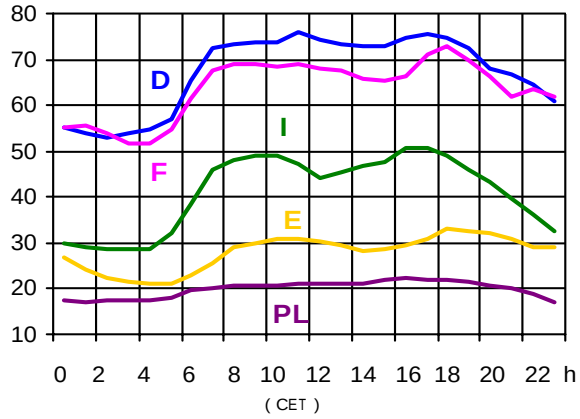
[1] Percentage as referred to total values (%)

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

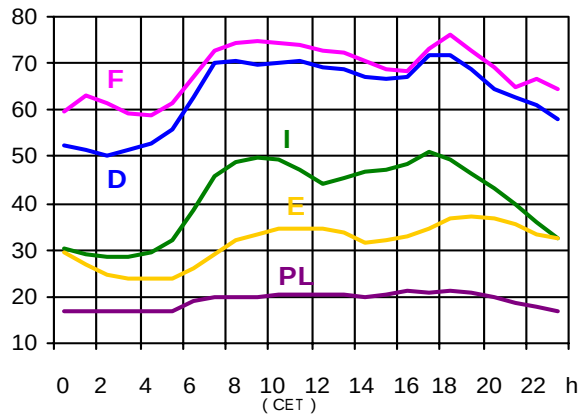
[2] JIEL = FRY + FYROM (Federal Republic of Yugoslavia and former Yugoslav Republic of Macedonia)

Load diagrams[1]

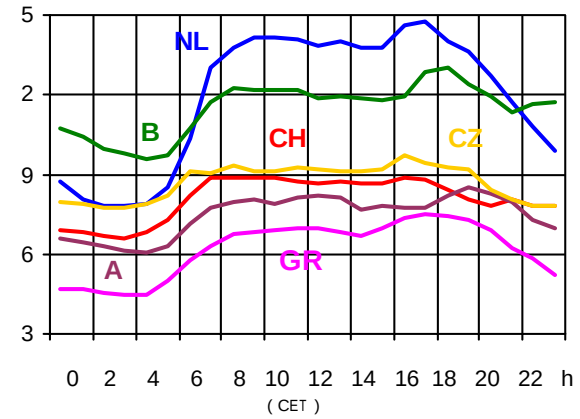
G7 18.12.2002 (in GW)



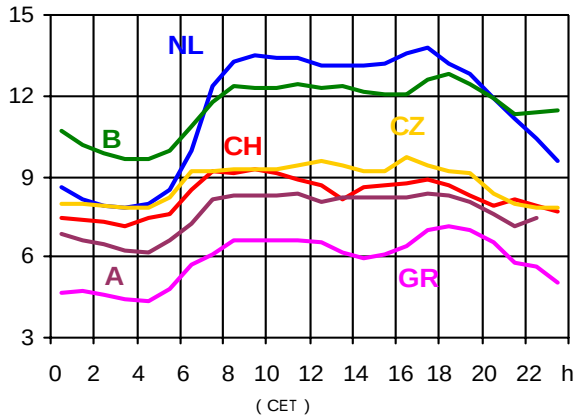
G10 15.01.2003 (in GW)



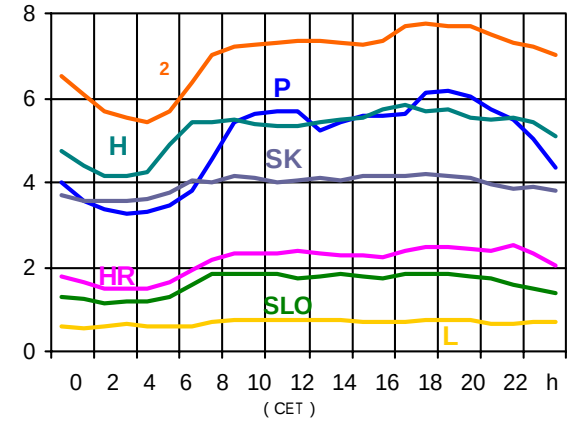
G8 18.12.2002 (in GW)



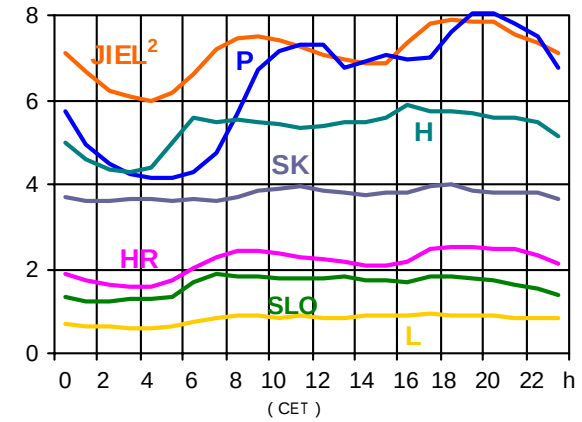
G11 15.01.2003 (in GW)



G9 18.12.2002 (in GW)



G12 15.01.2003 (in GW)



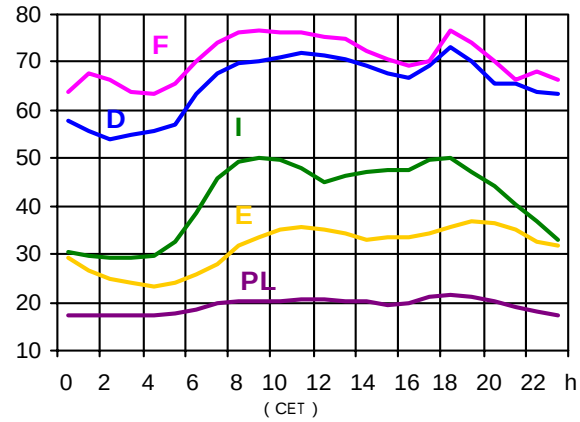
[1] Percentage as referred to total values (%)

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

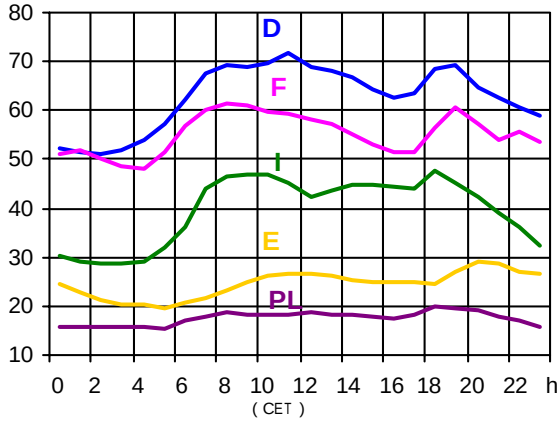
[2] JIEL = FRY + FYROM (Federal Republic of Yugoslavia and former Yugoslav Republic of Macedonia)

Load diagrams[1]

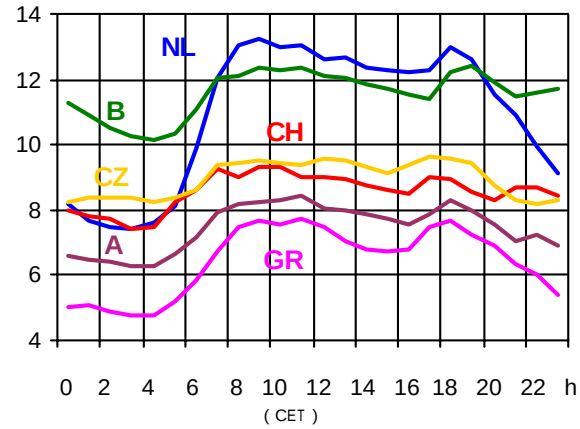
G13 19.02.2003 (in GW)



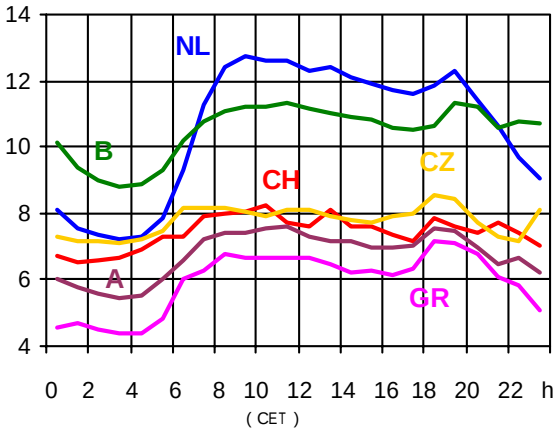
G16 19.03.2003 (in GW)



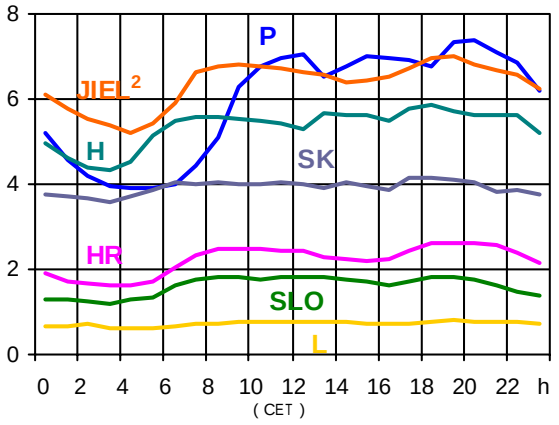
G14 19.02.2003 (in GW)



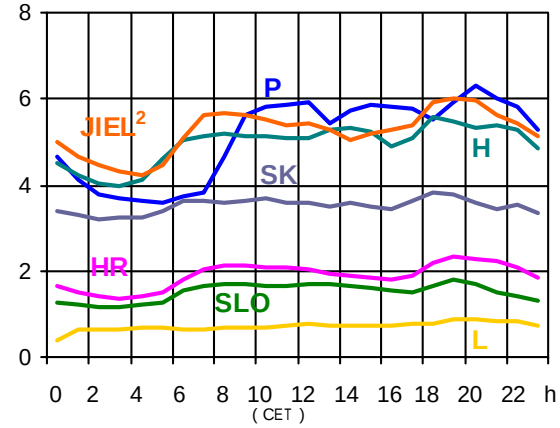
G17 19.03.2003 (in GW)



G15 19.02.2003 (in GW)



G18 19.03.2003 (in GW)



[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	97	93	100	95	100	96	99	90	82	91	100	100	100	100	100

[2] JIEL = FRY + FYROM (Federal Republic of Yugoslavia and former Yugoslav Republic of Macedonia)

Executive summary

The UCTE System Adequacy retrospect aims at :

- providing all players of the European power market with an overall overview of the operational conditions of the year 2002;
- identifying the trends which affect the UCTE system and their possible influence on system security in the medium term.

Since this year, the report provides all European electricity market players with an overview on the situation and main changes in the UCTE Transmission grids.

Energy Balance

In 2002, total production in the UCTE showed a 12.6 TWh increase compared to 2001 (+0.6%). The increase in the UCTE consumption is in the same proportion and accounts for 12.2 TWh (+0.6%).

Production from hydroelectric plants showed a very significant decrease, 59TWh (i.e.-18%), essentially due to the exceptional dry hydro conditions in continental Europe at the beginning of 2002. This decrease was partially compensated by the production from nuclear power plants which increased by 1.8% (+13 TWh) and from conventional thermal power stations (+54 TWh, i.e. +5% with regard to 2001). Moreover, production from renewable sources increased by 20% (+4 TWh) when compared to the 2001 situation. When the hydro power is taken into account, the total renewable production reach 300 TWh which represent nearly 14% of the total consumption in 2002 for the UCTE. This ratio is 2.5% lower than in the previous year.
Considering the EU targets in terms of total consumption satisfied by renewable sources (22% in 2010), the present situation shows that hydro conditions will continue to have a major influence in the coming years, despite the considerable efforts made in terms of increase in generating capacity from renewable sources (essentially wind power stations) and in terms of improvement of the availability of this kind of resources (availability hardly foreseeable today). The global amount of imports in all UCTE countries represents 262 TWh, that represents 12% of the consumption but is 1% lower than the previous year value.

Power Balance

System Adequacy, as far as Power Balance is concerned, is in the UCTE framework very dependent on the weather conditions in winter time. In 2002 these conditions were not so severe as in the previous year. For this reason, no difficult situation was observed at the UCTE level. The generating capacity increased by 1.7% while the load at the reference point in December 2002 was 0.3% lower than in the previous year.

Peak load in 2002 was observed in Central Western UCTE during the period of the 10th to 12th of December.
The UCTE remaining capacity reached its minimum, but sufficient, levels in January and in June (9.7% and 9.0% of the generating capacity, respectively).
Commissioning of new power plants has significantly improved the power balance in Spain, where a difficult situation was observed last year, and in Greece whose potential difficulties were highlighted in the System Adequacy Forecast report.

Transmission System Adequacy

From a general point of view, the interconnected UCTE network seems to be more and more loaded, especially as far as the cross-borders lines are concerned, even if the volume of international exchanges is slightly lower than in the previous year.
The physical flows, due to the commercial transactions between parties located in different countries (“the internal electricity market”), are becoming more significant than when they were related only to the mutual help between countries in order to maintain the security of the interconnected system. That can create some permanent or occasional congestions. Difficult situations resulting from unexpected loop flows were observed in Belgium, Italy, Switzerland and Austria.
The newly commissioned lines or the newly installed transmission devices have often a direct (or indirect when internal lines) impact on the constraints affecting the interconnections or on the transmission capacity and congestion management.

In 2002 these improvements concern the interconnections between France and Germany, France and Spain, Germany and The Netherlands, Spain and Portugal.
Some severe storms and rainy periods have affected the system in different countries, causing damages and loss of load. The main disturbances concern Belgium (storm in November), The Netherlands (storm in October), Greece (snow in January), Austria (storm in November), Czech Republic (floods in August).
On the 31st of January, the trial period of interconnected operation began within the 2nd synchronous zone. In July, the Western Ukrainian Power System (so called Burstyn Island) was interconnected to the UCTE network for the one year trial operation.

Market development

It is interesting to notice the likely link existing between the UCTE remaining index capacity and the prices observed on the European power exchanges.
High prices on the European power exchanges were observed in January, June and July. The weak levels of the remaining capacity in Germany in June, July, August and September (at UCTE the reference point) could probably explain the prices tension on LPX [1] exchange and the significant spread between LPX and Powernext for these months. The spread was lower in January due to a less comfortable situation in term of remaining capacity in France for this month.

1. Introduction

1.1 Objectives

The present report contains a retrospect of power and energy balances in the UCTE countries in 2002. The total results of the retrospect, comments and notes of national correspondents are presented in the report.
The UCTE System Adequacy Retrospect aims at:

- providing all players on the European power market with an overall overview of the operationnal conditions of the year 2002;
- identifying the trends which affect the UCTE system and their possible influence on system security in the medium term.
- since this year's report, providing all European electricity market players with an overview on the main changes in the UCTE Transmission grids.

From an "Energy and Power Balance Retrospect" to a "System Adequacy Retrospect"

Starting from this year's retrospect, some supplementary information concerning the recent transmission grid situation and commitments in each UCTE country have been included. 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.

Note 1 : the following CIGRE definitions are used:

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

Adequacy – a measure of the ability of the power system to supply the aggregate electric power and energy requirements of the customers within component ratings and voltage limits, taking into account of 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.

[1] LPX and EEX merge on July 29th 2002

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.

Note 2: for details about the adopted 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).

1.2 Content of the retrospect

The retrospect for 2002 includes power and energy balances for the following countries and electricity systems:

UCTE countries

Belgium (B)
Germany (D)
Spain (E)
France (F)
Greece (GR)
Italy (I)
Slovenia (SLO)
Croatia (HR)
Federal Republic of Yugoslavia (YU)
Former Yugoslav Republic of Macedonia (FYROM)
(new name Serbia&Montenegro)
Luxembourg (L)
The Netherlands (NL)
Austria (A)
Portugal (P)
Switzerland (CH)
Czech Republic (CZ)
Hungary (H)
Poland (PL)[2]
Slovak Republic (SK)

New countries included in this year's report[3]

Bulgaria (BG)
Romania (RO)
Burshtyn Island part of Ukraine (BI-UA)
(in trial synchronous operation with UCTE since July 1st, 2002)

Note: Bosnia & Herzegovina figures not included in this report, data only available since January 1st, 2003

In order to allow the simultaneous consideration of capacity being operated in parallel at the same frequency in the various member countries, the third Wednesday of each month at 11:00 a.m. (Central European Time) has been selected as the reference point for the balance.
For statistical reasons, data on electricity supplies in a number of countries have not been completely recorded. Depending upon the country concerned, the sectors included in this analysis represent between 85 (the Netherlands) and 100% of total consumption.
In order to ensure the coherence of the power and energy balances, the retrospect for the energy balance generally relates to the same statistical base as the power balance.
All data indicated in the power and energy balances are net values excepted Poland.

Regarding the representativeness of the power balance, it should be noted that the latter provides an instantaneous picture of the structure of production and consumption in the UCTE interconnected network.

2. Summary of Results

In the following tables, retrospective data for 2002 are compared to the results of the 2001 retrospect.

The main overall results of the power balance are shown in Table 1. Values are given in GW.

Table 1 | **UCTE - Power balance, Retrospect 2002** **Results in GW**

	December 2001 GW	December 2002 GW	Changes 2001-2002 GW	Changes 2001-2002 %
National generating capacity	513.3	524.1	8.8	1.7
Guaranteed capacity	379.4	394.5	14.9	3.9
Load at 11:00 a.m.	336.4	335.4	- 1.0	- 0.3
Balance of physical exchange	7.8	1.0	- 6.8	- 86.9
Remaining capacity with exchanges	51.0	60.1	9.2	18.0

In the UCTE, the results of the "Power Balance – Retrospect for 2002" for the month of December show an increase in the generating capacity (+1.7%) and the guaranteed capacity (+3.9%) in comparison to the previous year.

No significant changes in the reference load have to be noticed (-0.3%).

The remaining capacity, including the physical exchanges has increased by 18.0%. But the comparison is not so consistent due to the exceptional situation in December 2001 (see the UCTE Power Balance Retrospect 2001).

The main overall results of the Energy Balance are summarised in Table 2.

Table 2 | **UCTE - Energy balance, Retrospect 2002** **Results in TWh**

	Situation 2001 TWh	Situation 2002 TWh	Changes 2001-2002 TWh	Changes 2001-2002 %
Hydro power stations	334.5	275.4	- 59.1	- 17.7
Nuclear power stations	744.4	757.7	13.3	1.8
Conventional thermal power stations	1102.3	1156.5	54.2	4.9
Renewable energy sources	20.9	25.0	4.1	19.8
Not clearly identificable energy sources	4.9	5.0	0.1	3.0
Generation	**2207.0**	**2219.7**	**12.6**	**0.6**
Physical exchanges balance (imports-exports)	- 5.4	- 1.1	4.3	- 80.0
Pumped storage	- 38.0	- 42.7	- 4.7	9.1
Consumption	**2162.9**	**2175.9**	**12.2**	**0.6**

In 2002, total production in the UCTE showed a 12.6 TWh increase compared to 2001 (+0.6%). The increase in the UCTE consumption is in the same proportion and accounts for 12.2 TWh (+0.6%).
Production from hydroelectric plants showed a very significant decrease, 59.1TWh i.e. -17.7%, essentially due to the exceptional dry hydro conditions in continental Europe at the beginning of 2002, while production from nuclear plants increased by 1.8% (+13.3 TWh).

Production from renewable sources increased by 19.8% when compared to the 2001 situation. When the hydro power is taken into account, the total renewable production reached 300.4 TWh which represent nearly 14% of the total consumption in 2002 for the UCTE, but is 2.5% lower than the previous year.

This point has to be kept in mind when looking at the new European environmental requirements (Directive 2001/77/EC, September the 27th 2001, on the promotion of electricity produced from renewable energy sources) which ask for an average 22% of the total consumption satisfied by renewable sources.

Note: although hydroelectric power is a renewable energy source (according also to the definition from the relevant EU Directive no 2001/77/EC dated September 27th, 2002), it is shown separately on the grounds that hydroelectric capacity is foreseeable and contributes substantially to the reserve capacity available to transmission system operators.

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

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

3. Power Balance: Detailed Results

3.1 National generating capacity

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

Movements in national generating capacity between December 2001 and December 2002 are shown in Table 3:

Table 3 | **National generating capacity, Situation December 2002** | **Results in GW**

Country	Hydro power stations	Nuclear power stations	Convention all thermal power stations	Other sources	National generating capacity	Changes 2001-202	Changes 2001-2002
	GW	GW	GW	GW	GW	GW	%
B	1.4	5.8	8.2	0.2	15.6	0.0	0.0
D	9.3	20.7	65.0	10.9	105.9	0.1	0.1
E	18.1	7.6	26.4	5.3	57.2	5.1	9.9
F	23.9	63.3	23.5	0.4	111.1	- 0.1	- 0.1
GR	3.1	0.0	6.8	0.2	10.0	0.5	5.7
I	20.4	0.0	55.2	1.4	77.0	1.2	1.6
SLO	0.8	0.7	1.2	0.0	2.7	0.0	1.1
HR	2.1	0.0	1.6	0.0	3.7	0.1	2.8
JIEL System	3.9	0.0	6.7	0.0	10.6	0.0	0.0
L	1.1	0.0	0.5	0.0	1.6	0.1	6.3
NL	0.0	0.4	17.5	1.8	19.8	0.2	0.9
A	11.2	0.0	5.6	0.1	16.9	0.1	0.6
P	4.4	0.0	5.1	0.3	9.8	0.1	1.2
CH	13.2	3.2	18.2	18.2	18.2	18.2	0.3
CZ	2.1	2.6	10.5	0.0	15.2	0.9	6.3
H	0.0	1.8	5.4	0.4	7.6	- 0.2	- 2.2
PL	2.2	0.0	31.7	0.1	33.9	0.5	1.6
SK	2.4	2.6	2.3	0.7	8.0	0.0	0.0
UCTE	**119.7**	**108.7**	**273.8**	**21.9**	**524.1**	**8.8**	**1.7**

[4] Other sources: renewable energy sources + not clearly identified energy sources

At the end of 2002, the national generating capacity in the UCTE countries was 524.1 GW. This value represents an increase of 8.8 GW compared to the previous year (+1.7%). Moreover, in some countries very significant changes occurred: this is the case in Spain (+5.1 GW) and Italy (+1.2 GW).

The generating plant mix and the increase in capacity are shown in Table4:

Table 4 | **Generating plant mix and changes in capacity** | **Results in GW**

	Capacity December 2001		Capacity December 2002		Changes 2001-2002	
	GW	%	GW	%	GW	%
Hydro power stations	119.9	23.3	119.7	22.8	- 0.2	- 0.2
Nuclear power stations	107.4	20.8	108.7	20.7	1.3	1.2
Conventional thermal power stations	270.9	52.6	273.8	52.2	2.9	1.1
Other sources[5]	17.1	3.3	21.9	4.2	4.9	28.4
Generating capacity	**515.3**	**100.0**	**524.1**	**100.0**	**8.8**	**1.7**

Comments :

D The share of renewable energy sources in the installed generating capacity has again considerably increased in 2002.

E As it was said last year, because of the new environmental requirements and the favourable politics for renewable sources, the trend in the construction of new plants has shifted to wind power and combined cycle plants. Newly-commissioned conventional thermal capacity represents more than 2800 MW of combined cycle plants in Spain. Also, approximately 1500 MW of new wind power plants have been commissioned. Additionally, there are projects to construct 12200 MW of combined cycles and 8300 MW of wind plants until 2011.

F The year 2002 was marked by the connection of a 50 MW co-generation unit and the increase in the capacity of a 1450 MW nuclear power units to 1495 MW.

GR The new conventional thermal power plant in KOMOTINI is a combined cycle system comprising two gas turbine units of an installed capacity of 2x156 MW and a steam turbine unit of 164 MW. The new power plant was put into commercial operation in July 2002.

I The new conventional thermal power plants represent 1600 MW. 1850 MW conventional thermal power plant have been shutdown for re-powering. Newly installed capacity from renewable energy represent about 400 MW.

SLO Additional generating capacity in 2002 amounts to about 50 MW hydro power plant.

L The newly commissioned power plants represent 30 MW of co-generation.

CZ The Temelin 930 MW nuclear unit1 is in operation since June the 11th, 2002. Commissioning of NPP Temelin – unit2 is expected in second semester 2003.

H 185 MW conventional thermal power plants have been shut down in 2002.

PL 500 MW conventional thermal capacity has been commissioned, apart from smaller capacity increases due to modernisation efforts. The newly installed power plants from renewable sources represent around 40 MW.

[5] Other sources: renewable energy sources + not clearly identified energy sources

3.2 Unavailable capacity and reserves management

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

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

3.2.1 Non-usable capacity

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

Non-usable capacity for all UCTE countries reached its lowest value in December (74.3 GW) and its highest value in August (100.7 GW). These values represent a rate of between 14.2% and 19.3% of the total national generating capacity in December and August, respectively (524.1 GW in December and 520.5 GW in August).

Percentage figures for the various components of non-usable capacity in each country are shown in Table 5. These components are different according to the generating plant mix.

Table 5 | Comoponents of non-usable capacity in June and December 2002

	3rd Wednesday in June 2002		3rd Wednesday in December 2002	
	Hydro power stations	Thermal and other power stations	Hydro power stations	Thermal and other power stations
Country	%	%	%	%
B	n.a.	n.a.	n.a.	n.a.
D	n.a.	n.a.	n.a.	n.a.
E	65.0	35.0	62.0	38.0
F	51.0	49.0	38.0	62.0
GR	90.0	10.0	85.0	15.0
I	38.5	61.5	28.2	71.8
SLO	100.0		100.0	
HR	80.0	20.0	50.0	50.0
JIEL System	70.0	30.0	65.0	35.0
L	n.a.	n.a.		100.0
NL		100.0		100.0
A	35.0	65.0	89.0	11.0
P	88.0	12.0	76.0	24.0
CH	n.a.	n.a.	n.a.	n.a.
CZ	25.0	75.0	25.0	75.0
H	2.2	97.8	6.8	93.2
PL	6.9	93.1	8.6	89.4
SK	54.8	45.2	68.3	31.7

Comments:

B This information are commercially sensible and giving them for Belgium means giving them for the main producer. The figures in the annexed table A/1 represent an order of magnitude and not a precise value. The detailed values that should be mentioned in this table are not at disposal.

D According to the new methodology, the German TSOs do not collect detailed information on these items. As a result of statutory unbundling, the German transmission system operators do not receive detailed data on these power balance items from power plant operators. The data have partly been determined on the basis of estimations made prior to the liberalisation of the German electricity market.
In 2002, the energy capability factor was 1.24. Thus, hydro conditions were above the average. The share of renewable energy sources in the installed generating capacity has again considerably increased in 2002. This increase also explains the high level in non-usable capacity.

F The water availability observed in the first months of 2002 was very low especially when compared to the availability at the end 2001. The annual energy capability factor in 2002 was equal to 1.03.

G The energy capability factor ranged from 0.3 in February 2002 to 2.55 in September 2002. In autumn 2002, the favourable hydro conditions resulted in a significant rise of the hydro reserves. Nevertheless, the non-usable capacity throughout the year was mainly due to the limited reservoir capacity. In spring and in autumn 2002 the hydro conditions were more favourable than those of the previous years and the new power plant in Komotini (475 MW) was in operation in summer 2002 (heavy load period). Due to the fact that the new power plant was not in full commercial operation and the water reserves were low (poor hydro conditions in the last years) electrical energy was imported from abroad in order to meet the demand.

SLO Hydro conditions during the year 2002 : dry conditions during the first 4 months of the year and good conditions in the end of the year 2002.

L The hydro power is greatly influenced by the implementation of the pump storage plant of Vianden. 2002 was the first operating year for the new 385 MW conventional thermal plant. Smaller problems had to be solved.

CZ The unavailability rate of hydro power stations has been affected by destruction of the parts of the equipment caused by the flood on the Vltava river in August 2002. (The normal value in December is about 15%.)

PL There are not specific differences between year 2001 and 2002. Combined heat and power stations are the significant producers of electricity in Poland. Therefore the distribution of non-usable capacity of conventional thermal power stations depends on their type of operation – in summer the non usable capacity is much higher.

SK Reduction in pumping storage power plants overhauls has been noticed in June and July 2002 with regard to the 2001 value.

3.2.2 Thermal power plant overhauls

TABLE 6 shows the maximum and average capacity of plants in overhaul on the third Wednesday of the month in the UCTE countries. Since only a single reference point has been agreed for each month, it is not possible to provide an exact indication of overhauls completed in 2002 using data from the power balance only.

In the UCTE countries, non-available capacity due to overhauls reached a peak of 58.3 GW in September which represents 15.3% of the generating capacity of thermal power plants for that month.

Table 6 | **Characteristic values of overhaul programmes in the UCTE** **Results in GW**

	Max.capacity thermal power stations December 2002	Overhaul capacity, 3rd Wednesday at 11:00 a.m.				
		Average value		Max.value		
			Percent of thermal capacity		Percent of thermal capacity	month
Country	**GW**	**GW**	**%**	**GW**	**%**	
B	14.0	0.9	6.1	1.8	13.1	X
D	85.7	6.2	7.2	11.5	13.4	VI
E	33.9	1.0	3.1	3.1	9.1	IV
F	86.8	9.4	10.8	16.5	19.0	VI
GR	6.8	0.4	5.9	0.8	12.5	IV
I	55.2	9.0	16.3	12.1	21.9	VIII
SLO	1.9	0.1	5.1	0.7	35.4	V
HR	1.6	0.1	8.9	0.4	25.0	V,VI
JIEL System	6.7	1.4	20.4	2.1	31.3	V,VII,VIII
L	0.5	0.1	21.5	0.4	80.0	I-XII
NL	17.9	0.8	4.2	1.8	10.0	IX
A	5:6	2:8	49:3	4:3	76:8	I-XII
P	5.1	0.1	1.9	0.3	5.8	V,VI
CH	3.8	0.4	10.7	2.7	71.1	VIII
CZ	13.1	1.4	11.0	2.7	20.6	VI
H	7.2	0.5	7.3	1.0	14.4	V
PL	31.7	2.6	8.1	5.5	17.3	VII
SK	4.9	0.5	10.7	1.1	22.4	V,VI
UCTE	**382.4**	**37.5**	**9.8**	**58.3**	**15.3**	**VIII**

Comments:

B The figures represent an order of magnitude and not precise values. This is due to commercial sensibility of this kind of information.

E Both the unavailability due to the overhaul program and to outages has been greater in 2002 than in 2001. This difference has been caused by the new combined cycle plants, which are on trail.

F No remarkable difference with regard to 2001. Nevertheless, the level of overhauls at the end of the year was lower than in 2001.

GR There is no significant difference between the performed and the scheduled overhauls. In 2002, most overhauls were carried out during spring and autumn when the load was low, while in heavy load periods (winter and summer) the overhauls were reduced.

I Non sensible differences as compared to the previous year.

SLO The overhaul of the Nuclear power plant Krsko respected the plan.The overhaul of the Thermal power plant Sostanj (246 MW) was scheduled for the period from June 10 to July 22, 2002, but the overhaul was performed in the period from July 6th to September 16th, 2002.

NL TenneT is not any longer informed about the performed overhauls. Consequently, the values given correspond to the scheduled overhauls.

CH Thermal power stations are not taken into consideration for scheduled overhauls because the amount of production is insignificant in relation to the total amount.

PL The overhaul program in the year 2002 was less extensive than the one from the previous year.

SK In the year 2002 the overhauls were lower as compared to 2001. The differences occurred mainly at the beginning of the year (January - April).

3.2.3 Thermal power plant outages

TABLES A/1 in the appendix show the non-available thermal capacity due to outages for each month of the year 2002.

In 2002, the maximum value of capacity not available in the UCTE as a result of outages was 21.4 GW in September. This figure represents 5.6% of the nuclear and conventional thermal generating capacity for the same month.

Comments:

B The figures represent an order of magnitude and not precise value. This is due to commercial sensibility of this kind of information.

L On October 27th the busbars in the power station of the new conventional thermal plant was damaged by blustering wind and until October 30th in the evening the plant could not be re-connected to the grid.

NL The best estimated values for outages are given, as data are not any longer available for TenneT.

PL The outages decreased significantly in the winter months (January, February, December).

3.2.4 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.

During 2002, the reserve for system services ranged from 24 GW in July and August (approximately 8-9% of the synchronous load – 288.4 GW in July and 264.8 GW in August-) to 27.2 GW in November (approximately 9% of the synchronous load - 313.2 GW-).

Comments:

D In Germany, the TSOs’ system reserve (formerly included in the total reserves) shows a relatively constant value over the year, varying between 7.5% and 7.9% of the installed generating capacity.

GR There is an estimate of the figures on the table concerning the seconds and minutes reserve. Moreover, the TSO keeps as a reserve all the available generating capacity, according to the financial offers submitted by the generators, in order to use it for voltage and flow congestions.

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

3.2.5 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 in the UCTE reached a peak value of 394.5 GW in December – this figure represents more than 75% of the total generating capacity (524.1 GW in December). The lowest value of 322.5 GW was reached in August – this represents 62% of the total generating capacity (520.5 in August).

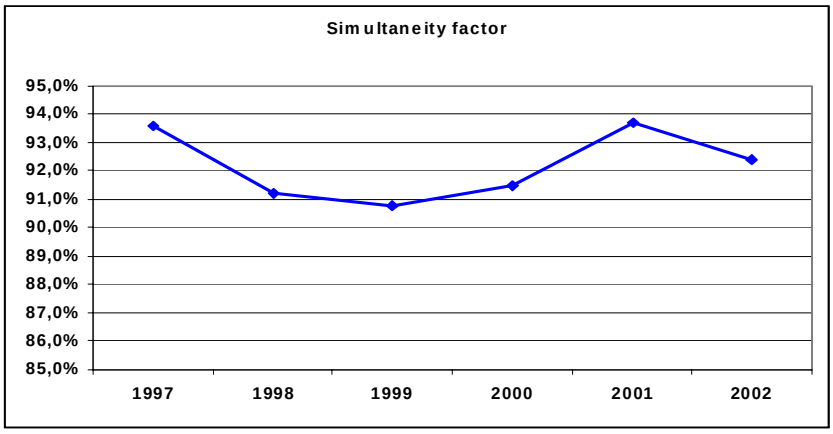
3.3 Load

The load at the reference point for the UCTE countries reached a maximum of 335.4 GW in December.
This figure is 1 GW lower than the maximum reference load recorded in December 2001. Maximum loads recorded in the various countries in 2002 (not at the same time) are shown in Table 7.

Table 7 | Time of maximum load in the various UCTE countries in 2002

Country	Day	Date	Time maximum	Peak load MW	Difference from 2001 peak load %	Obderved T °C	Deviation from average T °C
B	Wednesday	11/12/02	6:00 p.m.	13692	5.7	- 3.8	- 8.0
D	Tuesday	10/12/02	6:00 p.m.	79700	1.9	- 6.5	- 8.1
E	Wednesday	09/01/02	8:00 p.m.	34285	- 1.9	9.0	2.0
F	Tuesday	10/12/02	7:00 p.m.	76620	- 0.6	3.6	- 1.1
GR	Tuesday	16/07/02	12:00 a.m.	8924	3.8	36.0	n.a.
I	Thursday	12/12/02	5:00 p.m.	52590	1.2	7.3	- 0.3
SLO	Thursday	12/12/02	12:00 a.m.	1901	3.3	- 5.0	- 7.0
HR	Friday	04/01/02	6:00 p.m.	2685	- 3.9	n.a.	n.a.
JIEL System	Sunday	06/01/02	6:00 p.m.	8301	2.5	- 3.0	n.a.
L	Thursday	12/12/02	7:30 p.m.	967	4.3	- 4.1	- 7.0
NL	Thuesday	10/12/02	5:00 p.m.	15046	5.6	- 7.0	- 12.0
A	Wednesday	16/01/02	6:00 p.m.	8290	4.7	n.a.	n.a.
P	Thursday	12/12/02	7:45 pm.	7400	- 0.9	7.3	- 4.9
CH	Wednesday	16/01/02	10:30 a.m.	9236	1.7	n.a.	n.a.
CZ	Thursday	12/12/02	5:00 p.m.	10309	5.7	- 6.4	-7.7
H	Thursday	12/12/02	5:00 p.m.	5531	0.3	- 3.7	- 10.3
PL	Thursday	12/12/02	6:00 p.m.	23207	1.5	- 8.2	- 3.0
SK	Thursday	12/12/02	7:00 p.m.	4421	0.6	- 7.5	- 6.5

In 2002, the simultaneity factor (the common reference load of December divided by the sum of the individual peak loads) in the UCTE countries was 92.4% (as against 93.7% in 2001, 91.5% in 2000, 90.8% in 1999, 91.2% in 1998 and 93.6% in 1997). This ratio gives an estimation by excess of the difference between reference load and synchronous peak load at UCTE level.



Yearly peak loads were observed in most countries between the 10th and 12th of December. Exceptions concern Spain, Switzerland and Austria, JIEL system (peak in January) and Greece (peak in July).

Comments:

B The peak load value registered on 11/12/2002 is the maximum value ever registered.

D Data from the monthly statistics on load and on the balance of exchanges at 11 a.m. are not directly comparable, as the monthly statistics values are based on official statistics, whereas data on the power balance are obtained from separate enquiries made with the German TSOs.

E In 2002, the peak load has decreased with respect to 2001 in 1,85%. The temperature factor seems to be significant in this reduction. In fact, in 2001, the peak load occurred with a daily mean temperature of 4ºC, whereas in 2002 that temperature was 9ºC.

F The particularly mild weather conditions in 2002 (except for the first 10 days of January) led to a drop in heating-related consumption, evaluated at around 5 TWh compared with the previous year. In 2002, the maximum load was recorded on the 10th of December, with 76 620 MW, which represents the second maximum value registered (after the 77 080 MW recorded in 2001 on the 17th of December).

GR Despite the fact that the weather conditions in July 2002 were normal for the season, the peak load presented a significant increase.

I The maximum load represents the maximum historical value for Italy. Exceptional coldweather conditions were favorable to theese performances.

NL The given figures are the load as observed by TenneT. The total load of the Netherlands is supposed to be about 15% higher. As far as the peak load is concerned, the value observed was higher than expected, probably caused by the relatively low temperature.

P Monthly values and power balance values are not the same, because in the monthly values the following deliveries are not included as they are not available on time:
- Small hydroelectric independent producers;
- Renewable energy sources;
- Deliveries from the co-generators.

3.4 Remaining capacity without exchanges

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 service reserve. This capacity is required by power station operators to guarantee the reliability of supply to their clients, and compensate, for instance, longer power plant failures. In fact, it is interesting to compare this capacity with both generating capacity and margin against monthly peak load (differences between synchronous peak load and sum of non synchronous peak loads). Remaining capacity can be interpreted as the capacity that the system needs to assure 5% of installed capacity availability - a margin of 5% is considered by many operators as the level necessary by suppliers to guarantee the reliability of supply to their clients, and compensate, for instance, longer power plant failures - and, at the same time, the capacity necessary to cover the “margin against monthly peak load [6]”.

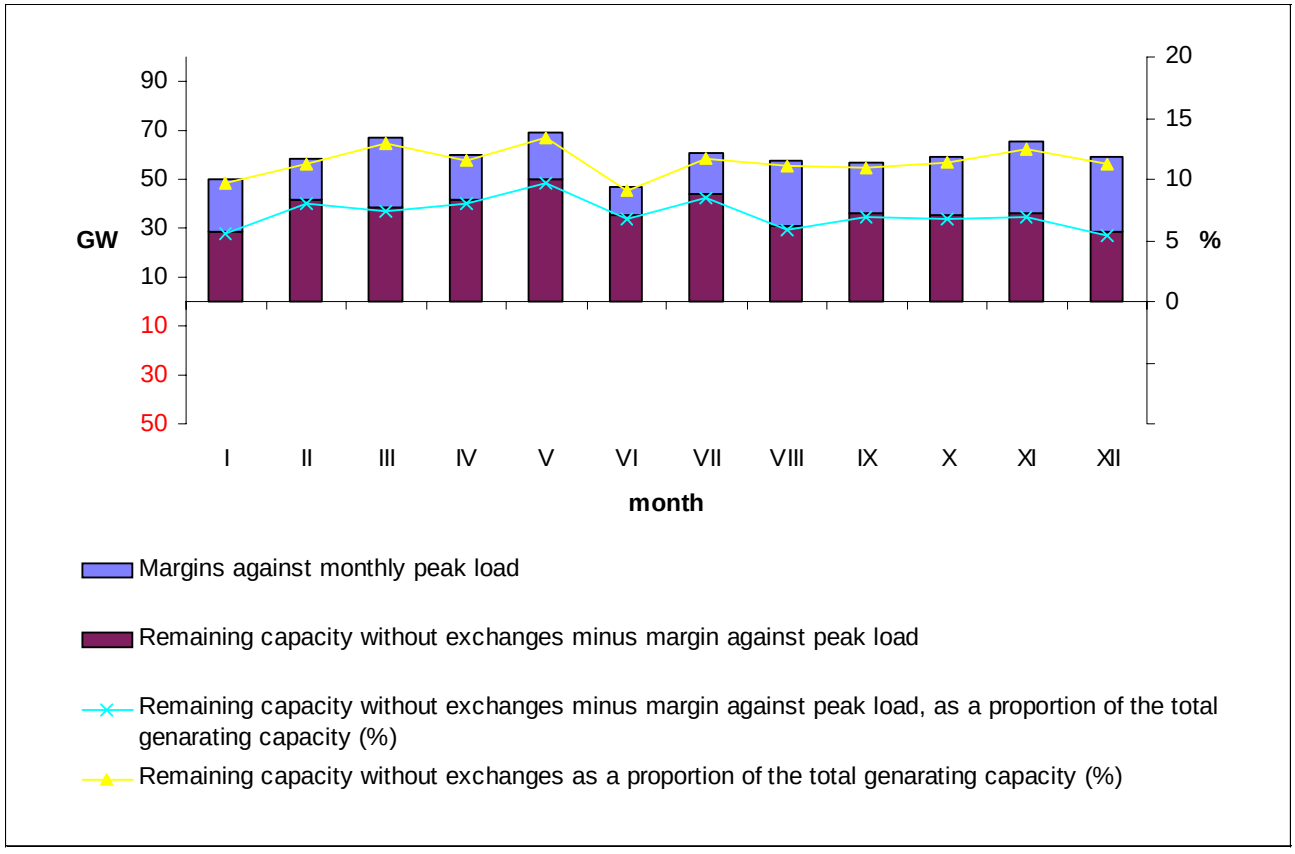
Monthly values for the remaining capacity without exchanges in proportion to total generating capacity in all countries are shown in Table 8.

Table 8 | **Remaining capacity without exchanges 2002 as % of total generating capacity**

month	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Noc.	Dec.
UCTE 2002	9.7	11.3	12.9	11.6	13.4	9.0	11.6	11.1	10.9	11.3	12.5	11.3
UCTE 2001	11.9	12.4	12.4	11.6	11.7	12.0	13.0	17.5	11.9	13.5	10.9	8.4
UCTE 2000	9.1	10.5	13.1	12.2	12.4	11.1	13.1	15.7	9.7	11.1	10.6	11.5

The lowest values are observed in June and January. Values in July and August are significantly lower than in the previous years. These values, together with the margin against peak load, expressed as a proportion of the monthly peak load, are shown in Figure 3. This margin provides an estimate of the potential fluctuations in demand which the remaining capacity would be required to cover.

Figure 3 | **Remaining Capacity**



The remaining capacity observed at the monthly reference points was sufficient to provide a 5% generation and to cover at the same time the peak load for the whole UCTE level.

[6] The margin against the peak load represents the difference between the reference load and pesk loak.

The following Tables 8.1 and 8.2 give the detail of the remaining capacity values for the UCTE countries for every month in 2002: values are given in GW and as % of the Generating Capacity respectively.

Table 8.1 | **Remaining capacity without exchanges 2002**
Net values at the reference time 11:00 a.m. every month — **Results in GW**

Country	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Noc.	Dec.
B	0.9	1.0	1.5	0.8	1.3	1.4	2.0	1.6	1.1	0.1	0.8	0.6
D	9.0	11.9	9.8	8.1	9.4	2.9	7.3	4.9	2.5	8.6	7.3	4.1
E	5.1	4.6	7.3	4.4	9.4	3.6	8.6	9.0	8.9	10.7	10.4	10.7
F	8.0	7.3	15.2	14.2	19.8	11.4	13.1	9.9	12.3	10.3	13.2	12.9
GR	0.4	0.0	0.5	0.3	0.1	0.2	- 0.2	1.2	0.8	1.5	1.3	1.1
I	2.8	2.9	2.4	2.6	2.1	3.0	3.3	3.0	2.5	2.0	3.5	3.8
SLO	0.4	0.5	0.5	0.7	0.0	0.7	0.4	0.3	0.6	0.6	0.5	0.3
HR	0.5	0.9	1.3	1.2	1.2	1.0	1.2	1.4	1.6	1.1	1.4	0.9
JIEL System	- 1.3	- 0.4	0.2	0.7	0.3	0.3	0.2	0.6	0.2	0.2	- 0.2	- 0.9
L	0.8	0.4	0.5	0.9	0.4	0.8	0.9	0.5	0.8	0.9	0.9	0.5
NL	3.5	4.0	4.3	3.4	3.6	3.0	4.6	4.4	3.1	3.8	3.0	2.4
A	3.7	4.2	4.2	4.3	3.9	3.3	3.4	3.4	4.3	3.6	3.7	4.8
P	1.9	2.0	2.6	2.0	1.9	1.7	1.4	2.0	1.8	2.2	2.2	2.4
CH	3.5	3.9	4.1	4.7	5.4	5.6	5.3	4.8	5.6	3.8	4.3	3.4
CZ	1.7	2.8	2.2	1.0	2.1	2.3	2.1	2.4	2.5	1.3	2.0	1.7
H	0.8	2.0	1.7	2.0	0.6	0.5	0.7	0.7	0.6	0.4	1.0	1.7
PL	7.5	8.9	7.4	7.4	6.6	4.9	5.6	5.9	7.0	6.9	8.3	7.5
SK	1.2	1.5	1.2	1.2	1.0	0.5	0.7	1.6	0.5	1.3	1.7	1.3
UCTE	**50.3**	**58.4**	**66.8**	**60.0**	**69.2**	**46.9**	**60.6**	**57.7**	**56.7**	**59.3**	**65.2**	**59.1**

Table 8.2 | **Remaining capacity without exchanges 2002**
as a % of the generating capacity at the reference point — **Results in %**

Country	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Noc.	Dec.
B	5.8	6.4	9.6	5.3	8.1	9.1	13.1	10.3	7.1	0.4	4.9	3.8
D	8.5	11.3	9.3	7.7	8.9	2.8	6.9	4.7	2.4	8.2	6.9	3.9
E	9.4	8.7	13.6	8.1	17.4	6.5	15.6	9.0	8.9	10.7	10.4	10.7
F	7.2	6.5	13.7	12.8	17.8	10.3	11.8	8.9	11.0	9.3	11.9	11.6
GR	4.1	0.4	5.1	3.5	1.1	1.9	- 2.4	12.4	8.2	15.4	12.9	11.0
I	3.7	3.8	3.1	3.4	2.7	3.9	4.3	3.9	3.3	2.6	4.6	4.9
SLO	14.7	16.7	18.8	24.2	1.5	23.9	14.2	12.6	21.4	20.4	17.3	10.2
HR	13.5	24.3	35.1	32.4	32.4	27.0	32.4	37.8	43.2	29.7	37.8	24.3
JIEL System	- 12.3	- 3.8	1.9	6.6	2.8	2.8	1.9	5.7	1.9	1.9	- 1.9	- 8.5
L	48.8	23.6	30.3	60.0	24.9	53.5	55.4	28.7	50.7	54.0	55.5	28.5
NL	17.7	20.4	21.8	17.5	18.4	15.2	23.4	22.4	15.5	19.1	15.3	11.9
A	21.9	24.9	24.9	25.4	23.1	19.5	20.1	20.1	25.4	21.3	21.9	28.4
P	20.1	21.1	26.3	20.7	19.8	17.0	14.6	20.2	18.5	22.1	22.8	24.1
CH	20.2	22.5	23.7	27.2	31.2	32.4	30.6	27.7	32.4	22.0	24.9	19.7
CZ	11.9	19.6	15.4	7.0	14.7	15.1	13.8	15.8	16.4	8.6	13.2	11.2
H	9.8	25.8	22.8	25.6	8.3	6.0	9.6	9.8	8.1	5.7	13.4	22.9
PL	22.5	26.3	21.9	22.0	19.6	14.4	16.4	17.5	20.8	20.4	24.4	22.1
SK	15.0	18.8	15.0	15.0	12.5	6.3	8.8	20.0	6.3	16.3	21.3	16.3
UCTE	**9.7**	**11.3**	**12.9**	**11.6**	**13.4**	**9.0**	**11.6**	**11.1**	**10.9**	**11.3**	**12.5**	**11.3**

The remaining capacity has reached a level lower than 5% for some periods in Belgium, Germany, Greece, Italy and JIEL system.
When looking at the situation in Spain (from July) and Greece (from August), it is interesting to notice the positive influence of the commissioning of new generating capacity on the remaining capacity.

The following information from individual UCTE countries are relevant to the interpretation of the remaining capacity:

Comments:

B The remaining capacity represents more than 5% of the installed generating capacity, except for October (exceptionally high overhauls value) and December, the annual peak load month.

D During most of the months, the remaining capacity without exchanges totalled more than 5% of the installed generating capacity. Only during three months it was slightly below this value.

E At the end of the year, the remaining capacity has increased greatly due to the new capacity commissioned (2800 MW of combined cycle plants and 1500 MW of wind plants) and the fact that the end of the year has been very humid.

GR When taking into account the margin against the peak load, the remaining capacity without exchanges was low and sometimes negative. When positive, it consisted mostly of hydro capacity, which was available to cover the peaks of the load. The improvement in remaining capacity is due to the commissioning of Komotini power plan (475 MW) in summer 2002.

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

CZ The value was lower than expected due to the delay in Temelin Unit-1 commissioning.

3.5 Balance of physical exchanges

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

It is generally an import balance except for May. The maximum value recorded is 5.6 GW import in February, which represents nearly 1.8% of the load (315.1 GW in December).

The following Table 8.3 gives the detail of the balance of the exchanges values for the UCTE countries for every month in 2002:

Table 8.3 | Balance of physical exchanges **Results in GW**

Country	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Noc.	Dec.
B	0.9	0.8	0.7	1.1	0.6	1.1	0.5	0.2	1.5	1.4	1.4	1.2
D	3.1	3.4	5.7	6.4	6.4	6.4	5.6	6.8	5.9	3.1	6.4	5.5
E	1.1	1.0	1.3	1.2	0.9	0.8	0.9	0.6	0.6	0.8	0.8	0.2
F	- 7.1	- 6.1	- 10.8	- 10.6	- 11.1	- 8.9	- 7.1	- 7.5	- 7.8	- 8.7	- 11.4	- 11.4
GR	0.3	0.5	0.4	0.4	0.5	0.5	0.9	0.5	0.5	0.4	0.4	0.3
I	6.0	5.9	6.3	6.3	5.6	5.9	5.2	3.2	5.6	6.5	6.3	6.7
SLO	- 0.1	- 0.2	- 0.2	- 0.3	0.3	- 0.4	- 0.1	- 0.1	- 0.2	- 0.2	- 0.4	- 0.3
HR	0.5	0.5	0.5	0.2	0.4	0.5	0.6	0.5	0.3	0.3	0.1	0.2
JIEL System	1.3	1.2	0.4	- 0.1	0.3		0.3	0.2	0.7	0.4	1.0	1.3
L	0.1	0.7	0.4	0.1	0.3	0.1	- 0.1	0.6	0.0	0.0	0.2	0.7
NL	2.1	2.8	2.9	2.2	3.0	2.1	2.1	2.2	2.3	2.1	2.4	2.4
A	0.6	- 0.3	- 1.0	- 0.9	- 1.7	- 1.8	- 0.2	- 1.3	- 0.1	- 0.7	- 1.5	- 0.7
P		0.1	- 0.4	- 0.3	0.2	0.2	0.1	0.2	0.2	0.3	0.4	0.2
CH	- 2.7	- 1.8	- 1.9	- 2.5	- 3.8	- 4.0	- 3.0	- 2.9	- 3.2	- 2.9	- 1.8	- 2.7
CZ	- 0.8	- 1.3	- 1.3	- 0.8	- 1.3	- 1.5	- 1.6	- 1.8	- 1.6	- 0.7	- 1.1	- 0.4
H	0.5	0.5	0.6	0.8	0.7	0.8	0.9	0.7	0.7	0.6	0.5	0.3
PL	- 1.6	- 1.6	- 1.4	- 1.3	- 1.3	- 1.3	- 1.0	- 1.1	- 2.0	- 1.9	- 1.9	- 1.8
SK	- 0.6	- 0.6	- 0.9	- 0.6	- 0.4	- 0.2	- 0.1	- 0.5	- 0.1	- 0.7	- 0.7	- 0.6
UCTE	**3.5**	**5.6**	**1.4**	**1.3**	**- 0.5**	**0.2**	**3.9**	**0.6**	**3.4**	**0.0**	**1.2**	**1.0**

Comments:

D The trend of the past year towards increased import has continued.

F In 2002, French exports made considerable strides forward compared to 2001 (10.6% more than in 2001), especially from March to June, and from November to December, as the internal consumption was at this time lower than in 2001. On the other hand, French imports fell substantially (by 13.9%), especially in November and December because of a lower internal consumption in 2002 than in 2001. In all, the export balance rose by 12.2% in 2002. On Sunday, 22 December 2002, the historical record of the capacity export balance with a value of 13 277 MW, up 2.2%, was bettered.

GR There was an increase in imported electrical energy in comparison to the past years due to the limited reservoir capacity.

I During 2002 we have noted an increase with the exchanges as regards the year 2001, the amount of the energy has reached the value of 51.2 billions kWh. The operation of the Italian eastern border recorded high power flows, mainly on the second half of the year. Exchange values were much larger than the scheduled ones.

NL In accordance with the forecast 2002 is set in an estimated value for outages of thermal power plants. In the retrospective 2001 no amount for outages was given. For several reasons it isn't possible to compose an exact image of the power balance for the Netherlands, and therefore the results in terms of remaining capacity should be considered as of limited significance. TenneT isn't informed properly about the availability of plants and their maximum output, and only receives information about day-ahead programs and power available for system balancing within a bidding system. Furthermore, there are hundreds of relative small cogeneration producers in industry and agriculture who bring their surplus power on the network, but exact amounts of this decentralised power are not known as it appears as load diminution and as the volume can vary according to industrial activity, climatologic conditions, etc. After all should be remarked also that the load as observed by TenneT concerns only the load of the high voltage grid. Embedded and dispersed generation and the connected load in lower voltage networks isn't detected. This generation and load is estimated to be about 15% of the national load.

SLO No major differences in the exchange programs were observed in comparison to the past years.

SK As in the year 2001, the export of electricity continued all over the year 2002.

3.6 Remaining capacity with exchanges

Since the balance of exchanges is relatively low (except for February), the remaining capacity including exchanges shows the same variations as the remaining capacity without exchanges.
For the UCTE, this figure ranges from 47.1 GW in June to 68.7 GW in May.
The following Tables 8.4 gives the detail of the remaining capacity with exchanges for the UCTE countries for every month in 2002: values are given in GW.

Table 8.4 | Remaining capacity with exchanges **Results in GW**

Country	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Noc.	Dec.
B	1.8	1.8	2.2	1.9	1.9	2.5	2.5	1.8	2.6	1.5	2.2	1.8
D	12.1	15.3	15.5	14.5	15.8	9.3	12.8	11.7	8.4	11.7	13.7	9.6
E	6.1	5.6	8.6	5.6	10.3	4.3	9.5	9.6	9.5	11.5	11.2	10.9
F	0.9	1.2	4.4	3.6	8.7	2.5	5.9	2.4	4.5	1.6	1.8	1.5
GR	0.7	0.5	0.9	0.8	0.6	0.7	0.7	1.7	1.3	1.9	1.7	1.4
I	8.8	8.8	8.7	8.9	7.7	8.9	8.5	6.2	8.1	8.5	9.8	10.5
SLO	0.3	0.3	0.3	0.4	0.3	0.2	0.3	0.3	0.4	0.4	0.1	0.0
HR	1.0	1.4	1.8	1.4	1.6	1.5	1.8	1.9	1.9	1.4	1.5	1.1
JIEL System		0.8	0.6	0.6	0.6	0.3	0.5	0.8	0.9	0.6	0.8	0.4
L	0.8	1.1	0.9	1.0	0.7	0.9	0.8	1.0	0.8	0.8	1.1	1.1
NL	5.6	6.8	7.1	5.6	6.6	5.1	6.7	6.7	5.4	5.9	5.4	4.7
A	4.3	3.9	3.2	3.4	2.2	1.5	3.2	2.1	4.2	2.9	2.2	4.1
P	1.9	2.2	2.2	1.7	2.1	1.8	1.5	2.2	2.1	2.4	2.7	2.6
CH	0.8	2.1	2.2	2.2	1.6	1.6	2.3	1.9	2.4	0.9	2.5	0.7
CZ	0.9	1.5	0.9	0.2	0.8	0.8	0.5	0.6	0.9	0.6	0.9	1.3
H	1.3	2.5	2.3	2.7	1.3	1.3	1.7	1.4	1.3	1.0	1.5	2.0
PL	5.9	7.3	6.0	6.1	5.3	3.5	4.5	4.9	5.0	5.0	6.4	5.6
SK	0.6	0.9	0.3	0.6	0.6	0.3	0.6	1.1	0.4	0.6	1.0	0.7
UCTE	**53.8**	**64.0**	**68.2**	**61.2**	**68.7**	**47.1**	**64.5**	**58.3**	**60.1**	**59.2**	**66.4**	**60.1**

It can be noticed that imports have contributed to improve the remaining capacity in the countries were the lowest values have been observed (see §3.4).

Comments:

GR The forecasted remaining capacity was higher than that of the retrospect. This is because of the low water reserves, (poor hydro conditions in the last years) which resulted in a higher non-usable capacity than the one expected. On the other hand, in the new liberalised market the availability of hydro power capacity is subject to the owner' s decision and policy, therefore there is a great amount of uncertainty concerning the non-usable capacity parameter. The remaining capacity consisted mostly of hydro capacity which was available to cover the peaks of the load.

P The remaining capacity maintains close to the previous years' levels. However this value would be lower this year if the consumption had evolved as in the previous years.

CZ Very low value has been observed in April – due to the delay of Temelin Unit-1 commissioning and parallel planned overhauls on two nuclear blocks in NPP Dukovany.

SK Increase in "remaining capacity with exchanges" during the year 2002 was caused by lower overhauls of thermal power plants.

4. Energy Balance: detailed results

The constituent elements of the energy balance for individual UCTE countries in 2002 and 2001 are presented in the appendix (Table B/1).

4.1 Electricity production

In 2002, net electricity production in the UCTE countries was 2219.7 TWh, which represents an increase of 0.6% compared to the generation for the previous year.

The respective contributions of hydroelectric, nuclear and conventional thermal plants, together with other sources, to total electricity production in each country are shown in Table 9.

Table 9 | **Structure of generating 2002** | **Results in TWh**

Country	National generation 2001 TWh	Hydro power stations %	Nuclear power stations %	Conv. thermal power stations %	Other sources[7] %	National generation 2002 TWh	Variation 2001-2002 %
B	76.0	1.9	57.7	40.4	0.1	77.9	2.6
D	502.2	4.7	30.8	63.3	1.2	503.9	0.3
E	206.4	12.3	28.5	54.0	5.2	211.9	2.7
F	511.8	11.6	80.4	7.8	0.2	516.6	0.9
GR	44.5	7.5	0.0	0.2	10.0	0.5	5.7
I	266.5	17.6	0.0	80.4	2.0	270.3	1.6
SLO	12.9	22.8	40.8	36.4	0.0	13.0	0.7
HR	11.3	47.5	0.0	52.5	0.0	11.3	0.1
JIEL System	41.7	30.3	0.0	69.7	0.0	41.2	- 1.3
L	1.6	27.7	0.0	72.3	0.0	3.6	124.4
NL	89.8	0.0	4.0	96.0	0.0	92.1	2.6
A	54.2	68.6	0.0	31.4	0.0	51.2	- 5.5
P	40.3	20.2	0.0	77.8	2.0	39.4	- 2.1
CH	71.2	56.4	39.6	4.0	0.0	64.9	- 8.9
CZ	68.8	4.0	25.0	71.0	0.0	70.4	2.3
H	33.6	0.6	39.9	53.0	6.6	32.9	- 2.0
PL	144.5	2.6	0.0	97.3	0.1	143.3	- 0.8
SK	29.7	17.3	54.1	19.1	9.4	30.6	2.9
UCTE	**2207.0**	**12.4**	**34.1**	**52.1**	**1.4**	**2219.7**	**0.6**

[7] Other sources: renewable energy sources + not clearly identified energy sources

4.1.1 Hydroelectric power plants

Figure G1 shows annual electricity production in the various countries.

Table 10 shows the capacity utilisation factor of hydroelectric plants in 2002, compared to the results of the 2001 retrospect, for the UCTE countries.The capacity utilisation factor (in %) is calculated as the ratio of electricity produced over the period considered to the theoretical electricity production under conditions of maximum potential capacity.

Figure G1 | **Electricity production in hydroelectric power plants Retrospect 2002**

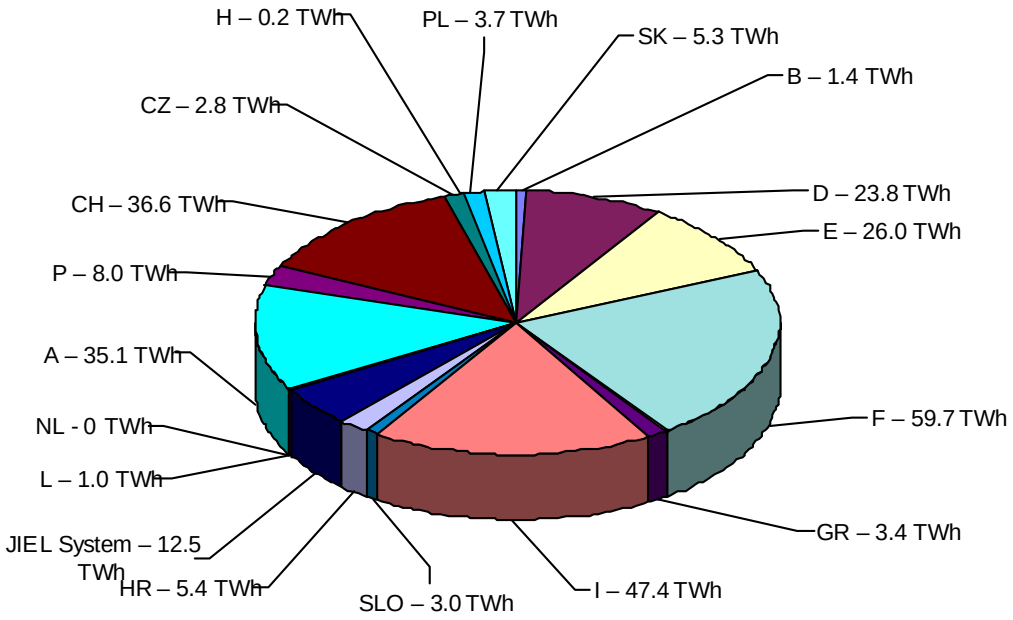


Table 10 | **Hydro power plants**

Country	Maximum capacity January 2001 GW	Maximum capacity January 2002 GW	Production 2001 TWh	Production 2002 TWh	Capacity utilisation 2001 %	Capacity utilisation 2002 %
B	1.4	1.4	1.6	1.4	13.0	11.8
D	9.8	9.3	23.4	23.8	27.3	29.3
E	17.7	18.0	44.0	26.0	28.4	16.5
F	24.3	23.9	74.9	59.7	35.2	28.5
GR	3.1	3.1	2.7	3.4	9.9	12.5
I	20.3	20.4	54.2	47.4	30.5	26.6
SLO	0.8	0.8	3.5	3.0	49.8	40.3
HR	2.0	2.1	6.6	5.4	37.7	29.2
JIEL System	3.9	3.9	12.2	12.5	38.6	36.5
L	1.1	1.1	0.9	1.0	9.3	10.1
NL	0.0	0.0	0.1		30.9	
A	11.2	11.2	40.5	35.1	41.4	35.8
P	4.4	4.4	14.1	8.0	36.5	20.6
CH	13.2	13.2	43.3	36.6	37.4	31.6
CZ	2.1	2.2	2.5	2.8	13.6	14.7
H	0.0	0.0	0.2	0.2	49.6	46.9
PL	2.2	2.2	4.0	3.7	21.1	19.4
SK	2.4	2.4	4.9	5.3	23.3	25.2
UCTE	**119.9**	**119.8**	**334.5**	**275.4**	**31.9**	**26.2**

In 2002, the production has been characterised by a scarce contribution of hydro power:
electricity production from hydroelectric plants was 275.4 TWh, which represents a decrease of 59.1 TWh with regard to the previous year's value! That point confirms the contribution of hydro energy to the 2001 electricity production was really significant, due to the exceptional hydro conditions.

Comments:

D Hydraulicity amounting to 1.24 was again considerably above the multi-annual average.

E In 2002, the hydro power stations generation reached less than 60% of that generation in 2001, because the hydraulic reserves were very low during the first semester of the year.

F The drop observed in 2002 in hydro generation (-16.6% compared with 2001) is mainly due to extremely low water availability observed during the first months of the year, compared to the high water availability in 2001. The annual energy capability factor in 2002 was equal to 1.03.

GR In 2002, the hydro generation presented an increase with respect to 2001 because the hydro conditions were more favourable than those of the previous years.

I The values of the energy capability factors during the year 2002 show a very variable behaviour. We have noted low factors during the first period of the year consequent a very dry weather phenomena. A high indicators has been observed in the last term of the year. In term of production the hydro generation has decreased by 10.9% as compared to the year 2001.

SLO Hydro power generation was lower than in the year 2001, mostly because of the dry conditions in the beginning of the year 2002.

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

P The hydro power stations generation had a reduction of almost 50%, due to the strong reduction of the inflows, situated 25% below the average values.

CZ Hydro power stations production was limited by destruction of the parts of the equipment caused by the flood on the Vltava river in August 2002.

SK The generation in 2002 increased (0.4 TWh). It was due to better hydro conditions that had influence mainly on hydro power station Gabcikovo.

4.1.2 Nuclear power plants

Table 11 shows the capacity utilisation factor of nuclear power plants in 2002, compared to the results of the 2001 retrospect, for the UCTE countries.

Table 11 | Nuclear power stations

	Maximum capacity January		Production		Capacity utilisation	
Country	2001 GW	2002 GW	2001 TWh	2002 TWh	2001 %	2002 %
B	5.7	5.8	44.2	45.0	88.5	88.5
D	20.7	20.7	161.2	155.0	88.9	85.5
E	7.4	7.6	61.0	60.3	93.9	91.0
F	63.2	63.2	401.3	415.5	72.5	75.1
GR	-	-	-	-	-	-
I	-	-	-	-	-	-
SLO	0.7	0.7	5.0	5.3	84.7	90.4
HR	-	-	-	-	-	-
JIEL System	-	-	-	-	-	-
L	-	-	-	-	-	-
NL	0.4	0.4	3.7	3.7	94.1	93.7
A	-	-	-	-	-	-
P	-	-	-	-	-	-
CH	3.2	3.2	25.3	25.7	90.3	91.6
CZ	1.6	1.6	13.8	17.6	98.5	125.5
H	1.8	1.8	13.3	13.1	86.3	84.5
PL	-	-	-	--	-	-
SK	2.6	2.6	15.7	16.5	68.9	72.6
UCTE	**107.3**	**107.6**	**744.4**	**757.7**	**79.2**	**80.4**

No major changes have to be noticed concerning the electricity production from nuclear power plants. In 2002, for the UCTE that accounts for 757.7 TWh, which represents an increase of 13.3 TWh (+1.8%) with regard to the previous year value.

Comments:

B The maximum capacity evolution is less important than shown in Table 11. The rules for rounding the MW values converted into GW have led to a lower value in 2001 and a higher one in 2002. The real difference is much smaller.

D The total energy generated by nuclear power stations has decreased by 3.8% and did not reach the record result of the previous year.

F As the nuclear power stations availability was better in 2002 than in 2001, the nuclear generation increased by 3.5% in 2002 as compared to 2001.

SLO The generation of the Nuclear Power Plant in the year 2002 was nearly the same as in the year 2001 – the overhaul was in the same period of time, no outages of the power plant.

CZ Increasing of nuclear power stations production (at about 28%) was caused by the successful completion of the operational tests on Temelin unit 1 and beginning of its regular operation in June.

SK The generation in 2002 increased (0.4 TWh). The highest increase of production was in the power plant Mochovce (0.48 TWh).

4.1.3 Conventional thermal power plants

Table 12 shows the capacity utilisation factor of conventional thermal power plants in 2002, compared to the results of the 2001 retrospect, for the UCTE countries.

Table 12 | Conventional thermal power plants

	Maximum capacity January		Production		Capacity utilisation	
Country	2001 GW	2002 GW	2001 TWh	2002 TWh	2001 %	2002 %
B	8.2	8.2	30.4	31.5	42.3	43.8
D	71.5	66.9	313.7	319.1	53.2	54.4
E	21.2	24.3	93.1	114.5	50.2	53.8
F	23.7	23.5	34.8	40.2	16.8	19.5
GR	6.3	6.3	41.4	41.3	75.1	74.9
I	54.4	54.7	207.3	217.4	43.5	45.4
SLO	1.2	1.2	4.4	4.7	40.6	44.2
HR	1.6	1.6	4.7	5.9	33.5	42.3
JIEL System	6.7	6.7	28.5	28.7	48.6	48.9
L	0.4	0.4	0.6	2.6	17.1	67.9
NL	17.3	17.5	84.5	88.5	55.6	57.7
A	5.6	5.6	14.2	16.1	28.8	32.8
P	5.1	5.1	25.5	30.7	57.5	69.2
CH	0.6	0.6	2.6	2.6	49.5	49.2
CZ	10.6	10.5	52.5	50.0	56.5	54.3
H	5.6	5.4	18.0	17.5	36.6	36.8
PL	31.2	31.3	140.5	139.5	51.4	50.9
SK	2.3	2.3	6.4	5.9	31.8	29.0
UCTE	**269.4**	**272.2**	**1102.3**	**1156.5**	**46.7**	**48.5**

In 2002, electricity production from conventional thermal power plants in the UCTE was 1156.5 TWh, which represents a significant increase of 54.2 TWh (+4.9%) with regard the previous year. This increase nearly compensates the decrease in production from hydro resources (- 59.1 TWh with regard to 2001).

Comments:

D The generation of conventional thermal power stations includes the quantities generated in plants of industrial auto-producers and supplied to the public/general supply network, and which are thus not used for auto-producers' own consumption.

E The total energy generation from conventional thermal power plants has increased by 23% with respect to 2001 in order to supply the lack of hydraulic generation. The contribution of different fuels has changed with respect to 2001 due to the increase of the gas share (new combined cycle plants).

F Conventional thermal power stations generation has increased by 15.5%, due to its role in providing power during peak load periods so as to achieve balance between power generation and consumption.

GR In 2002, the thermal power plants generation was nearly the same as in 2001. The contribution of the different fuels was : lignite 66.4%, natural gas 14.3% and oil 7.2%.

I The conventional thermal power stations generation has increased during the year 2002 by the 4.9%.

L The high variation 2001-2002 in Table 9 and in Table 12 is due to the new power plant in Esch.

NL The given share is obtained from Tennet's National Statistics Organisation. Tennet is not informed with specific information such as fuelling, performance, constraints.

SK Decrease of production (0,5 TWh) was due to more economical production of hydro and nuclear power plants.

4.1.4 Renewable energy sources generation

Table 12.2 | National energy sources generation **Results in GWh**

Country	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Noc.	Dec.
B	6	10	4	5	3	2	3	2	3	4	3	5
D	500	500	500	500	500	500	500	500	500	500	500	500
E	887	1006	1027	835	1013	853	934	838	780	950	971	1000
F	97	86	108	103	91	80	111	87	105	85	104	101
GR	20	27	40	31	29	31	20	30	11	21	26	40
I	427	432	480	442	445	409	403	428	450	525	538	541
SLO	-	-	-	-	-	-	-	-	-	-	-	-
HR	-	-	-	-	-	-	-	-	-	-	-	-
JIEL System	-	-	-	-	-	-	-	-	-	-	-	-
L	5	5	5	5	5	5	5	5	5	5	5	5
NL	-	-	-	-	-	-	-	-	-	-	-	-.4
A	0.6	- 0.3	- 1.0	- 0.9	- 1.7	- 1.8	- 0.2	- 1.3	- 0.1	- 0.7	- 1.5	- 0.7
P	64	63	68	61	63	49	72	58	59	76	67	87
CH	-	-	-	-	-	-	-	-	-	-	-	-
CZ	-	-	-	-	-	-	-	-	-	-	-	-
H	-	-	-	-	-	-	-	-	-	-	-	-
PL	6	6	11	6	8	9	9	7	8	12	12	14
SK	-	-	-	-	-	-	-	-	-	-	-	-
UCTE	**2006**	**2130**	**2238**	**1983**	**2152**	**1933**	**2052**	**1950**	**1916**	**2173**	**2221**	**2288**

Electricity production from renewable sources accounts for 25 TWh in 2002. These values represents an increase of around 20% with regard to the value in 2001.

Comments:

B In spite of a +44% evolution, the renewable energy sources generation is still very small.

D For the interpretation of values, account must be taken of the fact that official statistics usually comprise only values of plants = 1 MW. Consequently, the major part of generation from renewable energy sources is not included in line 4. Waste which by definition belongs to renewable energy sources has a predominant share in generation from renewables. Wind energy supplies are estimated at about 17 TWh in 2002 (11 TWh in 2001).

E 1500 MW of new wind plants were commissioned. This has caused an increase of 35% of renewable energy generation with respect to 2001.

GR There was no significant change with respect to 2001 in renewable generation. The contribution of the renewable generation to the total generation was 1%. The data are referred to wind power plants (installed capacity 174MW) connected to the transmission system.

I The renewable energy sources generation has increased during the year 2002 by 1.5%.

L The amount of renewable energy production in Luxembourg represents about 2% of the energy production in 2002. Promotions from government will increase this value in the future.

NL The given values are an estimate. No specific information is available.

P The wind production continues to increase significantly, 40% more than in 2001. In 2002 it represents 0.8% of the total production. Municipal waste power stations are included in conventional thermal power stations Wind power stations are included in hydroelectric power stations, as we do not have any place to include them.

CH The total production from renewable energy sources reached 884 GWh in 2001. There is no information available concerning the monthly production.

PL The significant increase of electricity production in renewable sources was to be observed in December 2002. No method of monthly statistics from this kind of sources exists due to the very small amount of renewable energy sources production.

4.2 Electricity exchanges

The volume of electricity exchanges (imports - exports) in the UCTE countries in 2002 represented 1.1 TWh export, lower than the corresponding figure for the previous year by 5.4 TWh.

Table 13 shows the balance of electricity exchanges and the proportion of the electricity consumption in 2002 for the UCTE countries. Results are compared with the balance for 2001.

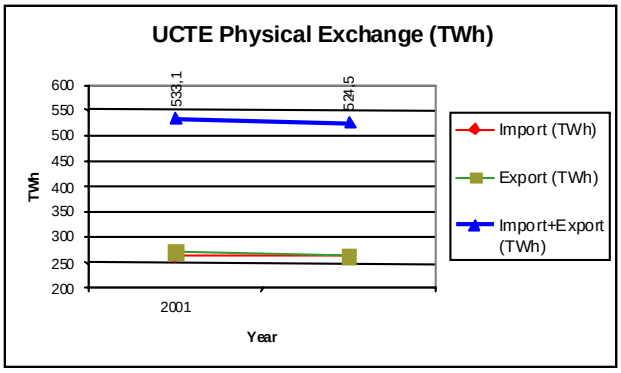
Table 13 | Balance of physical exchanges (import - export) — Results in TWh

	Balance		Balance of consumption		Consumption	
Country	2001 TWh	2002 TWh	2001 %	2002 %	2001 TWh	2002 TWh
B	9.0	7.5	10.8	8.9	83.4	83.9
D	- 1.3	0.7	- 0.3	0.1	494.8	498.6
E	3.5	5.3	1.7	2.5	205.7	210.3
F	- 68.9	- 76.9	- 15.8	- 17.8	437.1	432.4
GR	2.5	2.9	5.4	6.2	46.1	47.0
I	48.4	50.7	15.8	16.3	304.8	310.4
SLO	- 1.7	- 1.3	- 14.7	- 10.7	11.2	11.7
HR	3.2	3.5	22.1	23.9	14.5	14.7
JIEL System	4.2	4.5	9.4	10.0	44.9	44.6
L	5.4	3.7	91.5	60.5	5.9	6.1
NL	17.3	16.4	16.2	15.1	107.1	108.5
A	0.26	1.7	0.4	3.2	52.9	51.9
P	0.1	1.9	0.3	4.7	39.9	40.7
CH	- 12.0	- 3.2	- 21.0	- 5.5	57.2	59.2
CZ	- 9.5	- 11.4	- 16.2	- 19.5	58.7	58.5
H	3.2	4.3	8.7	11.4	36.8	37.2
PL	- 6.7	- 7.1	- 5.0	- 5.3	135.2	134.0
SK	- 3.6	- 4.2	- 14.0	- 15.9	25.8	26.1
UCTE	**- 5.4**	**- 1.1**	**- 0.2**	**- 0.0**	**2162.9**	**2175.9**

Table B/1 shows the detail of the export and import in 2002 for the UCTE.

The figure here below shows the evolution in physical exchanges for the UCTE (import + export) between 2001 and 2002.

Physical Exchanges TWh	2001	2002
Import	263.9	269.2
Export	261.7	262.8
Import + Export	**533.1**	**524.6**



Comments:

B In 2002 physical energy exchanges totalled more than 25 TWh. In the same time, the exchanges balance decreased, due to the fact that the value of 2001 was particularly high, as a consequence of a low national production.

F In 2002, French exports made considerable strides forward compared to 2001 (10.6% more than in 2001), especially from March to June, and from November to December, as the internal consumption was at this time lower than in 2001. On the other hand, French imports fell substantially (by 13.9%), especially in November and December because of a lower internal consumption in 2002 than in 2001.

GR There was an increase in imported energy because of the increase in the load and of the low hydro reserves.

I The import balance in 2002 has reached the amount of 51.5 GWh. This is the maximum historical value for Italy.

CZ The export of electricity from CZ has been always growing since 1997 (especially to Germany and Austria). On the other hand the import to separated islands (especially from Poland through 110 kV lines) has continued. The amount was over 1 TWh in 2002.

SK In the first half of 2002 the Burshtyn Island was in radial operation with the power system of Slovakia. From the middle of 2002 the western part of the Ukraine has been in trial operation with the UCTE. The balance (export) increased (0.6 TWh).

4.3 Electricity consumption

Electricity consumption in the UCTE countries in 2002 reached 2175.9 TWh and exceeded the last year's consumption by 12.2 TWh (increase of 0.6%).

Figure 2 shows the variation between 2001 and 2002 of the national electricity consumption, during the summer and the winter semester.

Figure 2 Variation of national electricity consumption during the summer and winter semesters in 2002 with regard to 2001

Figure 2 | **Variation of national electricity consumption during the summer and winter semesters in 2002 with regard to 2001**

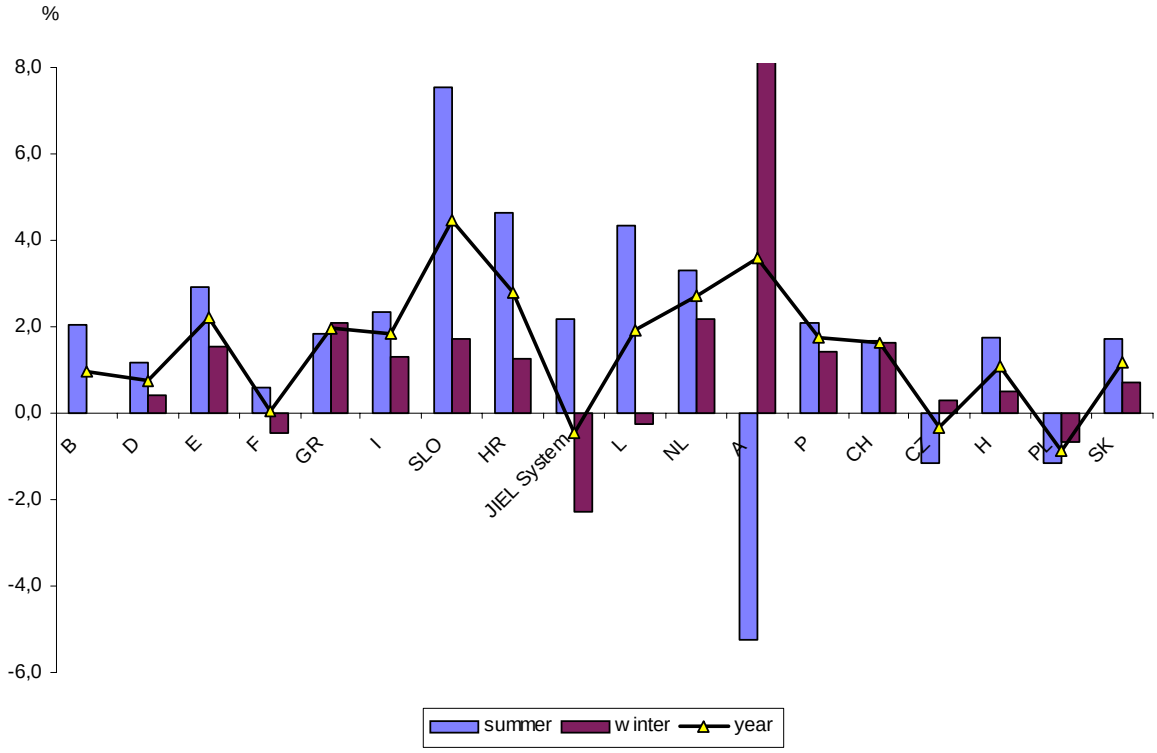


Table 14 shows the exchanges in electricity consumption in each UCTE country in percent

Table 14 | **Electricity consumption**

Country	Consumption 2001 TWh	Consumption 2002 TWh	Variation 2001 - 2002 %
B	83.4	83.9	0.6
D	494.8	498.6	0.8
E	205.7	210.3	2.2
F	437.1	432.4	- 1.1
GR	46.1	47.0	1.9
I	304.8	310.4	1.8
SLO	11.2	11.7	4.4
HR	14.5	14.7	1.6
JIEL System	44.9	44.6	- 0.6
L	5.9	6.1	2.6
NL	107.1	108.5	1.3
A	52.9	51.9	- 1.9
P	39.9	40.7	1.9
CH	57.2	59.2	3.4
CZ	58.7	58.5	- 0.3
H	36.8	37.2	1.1
PL	135.2	134.0	- 0.9
SK			
UCTE	**2162.9**	**2175.9**	**0.6**

Comments:

B The consumption growth can be considered as normal. It is a bit higher than the growth figure in 2001 but it is still under the average of the last five years (1.8%) These low growth figures show that energy consumption is determined to a large extent by the economy.

D Electricity consumption grew due to the climatic conditions and the weak economic cycle only by 0.8%.

F The particularly mild weather conditions in 2002 led to a drop in heating-related consumption, evaluated at around 5 TWh compared with the previous year. A slight upturn in industrial consumption was to be noted, with a growth of 0.5%. The electricity consumption thus reached in 2002 a value of 432.4 TWh.

GR There is an increase of 2% in consumption in 2002 with respect to that of 2001. The increase is lower than the forecasted one.

NL The growth of the consumption is a normal value and no exceptional trends towards climatic conditions can be concluded

.

P The increase of the consumption was the lowest since 1993. With correction of the temperature effect the consumption evolution changes from 1.7% to 2.7%.

SK The highest increase of consumption was in October (+7,0%) due to colder weather than usually. Notably increased consumption was also in July (+3,8%).

5.Transmission System Adequacy

Transmission system adequacy is analysed regarding three aspects :

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

From a general point of view, the interconnected UCTE network seems to be more and more loaded, especially as far the cross-borders lines are concerned. The physical flows, due to the commercial transactions between parties located in different countries ("the internal electricity market"), are becoming more significant than when they were related only to the mutual help between countries in order to maintain the security of the interconnected system. That can create some permanent or occasional congestions and situations that can affect system security.

In 2002 such difficult situations were observed in Belgium on the 27th of September, in Italy on the eastern border on the seconf half of the year, in Austria due to north to south internalflows, in Switzerland with most critical situations on the 15th and 16th of February and on the 16th of October.
The newly commissioned lines or the newly installed transmission devices have often a direct (or indirect when internal lines) impact on the constraints affecting the interconnections or on the transmission capacity and congestion management. In 2002 they concern the interconnections between France and Germany, France and Spain, Germany and The Netherlands, Spain and Portugal.
Some severe storms and rainy periods have affected the system in different countries, causing damages anf loss of load. The main disturbances concern Belgium (storm in November), The Netherlands (storm in October), Greece (Snow in January), Austria (storm in November), Czech Republic (floods in August).
On the 31st of January, began the trial period of interconnected operation within the 2nd synchronous zone.
In July, the Western Ukrainian Power System (so called Burstyn Island) was interconnected to the UCTE network for the one year trial operation.

Detailed comments:

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

B **Congestions:** troughout the year the Belgian network was heavily loaded by unidentified flows in direction South to North. These flows are mainly due to the French export in addition to exchanges from Switzerland to Germany, which are partly passing trough both Belgian borders. Non nominated flows to the extent of 1600 MW were reached during the summerperiod. Severe flows on the south-border were noted every month and reached their peak of 2600 MW on 27thSeptember when, due to severe security issues, ELIA was forced to warn the neighbouring TSO's that the opening of the Belgian North border, as a last resort, was imminent. As a result of intensive preparations with the concerned countries, the scheduled reinforcement of both tie-lines Vigy-Uchtelfangen was executed without security issues for the Belgian grid.

Main disturbances: during the autumn storm on 27th November, wind gusts up to 140 km/h were noted,causing 14 incidents, mainly in the 70 kV grid.

NL **Main disturbances:** At the end of October, the day after a heavy storm which passed over the Northern part of Europe, and which on itself did not cause damage to the network, several outages occurred in a regional 150 kV network in the south of the country, initiated by salt-pollution of isolators. The connection with the 380 kV network was lost and nearby the whole of the involved load as well as the local production was interrupted for about 2 hours. Some heavy industries in the region restarted their processes in the hours after the outage. So the amount of energy not supplied to the load, from the beginning of the outage until „normal supply situation" was reached, resulted to be nearby 6000 MWh.As local power plants also restarted later on the day, the loss of produced energy was calculated to be about 19300 MWh. Two days after this storm a 380 kV cable junction failed nearby the substation Maasvlakte. Salt deposits after the storm caused this problem too.

Main developments: the first phase shifter in Meeden has been commissioned in September. It main purpose is to increase the NTC value of the cross-border line Meeden-Diele/Conneforde between TenneT and Eon-Netz. These lines have been out of service for long periods, due to reconstruction works in connection with the phase shifters A second transformer has been commissioned in January 2003.

D **Congestions:** in 2002, bottlenecks on the transmission network existed at the frontierpoints of Germany to the Czech Republic, Poland, Denmark and the Netherlands. Congestion management will be handled by auctions. More details can be found on the Web sites of the German TSOs. Relevant links are available on the Web site of VDN (www.vdn-berlin.de).

Main developments: the thermal transmission cabability of the line Uchtelfangen - Vigy will increase by about 2x 450 MW on the frontier point (French side). Developements of the internal network are described in appendix 1.

F **Congestions:** the international interconnection have been highly loaded all the year long, especially towards Spain and Italy. The main congestions on the internal network concerns the lines in the Rhone valley and in the Alps.

Main disturbances: along the year 2002, the French power system has been operated without specific difficulties. No major disturbances endangered the system due to the offerdemand imbalance or to the network situations.

Main Developments: reinforcements have been put into operation in 2002 :

- reinforcement of the western 400kV line on the France Spain interconnection wich allows a capacity increase of 300 MW ;

- installation of a phase shifter transformer on the France Italy interconnection in order to reduce the congestion costs ;
- reinforcement of the France Germany interconnection by the renewal of the existing Vigy-Uchtelfangen line.

I **Congestions:** Regarding the interconnections, the operation of the Italian eastern border recorded high power flows, mainly on the second half of the year, sometimes with impact on the respect of the security criteria. Exchange values were much larger than the scheduled ones. These operating conditions were originated by remarkable loop flows on the border network. Very high temperatures and humidity, unusual in the period under consideration, were recorded on June, with consequent increase of the active and reactive power flows due to the high demand. In that period, emergency procedures, intended first of all to control voltage, were performed.

SLO **Congestions:** Main bottleneck is on the border between Slovenia and Italy on the two interconnection lines: 220 kV line Divaca – Padrice and 400 kV line Divaca – Redipuglia. The highest amounts of the power flows are observed during winter period and especially during the night. Limitations due to the transmission network – because of the high amounts of the ring power flows in the direction from East to West through the Slovenian network, the congestions on the border between Slovenia and Italy were observed. Operating conditions in the year 2002 were similar as in the year 2001.

Main development: a new transformer has been commissionned in the substation of Krsk with positive impact is on the internal voltage stability.

A **Congestions:** Generally the liberalisation process in Austria lead to increased load flows on the 220 kV grid between the north and the south of Austria. In some cases the (n-1) criteria could not be fulfilled. In addition on some days during the winter period remarkable simultaneous load variations of power plants in France and Germany resulted in a significant increase of the load flow on these lines and aggravated the tight load flow situation.

Main disturbances: between 14th and 17th November heavy storms caused some line outages in the central and western parts of Austria including the 380 kV connection between Westtirol (Austria) and Leupolz (Germany), which was out of operation for more than five hours. With the exception of the outage of two parallel 220 kV lines, which led to the interruption of supply in the substations Pyhrn and Klaus and the respective regional network (energy not delivered: approximately 10 MWh), there were no further interruptions of supply.

CH **Congestions:** the opening of the electricity market around Switzerland has strongly influenced the production pattern in and around Switzerland. This has led to an important increase of the transit flows crossing Switzerland during the night and in the week-end. The Swiss transmission grid was again heavy loaded in the winter and in the summer periods; two typical overload situations can occur in Switzerland :
„Summer day“ with high Swiss exports (high level of national generating capacity) and a large number of simultaneous withdrawals from service. This constellation leads to local bottlenecks when transporting generated capacity in the alpine region.
„Winter night“ with high Swiss imports (low level of national generating capacity) and simultaneous high north-south transits. Unacceptable overloads on the north-south interconnection lines and on the coupling transformers between 380 kV and 220 kV level can occur.

Main disturbances: the situation was particularly critical on the 15th and 16th February and in the night of the 16th October. In spite of this numerous critical situations no interruption of the electricity supply was registered till now. Mid of November heavy rain falls have lead to landslides and floods in some valleys in the Swiss Alps. Several transmission lines were damaged and a reduction of the exchange programs with Italy was necessary.

PL **Congestions:** transmission capacities from Poland towards the West are still fully utilised for most of the time of the year.

Main developments: The part of Western Ukrainian power system (so called Burshtyn Power Plant Island) after two week test operation in April 2002 was interconnected to the UCTE network for the one-year trial synchronous operation on 1st July 2002. Burshtyn Island cooperates in the frame of CENTREL Accounting and Control Block where Polish power system is a control block co-ordinator.

CZ **Main disturbances:** at the beginning of August long-lasting heavy rains caused flooding damage not chronicled in history of the country yet. Especially the Vltava Cascade´s hydro power plants were touched very much. Two storage plants – Orlik (4 x 90MW) and Stechovice 1 (2 x 11.25 MW) and one pump-storage plant Stechovice 2 (1 x 45 MW) - are still out of order. As referred to the HV network the 400 kV line from substation Cechy- Stred to substation Vyskov was out of order up to 20th December 2002 – the reason was a destroyed undermined tower.

SK **Congestions:** Slovakia is predestined by its geographic location, and in fact is significantly involved in electricity transits, especially in the north-south direction (from Polandto Hungary), as well as in the east-west direction. Existing 400 and 220 kV connections with the Czech Republic, Hungary, Poland, and Ukraine are fully loaded with electricity exchanges among the above states, and have significant share in electricity marketing in the Central and South-European region. Strengthening of cross-border lines and the solution of possible bottlenecks was a subject of a number of negotiations held in 2002 among transmission system operators of the surrounding countries. Particular attention was paid to the methodology of non-discriminatory allocation of transmission capacities at international profiles by application of an auction mechanism.

H **Main disturbances:** there was some trouble in the power supply on 2nd July 2002. There were some simultaneous failures in the transmission and distribution network in the south-west region of Hungary, which caused also generation outage. The power balance was able to be re-established by the help of foreign partners, however the some 25% voltage drop on the 120 kV distribution network was able to be corrected by load shedding ordered by dispatchers of national control centre. The actual load shedding was 43 MW (41.6 MWh). Before this, the previous supply outage caused by transmission network failure was more than 10 years ago.

Main developments: on 1st July 2002 the power system of Burshtyn Island was interconnected to the Hungarian and Slovak power systems, i. e. to the UCTE. The one-year synchronous test operation is in progress. This means, that after a more than 8-year period, also Albertirsa – Zahidno Ukrainska 750 kV transmission line was put into normal operation again. In 2001, the investment programs of Sándorfalva-Békéscsaba 400 kV and Paks-Pécs 400 kV internal lines were accepted and decision was made to start the projects. The expected date of commissioning is end of 2003 and not before 2005, respectively.

E **Main disturbances:** the most significant event in the Spanish system has been the incident occurred on April 15th : as a result of an over-tripped fault in the network, the Asturias area was disconnected from the rest of the system and began to work as an isolated system for 50 minutes. As the zone had generation excess the resulting loss of generation caused a registered deviation, in the power exchange with France, of 1178 MW (maximum value) and a recovering time of 16 minutes. The generation in the disconnected zone was regulated in pure frequency mode. Frequency values were kept between 49.95 and 50.20 Hz. No loss of supply was registered.

Main developments: a lot of new lines and substations were commisionned in 2002 (see list in appendix 1)

P **Congestions:** the main constraint occurs in wet conditions, whenever the hydro production at North is high and the transmission capacity inside Portugal (from North to Center/South where exist great load demand) is occupied in draining these excessive production. During year of 2002 the Portuguese NTC remains at the same level compared to previous year. The average value is around 650 to 750 MW in Winter and 550 to 650 MW in Summer, although values until 1400 MW can be reached in some more favourable network conditions. Otherwise when those unfavourable conditions occur simultaneously with network elements unavailability, some very low NTC values were registered along 2002.

Main developments: the new single 220 kV circuit 'Estarreja – Pereiros' will increment the transmission capacity inside Portugal (from North to Center/South). Also, there will be an increment of the NTC between North of Spain (Spain) and Portugal, basically in winter wet conditions. The new single 400 kV circuit 'Sines – Ferreira do Alentejo' in conjunction with the autotransformer 400/150 kV, 250 MVA at Ferreira do Alentejo will improve the supply conditions to the South of Portugal, in special during summer time.

GR **Main disturbances:** during the whole year continued the isolated operation of the 2nd synchronous zone from the main UCTE grid.

- The problem consisting in energy shortages deriving mainly from bad hydraulicity also from difficulties in energy procurement, especially in JIEL block and Albania, which appeared during the last months of the year 2001, continued mainly during the first half of January and had as result the accumulation of big inadvertent deviations and low frequency regimes.
- On 4th January 2002 some severe snowfall lasting more than 3 days hit eastern Greece, especially Attica and Evia. Around noon of the first day the loss of the major part of the lines in the areas of Lavrio and Aliveri resulted in the loss of the local production (approximately 900 MW) and the appearance of very low tensions in these areas (127 kV), inhibiting the resynchronisation of the power plants. To overcome the difficulty HTSO requested the load shedding of some 280 MW for approximately 30-50 minutes. The repairing of the high voltage lines, especially in Evia, took about one week, with the exception of one line which necessitated 37 days (18 towers damaged, two new ones installed). Low tension customers (mainly households) suffered mostly, mainly due to the fall of trees, resulting in the damage of the lines.

Main developments: the auto-transformer in the EHT s/s Acharnai has a positive impact on congestions in the Athens area. The submarine cable (DC link – 400KV – 500MW) between Greece and Italy has been put into commercial operation, increasing the total NTC value of the country and facilitating the development of the electrical energy market.

6. Comments on Market deregulation and Electricity Market Developments

This chapter gives some general information on the opening up of the internal market in terms of implementation of the EU Electricity Directive and market developments occured in the UCTE countries. The status of electricity market deregulation is not homogeneous over the UCTE countries. The new Electricity Directive draft will probably help to create a real internal European electricity market by the necessary harmonisation. Different power exchanges have been created over the Europe during the last two years and, some of them, shown an impressing growth of activity in 2002. From the market structure point of view, the creation and the development of regional power exchanges all over the Europe, based on market models at least consistent when not identical, is one the "conditio sine qua non" to promote a global electricity market. Moreover, from the infrastructure and operational point of view (interconnection lines), a lot of efforts have to be made to develop new exchanges capacities between these regional markets and to promote the harmonisation of the capacity allocation procedures.

B **Access to the grid:** The access from the French network to the Belgian network has been significantly improved by a new way of allocating exchange capacities on the France-Belgium border that has been settled by RTE and Elia , and implemented in July 2002.

Opening process of the market: situation in 2002 and timetable:

- Flanders:
  2002: end users consuming more than 1 GWh per year per site are eligible;
  1 January 2003: end users with connection capacity to the distribution network equal to or greater than 56 kVA will become eligible;
  1 July 2003: all users.

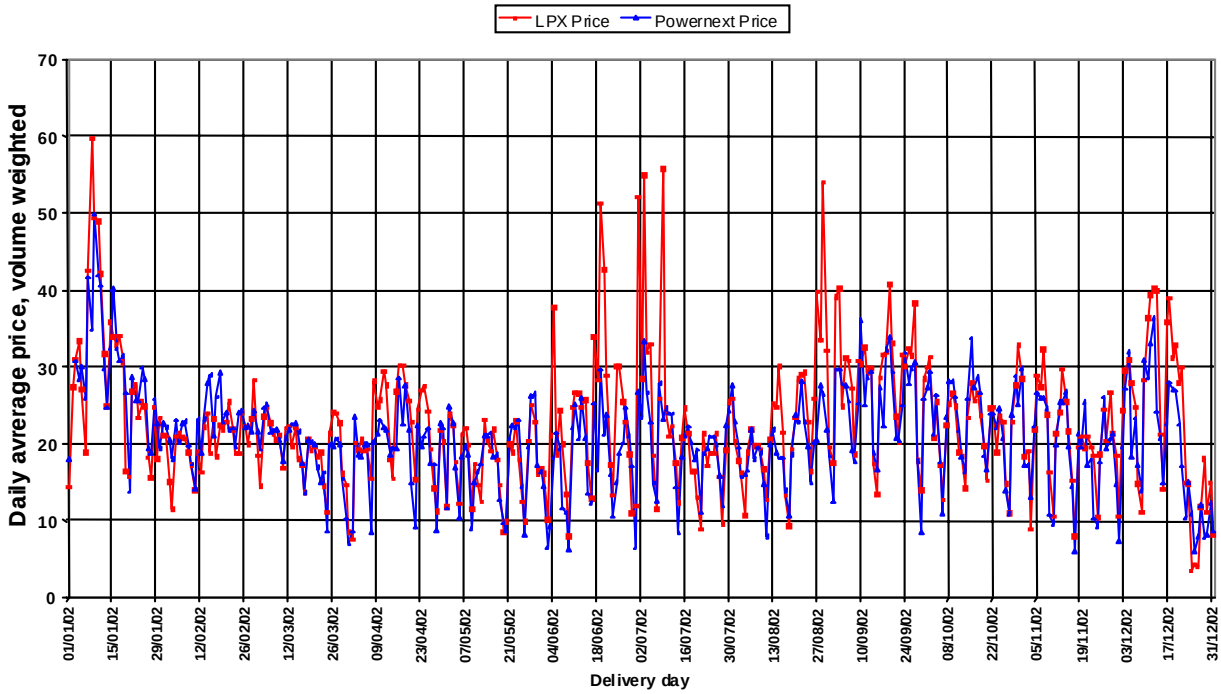
- Wallonia:
  The following consumers are eligible in 2002:
  end users with an annual consumption equal to or greater than 20 GWh per site;
  end users who buy exclusively from suppliers of environmentally friendly electricity;
  End users whose annual consumption is equal to or greater than 10 GWh per site will become eligible by 31 December 2002 .
  All end users of the high-voltage network will be eligible by 31 December 2004 at the latest.

- Brussels:
  End users who consume more than 20 GWh per year are eligible. On 1 January 2003 the threshold will be lowered to 10 GWh. All end users connected to the high-voltage network will become eligible on 1 January 2005, and all end users connected to the low-voltage network will become eligible on 1 January 2007.

D **Opening process of the market:** opening up of the German electricity market as a result of the new German Energy Industry Act of April 1998 has led to increased competition. Today, the German electricity market is characterised by mergers of electricity companies and by the entry of numerous new players, also from other countries, into the market. After the merger of VEAG, HEW and BEWAG, only 4 transmission system operators and control areas (EnBW, E.ON Netz, RWE Net and VET) instead of 6 have existed since April 2002.

Development of power exchanges: the Leipzig Energy Exchange formed in mid-2002 from the merger of the Power Exchanges in Frankfurt and Leipzig currently has about 120 participants, of which 50 are from other countries. The trade volume of the Energy Exchange has tripled in 2002. About 6 percent (approx. 30 TWh) of the German electricity consumption was traded on the Leipzig EEX. In 2002, the highest price on the EEX auction market amounting to 500.01 EUR/MWh was traded on 9 July for the hour 12 (11 a.m. to 12 noon). In the hour before and after that time, prices reached only 81.36 EUR/MWh and 71.05 EUR/MWh, respectively. The daily average price on the same day amounted to only 48.01 EUR/MWh. Generally, prices above average were observed during the 25th to the 29th weeks. The reasons for this were the persistent drought in Scandinavia and the resulting price increase in these countries. Furthermore, three German nuclear power stations were not available at the time of the highest prices. (Compared with that, the highest price recorded for the year 2001 reached 997.98 EUR/MWh on 18 December 2001 at 7 p.m. and 691.40 EUR/MWh on 17 December 2001 at 6 p.m. Prices of more than 650 EUR/MWh were also recorded during the hours before and after. The daily average price on this day was 240.26 EUR/MWh.)

Daily average price, volume weighted (€/MWh) from January 1st to December 31st 2002



F[8] **Development of power exchanges:** Powernext opened for trading day-aheadelectricity contracts on November 26th2001. One year on, its situation was characterised by coherent pricing, sharply higher volumes and a solid, diversified base of active members. The average base-load price on Powernext between November 27th 2001 and November 13th 2002 was 23.218 EUR per megawatt-hour. The average peak-load price (between 8 A.M. and 7.59(P.M) was 28.793 EUR/MWh – much higher than off-peak prices (17.640 EUR/MWh). Also, prices varied sharply depending on the season, from an average of 27.886 EUR/MWh during the „electric winter" (November to March) compared with 20.613 EUR/MWh for the rest of the year. Concerning the prices, on Powernext, a record was set on December 19th 2001 when hour 19 traded at 400.008 EUR/MWh. However, prices can sometimes plummet: on June 2nd 2002, the average price dropped to 6.631 EUR, the lowest level since the exchange opened. Price volatility on Powernext is high, as it is on other power exchanges. Since the market opened, volatility on base-load prices (i.e. the average price for the 24 hours of one day) has been running at nearly 900% (Volatility is measured by the annualised standard deviation of daily changes in the base-load price. The calculations are based on data supplied by the exchanges referred to in the Powernext report). Over the same period, volatility on Germany's EEX was approximately 700%. By comparison, the annual volatility of stock market indexes generally ranges from 10% to 20%. The prices determined by Powernext's auction essentially depend on the French grid's balance conditions, as well as arbitrage with other markets (the French OTC market and foreign markets). One of the reasons behind such levels of volatility is that electricity prices – yearly, weekly and daily – contain a significant seasonal component. There is a close correlation between the prices traded on Powernext and the structure of electricity consumption on the French power grid. Increasing demand for electricity at certain times of the day, week or year puts pressure on prices. With demand-correlation exceeding 90% and remaining stable throughout the year, Powernext prices offer a reliable benchmark.

GR **Opening process of the market:** deregulation of the market has introduced a new structure for the electricity industry in Greece. This structure, which applies only to the interconnected system, has been introduced in order to comply with the EU Electricity Directive.HTSO, an independent system organization, has been created and has taken over from PPC the responsibility for system planning, operation and development, together with the operation of the new trading arrangements.

[8] This information is issued from the Activity Assessment Report 2001-2002 of Powernext SA. The full report is available on the Powernext web-site www.powernext.fr.

HTSO will facilitate the entry into the market of independent generators who are permitted to compete for sales to certain customers, termed Eligible Customers. Under this new structure the main entities are:

- HTSO: An independent System Operator and a Market Operator.
- RAE: A Regulatory Authority for Electricity, responsible for the regulation of the new competitive activities.
- PPC: Continues to be responsible for the existing generation plants and all its customers, eligible and non-eligible. PPC is the transmission system owner and it is responsible for its physical operation. For accounting and regulatory purposes, PPC is unbundled between generation, transmission, distribution and supply.
- Independent generators: Are authorized to sell power in Greece , providing they are located in the EU. They can obtain access to interconnectors and all other necessary transmission capacity.
- Independent Suppliers (Purchasers): Are allowed to compete and sell power to Eligible Customers. As required by the Electricity Law, these suppliers cannot simply be traders, but they are required to own, in the EU, generating capacity sufficient to meet the demand of their contracted customers.
- Eligible Customers: They are initially large consumers connected directly to HV (transmission system) or to MV (distribution network).
- Non-Eligible Customers: Will continue to be supplied by PPC.
- Renewable Generators: Contract directly with HTSO. The Electricity Law has imposed special arrangements, related to tariffs, for these units.

The new Electricity structure is governed by codes and agreements. The Power Exchange Code and the Operating Code have been developed for the purposes of the new market. The Power Exchange Code sets the commercial rules of the market. The Operating Code sets the rules for system operation. A number of other agreements concerning the use of transmission system, ancillary services, transmission connection, transmission control and a number of authorizations set the rest of necessary rules for the market operation. The System Trading Arrangement creates the mechanisms by which new suppliers, new generators, international participants and the PPC can buy and sell electricity.
These mechanisms include procedures for scheduling and dispatching electricity generation and for determining a price at which imbalanced energy trades.

The principal characteristics of the System Trading Arrangement are:

- An independent System Operator and Market Operator, HTSO owns the two responsibilities, market operation and system operation.
- An offer based dispatch: Unit scheduling and dispatching is based on offers submitted by generators. HTSO conducts a least-cost dispatch of the offered generating capacity.
- A single price for imbalanced energy: a unique price of energy is set for the entire interconnected system, in every hour. This price (SMP) is the marginal offer cost of supplying an additional MW of energy to the system. SMP is determined ex-post on the basis of actual generation and actual load.
- Imbalances settlement: all electricity generated or consumed is sold by generators, bought by purchasers and settled by HTSO. HTSO does not consider independent contractual arrangements between participants during the settlement. Suppliers, which are both purchasers and generators are invoiced or paid for their net financial imbalance.
- Other costs incurred from the market and the system stability and safety such as ancillary services, losses adjustment and interconnector net costs are accumulated in an account named uplift account. These costs are recovered from purchasers on the basis of the energy consumption of their customers.

In the Greek Market there is a single price for imbalanced energy, the SMP price, which is determined ex-post on the basis of actual generation availability and actual load. The SMP price is high in heavy load periods when expensive units are scheduled to meet the demand. Some other parameters affecting the SMP price are the fluctuation of the fuel prices and the unconditional must run output of the units.

SLO **Opening process of the market**: from January 2003 the electricity market in Slovenia is open up to 60%. (for consumers which exceeded a connected load of 41 kW at one take-of point).

L **Opening process of the market:** the opening of the market is foressen by the law of 25th July 2000. Open processing is given in several thresholds.

- 1st threshold by February 19th 1999; consumer >100 GWh; distributors > 800 GWh
- 2nd theshold by 1st January 2001; consumer >20 GWh; distributors > 800 GWh
- 3rd theshold by 1st January 2003; consumer > 9 GWh; distributors > 90 GWh
- 4th theshold by 1st January 2005; consumer >1 GWh; distributors > 1 GWh

This may change up from July 1th 2004 due to new EU directive.

NL **Opening process of the market**: up from July 2001 all consumers of certified green electricity (renewables) are set free. This accelerated market opening, which has the intention to stimulate the use of renewables in households, resulted to be very successful and about one quarter of all consumers changed to providers of green energy. Since the beginning of 2002 also was made possible within this program the import of green electricity and consequently raised the share of renewables in imports to about 8 TWh in the year 2002. The remaining group of consumers will be set free at the beginning of 2004.

P **Opening process of the market**: the clients of the independent system represented in the end of 2002 about 4% of the total consumption.

CH **Opening process of the market**: deregulation of the Swiss market was rejected by the people when they voted against the introduction of the Elektrizitätsmarktgesetzes (EMG) market opening bill on September 22, 2002. The Swiss federal government finds itself caught in a dilemma between guaranteeing security of supplies in the electricity market and reconciling economic competitivity. Absence of guidelines makes it difficult to chart the future course of the electricity market and eventual deregulation remains open. Swiss grid operators are willing to negotiate access to EU countries to supply large, transmission gridconnected users.

PL **Opening process of the market** : according to the latest amendments to the Energy law (dated 24 July 2002) – at the day of Poland's accession to the EU, the opening of electricity market will be extended to electricity generated in the EU Member States. The already binding Regulated TPA has been introduced consequently. The Ordinance of the Minister of Economy on the schedule for acquisition of rights to use transmission services by individual groups of customers provides for opening of the Polish power market to progressively smaller customers. On 1st January 2002 all customers with total annual purchase of electricity of more than 10 GWh acquired that right. Customers with total annual purchase of electricity of more than 1 GWh will acquire that right from 1 January 2004, and others - from 5 December 2005.

SK **Opening process of the market**: opening of the electricity market in a customer's view means the option of electricity supplier selection. The process was started in Slovakia in 2002 and is proposed as a step-by-step process as per the Decree of the Ministry of Economy of the Slovak Republic No. 548/2002 Coll. The annual limit of electricity consumption was set from which a customer is authorised to conclude contracts on supplies of electricity generated either in Slovakia or in abroad:

- Since 1 January 2002 – customers with consumption no less than 100 GWh per year
- Since 1 January 2003 – customers with consumption no less than 40 GWh per year
- Since 1 January 2004 – customers with consumption no less than 20 GWh per year
- Since 1 January 2005 – customers with consumption higher than 0 GWh per year

The influence of opening the electricity market on the electricity price in particular periods has not yet been recorded, since a new rate structure has been valid since 1st of January 2003. In 2002 Slovakia commenced activities leading to establishment of the Electricity Market Operator (EMO) who shall be responsible for organising the electricity market at national as well as international level, and for co-operation with newly established electricity stock markets. EMO shall be established under the participation of entities acting on the electricity market. The process of meeting conditions of the Directive EU 96/92 EC continued by the establishement of the Slovak electricity transmission system (Slovenská elektrizaná prenosová sústava, a.s.) (SEPS) as an independent legal entity, on 21st of January 2002. The SEPS mission is to ensure electricity transmission from the main producer, Slovenské elektrárne, a.s. (SE) to three distribution companies and direct customers, as well as electricity imports, exports, and transits via the Slovak territory. The privatisation process of the Slovak power industry in 2002 continued in two areas. The

privatisation of three regional power distribution companies, which own and operate the part of the power system with voltage level of 110 kV and less, was completed. West-European power companies entered all the three distribution companies with 49% owner's share, i.e. Západoslovenská energetika, a.s. (ZSE) is partially owned by E.ON, Stredoslovenská energetika, a.s. (SSE) is owned by EdF, and Východoslovenská energetika, a.s. (VSE) is held by RWE. The privatisation of the dominant Slovak electricity producer - Slovenské elektrárne, a.s. - with generation capacities representing 87.8% of the total Slovak installed capacity, is in progress in co-operation with Pricewaterhouse Coopers agency and shall be completed in 2003.
New legislation has been adopted in the area of environment in order to harmonise with EU legislation. The following legal regulations have been adopted, having impact on activities related to electricity transmission:

- Act No. 184/2002 Coll. on the Waters (Water Act), Act No. 468/2002 Coll. on the System of Environmentally Oriented Management and Audit
- Act No. 261/2002 Coll. on Preventing from Serious Industrial Accidents, Notice No. 283/2002 Coll. on Execution of certain provisions of the Act on Wastes
- Notice No. 284/2002 Coll. which sets out the Waste Catalogue.

The SEPS's Environmental Policy (EMS) was updated in 2002 as per requirements of ISO 14 000 standards.The process of power generation deregulation and liberalisation was in progress in 2002. The Regulatory Authority, established on 1st of August 2001 by the Act No. 276/2001, has issued a number of decisions related to the regulation of electricity supplies prices for protected customers, and electricity distribution for authorised customers, as well as rates for transmission and system services. The basic legislative standard in the power generation industry is the Act No. 70/1998 (on power engineering), and the Act No. 276/2002 (on regulation in network industries). The acts are followed by the Decree of the Ministry of Economy (No. 548/2002 and 549/2002 Coll.), which set out rules of the electricity market opening, as well as conditions and rules for electricity transmission and distribution in the liberalised environment. Linked to the legislation adopted, SEPS issued the following documents in 2002, which have been approved by Regulatory Authority:

- Grid Code
- Dispatch Order for Control of the Power System of the Slovak Republic
- Trading Code

All the above documents are available on the web-site www.sepsas.sk. SEPS's commercial conditions for performance of the regulated activities are being developed.

7. Additional remarks

D At the time of data collection for the 2002 Energy Balance Retrospect (date: March, 2003), there were no data available from the official statistics. The values given here have been based on projected provisional statistics which will be successively replaced by official statistics during the year 2003. Consequently, the values given above may still differ from actual results.

SLO Slovenia signed CBT clearing and settlement agreement at the end of the year 2002 and is a member of the ETSO CBT from January 2003.

PL Poland has successfully finished its negotiation related to the EU accession. As a result of accession commitments the Revised Energy Policy up to 2020 has been adopted by the Polish Government ensuring further progress of the competitiveness within the power sector. Some transitional periods have been admitted to the Polish power sector, considering its obligation to fulfil requirements under the environmental issues. This derogation specified already in the negotiated measures for Poland (as of 19 December 2002) apply on provisions of the Directive 96/61/EC concerning integrated pollution prevention and control, and the Directive 2001/80/EC on the limitation of emission of certain pollutants into the air from large combustion plants.

8. Situation of Romania, Bulgaria and Burstyn Island

8.1 Power Balance

The main results concerning romanian and bulgarian power balance are shown in the following table.

Table 15 | Power balance, Retrospect 2002 — **Results in GW**

	Bulgaria Dec. 2002 GW	Romania Dec. 2002 GW	BG + RO Dec. 2002 GW
National generating capacity	13.2	17.3	30.5
Guaranteed capacity	8.7	10.8	19.5
Load at 11:00 a.m.	5.7	7.1	12.8
Balance of physical exchange	- 0.9	- 0.9	- 1.8
Remaining capacity with exchanges	2.2	2.8	5.0

Comments for Romania

Generating capacity:	320 MW conventional thermal capacity have been re-commissioned in 2002. 210 MW coal power plants have been shutdown.
Non usable capacity:	regarding meteorological conditions, the year 2002 was a normal year, with a slight draught in the first part of the year and an excess of rain in the second part.
Thermal power plants outages:	two outages of the largest unit (706.5MW) were registered; the deficit was covered within the time limits recommended by the UCTE regulation.
Reserves for system services*:*	system services reserves were programmed and realised above the value imposed by the standard disturbance (tripping of the largest unit), covering also the control of exported power.
Load:	the annual peak was with about 150MW lower than in 2001, in similar meteorological conditions.
Remaining capacity:	the remaining capacity represented between 3300 MW and 5000 MW, available for potential export.

The following table shows the power balance of the Burstyn Island in December 2002 :

Table 16 | Burstyn Island - Power balance, Retrospect 2002 — **Results in GW**

	Dec. 2002 GW
National generating capacity	2.6
Guaranteed capacity	1.2
Load at 11:00 a.m.	0.8
Balance of physical exchange	- 0.4
Remaining capacity with exchanges	0.0

Comments for Burstyn Island

The data only cover the three last months of the year. With an installed capacity of 2 550MW and a peak load of 1 000MW in December the export balance of Burstyn Island has been up to 420 MW during the period.

8.2 Energy Balance

The main results concerning Romanian and Bulgarian energy balance are shown in the following table.

Table 17 | Energy balance, Retrospect 2002 — Results in TWh

	Bulgaria Dec. 2002 TWh	Romania Dec. 2002 TWh	BG+RO Dec. 2002 TWh
Hydro power stations	2.4	15.8	18.2
Nuclear power stations	18.8	5.1	23.9
Conventional thermal power stations	15.5	29.5	45.0
Renewable energy sources	0.3	0.0	0.3
Not clearly identifiable energy sources	0.0	0.0	0.0
Generation	**36.9**	**50.4**	**87.3**
Physical exchangees balance (import-export)	- 6.3	- 2.9	- 9.2
Pumped storage	0.8	0.0	0.8
Consumption	**29.8**	**47.5**	**77.3**

Comments for Romania
The export increased by 122% with regard to 2001. The hydro generation registered an increase of about 9% compared to the previous year, while the energy reserve in reservoirs at the end of the year was with about 265GWh greater than in the previous year. Thermal generation was at the same level as in 2001.

The following table shows the energy balance of the Burstyn Island for the last three months of the year 2002 :

Table 18 | Energy balance, Retrospect 2002 — Results in TWh

	Situation October -December 2002 TWh
Hydro power stations	0.0
Nuclear power stations	0.0
Conventional thermal power stations	1.9
Not clearly identifiable energy sources	0.0
Generation	**1.9**
Physical exchangees balance (import-export)	- 0.7
Pumped storage	0.0
Consumption	**1.2**

8.3 Information concerning the Romanian system

Transmission system: no changes have to be noticed in the Romanian grid. The existing 750kV line Isaccea(RO)-Varna(BG) was operated at 400kV in a temporary scheme (Isaccea-Dobruja), which led to an increase of NTC values and of interconnected operation security.

Operating conditions: on the 31st of January 2002 the 1 year trial period of interconnected operation started, within the 2nd synchronous zone.
The first preliminary conclusions of the expertise team are the following:
- The actual network power frequency values are sufficient.
- The required amount of primary reserve is available.
- The behavior of the secondary control is good.
- The statistical parameters for the ACE fulfil the UCTE standard.
- The power system is operated under UCTE rules and requirements.

Normal frequency operating conditions were achieved through the joint effort of all partners to cover the load curve.

Opening process of the market: 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;
  - negociated 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 offers (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 Romanian Electricity and Heat Regulatory Authority – ANRE , that regulates these payments which are in strict conformity with the regulated contracts and the accepted offers.

The wholesale market consists of wholesale trade arrangements among participants for electricity and associated services. The price of electric power transmission is regulated 100% and approved by Romanian Electricity and Heat Regulatory Authority – ANRE.

8.4 Information concerning the Bulgarian system

The main developments of the Bulgarian grid are shown in the following table :

Substation/ Power plant		Voltage level, kV	Transmission capacity		
			Thermal		Limitation, MVA
			A	MVA	
Isaccea	Dbrodja	400	2475	1715	850
Isalnica	Kozlodui NPP	220	945	360	_**
Tantareni	Kozlodui NPP	400	1890	1309	1000*
Tantareni	Kozlodui NPP	400	1890	1309	
Nis	Sofia Zapad	400	1890	1309	1200
Thessaloniki	Blagoevgrad	400	1890	1309	1000

* This value is a limit that does not depend on the number of the lines that are switched on.
** The line is not currently in operation.

A / 1	UCTE System adequacy retrospect 2002, Power data (net values at the reference time 11:00 a.m. every month)	Results in GW

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
National generating capacity												
1. Hydro power stations	119.8	119.6	119.7	119.7	119.7	119.7	119.7	119.7	119.7	119.7	119.7	119.7
2. Nuclear power stations	107.6	107.6	107.6	107.7	107.7	107.7	107.7	107.7	107.7	107.7	107.7	107.7
3. Conventional thermal power stations	272.2	272.5	272.5	272.4	272.4	272.2	273.3	272.7	272.8	273.9	273.6	273.8
4. Renewable energy sources	15.6	15.7	15.9	16.5	16.6	17.0	17.3	17.7	18.1	18.8	19.7	20.2
5. Not clearly identifable energy sources	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
6. National generating capacity (6 = 1+2+3+4+5)	**516.9**	**517.1**	**517.4**	**517.9**	**518.1**	**519.4**	**520.7**	**520.5**	**521.1**	**522.8**	**523.5**	**524.1**
7. Non-usable capacity	75.9	77.0	87.5	79.7	78.7	76.9	82.3	100.7	84.2	87.9	78.5	74.3
8. Overhauls (thermal power stations)	15.4	24.1	29.8	43.4	50.8	52.1	53.9	53.9	44.7	36.6	24.3	16.6
9. Outages (thermal power stations)	14.2	15.5	13.7	13.4	17.1	18.2	13.3	19.4	21.4	15.9	14.7	12.2
10. System services reserve	26.6	27.7	26.8	26.5	24.1	24.7	24.0	24.0	24.5	25.8	27.5	26.4
11. Guaranteed capacity (11 = 6-(7+8+9+10))	**384.8**	**373.5**	**359.5**	**354.9**	**347.5**	**341.3**	**349.0**	**322.5**	**346.2**	**356.6**	**378.4**	**394.5**
12. Load	334.5	315.1	293.8	295.0	278.3	294.4	288.4	264.8	289.6	297.3	313.2	335.4
13. Margin against monthly peak load	22.0	16.8	28.7	18.5	18.9	11.7	16.4	27.0	20.8	23.8	28.8	30.9
14. Remaining capacity without exchanges (14 = 11-12)	**50.3**	**58.4**	**66.8**	**60.0**	**69.2**	**46.9**	**60.6**	**57.7**	**56.7**	**59.3**	**65.2**	**59.1**
Physical exchanges												
15. Import	33.5	33.6	32.3	32.1	33.0	32.6	35.2	31.2	33.5	30.6	34.1	34.6
16. Export	30.1	28.0	30.9	30.8	33.5	32.3	31.3	30.7	30.1	30.7	32.9	33.6
17. **Physical exchange balance (17=15-16)**	**3.5**	**5.6**	**1.4**	**1.3**	**-0.5**	**0.2**	**3.2**	**0.6**	**3.4**	**0.0**	**1.2**	**1.0**
18. Remaining capacity with exchange (18=14+17)	**53.8**	**64.0**	**68.2**	**61.2**	**68.7**	**47.1**	**64.5**	**58.3**	**60.1**	**59.2**	**66.4**	**60.1**

B / 1 UCTE System adequacy retrospect 2002, Energy data — Results in TWh

	B	D[9]	E	F	GR	I	SLO	HR	JIEL	L	NL	A*	P	CH*	CZ	H	PL	SK	UCTE
Generation																			
1. Hydro power stations	1.4	23.8	26.0	59.7	3.4	47.4	3.0	5.4	12.5	1.0	-	35.1	8.0	36.6	2.8	0.2	3.7	5.3	**275.4**
2. Nuclear power stations	45.0	155.0	60.3	415.5	-	-	5.3	-	-	-	3.7	-	-	25.7	17.6	13.1	-	16.5	**757.7**
3. Conventional thermal power stations	31.5	319.1	114.5	40.2	41.3	217.4	4.7	5.9	28.7	2.6	88.5	16.1	30.7	2.6	50.0	17.5	139.5	5.9	**1156.5**
4. Renewable energy sources	0.1	6.0	11.1	1.2	0.3	5.5	-	-	-	-	-	-	0.8	-	-	-	0.1	-	**25.0**
of which, wind	-	-	9.0	-	0.3	1.1	-	-	-	-	-	-	0.4	-	-	-	0.1	-	**10.9**
5. Not clearly identifable energy sources	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.2	-	2.9	**5.0**
6. Total (6=1+2+3+4+5)	**77.9**	**503.9**	**211.9**	**516.6**	**45.0**	**270.3**	**13.0**	**11.3**	**41.2**	**3.6**	**92.1**	**51.2**	**39.4**	**64.9**	**70.4**	**32.9**	**143.3**	**30.6**	**2219.7**
7. Exchanges (7 = 7a+7b)	**7.5**	**0.7**	**5.3**	**- 76.9**	**2.9**	**50.7**	**- 1.3**	**3.5**	**4.4**	**3.7**	**16.4**	**1.7**	**1.9**	**- 3.2**	**- 11.4**	**4.3**	**- 7.1**	**- 4.2**	**- 1.1**
7a. Import	16.6	46.2	12.5	3.0	4.6	51.6	7.2	3.9	7.4	6.6	20.9	15.6	5.3	27.0	9.5	12.6	4.5	6.7	**261.7**
7b. Export	9.1	45.5	7.2	79.9	1.7	0.9	8.4	0.4	2.9	2.9	4.5	14.5	3.4	30.3	20.9	8.3	11.5	10.9	**262.8**
8. Pumped storage	1.5	6.0	7.0	7.4	0.9	10.6	-	0.1	1.0	1.2	-	1.0	0.7	2.4	0.5	-	2.2	0.3	**42.7**
9. Consumption (9 = 6+7-8)	**83.9**	**498.6**	**210.3**	**432.4**	**47.0**	**310.4**	**11.7**	**14.7**	**44.6**	**6.1**	**108.5**	**51.9**	**40.7**	**59.2**	**58.5**	**37.2**	**134.0**	**26.1**	**2175.9**

* estimeted values

[9] For the interpretation of value, account must be taken of the fact official statistics usually comprise only values of units 1 MW or more. Consequently, the major part of generation from renewable energy sources is not included in line 4. Waste which by definition belongs to renewable energy sources has a predominant share indicated in the Table for generation from renewables.
Wind energy supplies are estimated at about 17 TWh in 2002 (11 TWh in 2001).

Appendix -Transmission System Adequacy, main grid developments

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

Germany

Line or Equipment name	Voltage Level	Commissioning Date	Main Characteristics (single or double circuit line, length, AC lines or DC lines,...)
Goldisthal - Altenfeld	2 x 388 kV	End of 2002	8 km
Röhrsdorf - Hradec	2 x 380 kV	End of 2002	1 km (reconstruction)
Zukunft - Verlautenheide	1 x 380 kV 2 x 110 kV	End of 2002	11 km (operated at 1x380 kV)
Anschluß Trossingen *	1 x 380 kV	End of 2002	1 km

* In the year 2002new constructions took place in the area of Engstlatt and Trossingen. A new 380 kV substation was built in Trossingen. For the additional support of this substation a new 380 kV line has been built between Engslatt, Kühmoos and Villingen, using the existing 380 kV line between Kühmoos and Villingen.
On 14th October 2002 till 10th November 2002 the 380 kV tie-line Uchtelfangen (Germany, RWE) - Vigy (France) haas been switched out of service for reinforcing the capacity with France.

Spain

Line or Equipment name	Voltage Level	Commissioning Date	Main Characteristics (single or double circuit line, length, AC lines or DC lines,...)
Substations:			
Rueda Jalón	400 kV		
Anchuele	400 kV		
Boimente	400 kV		
Zierbene	400 kV		
Terrer	400 kV		
Mediancelli	400 kV		
Las LLanas	220 kV		
Páramo de Poza	220 kV		
Saladas	220 kV		
Fausita	220 kV		
Boadilla	220 kV		
Aravaca	220 kV		
Alvarado	220 kV		
Casillas	220 kV		
Villanueva del Rey	220 kV		
Escombreras	220 kV		
Lines:			
Boimente - Aluminio	400 kV		
Boimente - PG Rodrigez	400 kV		
Meson do Vento - Cartelle	400 kV		Double circuit line
Cartelle - Trivis	400 kV		Double circuit line
Santurce - Ziérbena	400 kV		
Castejón - La Sema	400 kV		Double circuit line
Magallón - La Sema	400 kV		
Magallón - Penaflor	400 kV		
Rueda - Magallón	400 kV		
Rueda - Medinaceli	400 kV		
Medinaceli - Trillo	400 kV		
Terrer - Magallón	400 kV		
Terre - Trillo	400 kV		
Anchuelo - Trillo	400 kV		
Anchuelo - Loeches	400 KV		

France			
Line or Equipment name	**Voltage Level**	**Commissioning Date**	**Main Characteristics** (single or double circuit line, length, AC lines or DC lines,...)
La Praz	400 kV	August	Phase shifting transformer
Argia	400 kV	June	Substation
Croix de Metz - Void	225 kV	August	32 km
Vigy - Uchtelfangen (F - D)	400 kV	November	AC line, double circuit 4 x 570 mm^2 AM, 63 km

Greece			
Line or Equipment name	**Voltage Level**	**Commissioning Date**	**Main Characteristics** (single or double circuit line, length, AC lines or DC lines,...)
Florina	400 kV	2002	Substation
Arachtos - Trikala	400 kV	2002	AC, 106 km, single circuit
Galatina - Arachthos	225 kV	2002	DC, submarine cable, line 205 km
Autotransformer Acharnes EHT	400 kV	2002	280 MVA
Florina - Amyntaio	400 kV	2002	AC, 26 km, double circuit

Italy			
Line or Equipment name	**Voltage Level**	**Commissioning Date**	**Main Characteristics** (single or double circuit line, length, AC lines or DC lines,...)
Ravenna Canala - Porto Corsini	1 x 380 kV		12.860 km
Cagliari sud - santa Margherita	1 x 150 kV		2.290 km
Ceprano - Anagi	1 x 150 kV		58.120 km
6 new lines	150 / 132 kV		29.104 km
1 Transformer	380 / 220 kV		400 MVA
3 Transformer	380 / 150 kV		400 MVA each total 750 MVA
6 Transformer	380 / 132 kV		250 MVA each total 1500 MVA
2 Transformer	220 / 150 kV		160 MVA each total 320 MVA
4 Transformer	220 / 132 kV		250 MVA each total 1000 MVA
4 Transformer	220 / 132 kV		160 MVA each total 640 MVA
Transformer	220 / xxx kV	Decommissioned	

Slovenia

Line or Equipment name	Voltage Level	Commissioning Date	Main Characteristics (single or double circuit line, length, AC lines or DC lines,...)
TR 411 Krsko	400 / 110 kV	September 2002	

The Netherlands

Line or Equipment name	Voltage Level	Commissioning Date	Main Characteristics (single or double circuit line, length, AC lines or DC lines,...)
Phase shifter Meeden	380 kV	September 2002	1000 MVA

Portugal

Line or Equipment name	Voltage Level	Commissioning Date	Main Characteristics (single or double circuit line, length, AC lines or DC lines,...)
AT at SE of Ferreira do Alentejo	400 / 150 kV	21 December 2002	250 MVA autotransformer
TR at new SE of Lavos	400 / 60 kV	27 May 2002	170 MVA transformer
TR at new SE of Santarém	220 / 60 kV	07 June 2002	63 MVA transformer
TR at SE of Vila Cha	220 / 60 kV	19 July 2002	126 MVA transformer
TR at SE of Trajouce	220 / 60 kV	10 JUne 2002	170 MVA transformer
TR at SE of Sacavém	220 / 60 kV	23 December 2002	170 MVA transformer
Sines - Ferreira do Alentejo	400 kV	21 December 2002	single AC circuit of 59.4 kmA
Estarreja - Pereiros	220 kV	08 November 2002	single AC circuit of 81.3 km
Carregado - Santarém	220 kV	07 June 2002	double AC circuit of 34.7 km

Poland

Line or Equipment name	Voltage Level	Commissioning Date	Main Characteristics (single or double circuit line, length, AC lines or DC lines,...)
Transformer in Mikulowa substation	440 / 220 kV	15 August 2002	500 MVA
Transformer in Mikulowa substation	400 / 220 kV	15 December 2002	500 MVA

Executive editor: UCTE-Secretariat
15, Boulevard Saint-Michel, 1040 Brussels

Responsible for content: UCTE

Production editor: Vattenfall Europe Information Services GmbH, Berlin

Contact: www.ucte.org
info@ucte.org

Contact

Boulevard Saint-Michel, 15
B-1040 Brussels – Belgium
Tel +32 2 741 69 40 – Fax +32 2 741 69 49

info@ucte.org
www.ucte.org