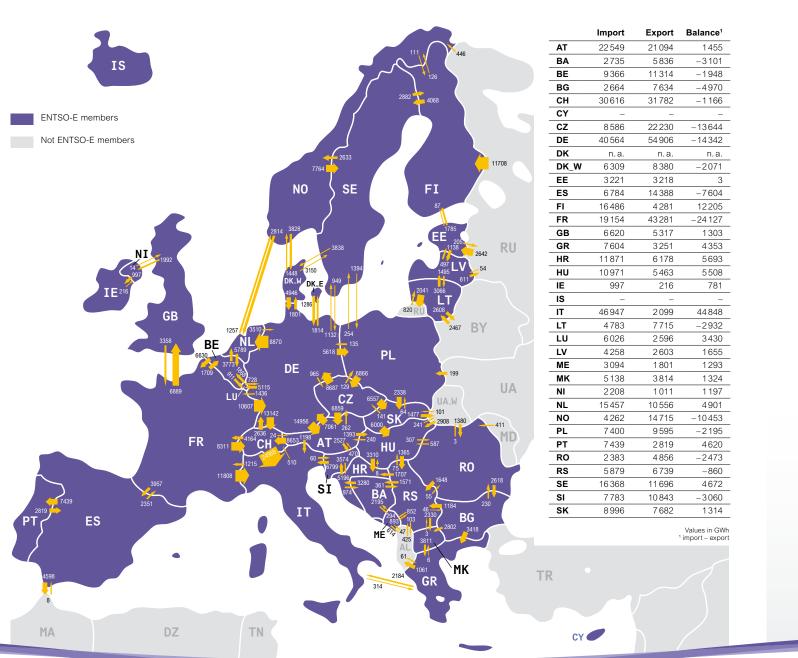
# **Memo 2009** provisional values as of 30 April 2010

# Physical energy flows



# ENTSO-E in figures

Representativity of the values % 100 100 100 100 100

tegional group												Con	tinenta	al Euro	ре										
		AT <sup>3</sup>	ВА	BE⁴	BG	CH⁵	CZ	DE <sup>6</sup> I	DK_W8	ES	FR	GR	HR	HU9	IT <sup>10</sup>	LU	ME <sup>7</sup>	MK	NL	PL <sup>11</sup>	PT	RO	RS	SI	SK
let generation¹																									
uclear thermal	TWh	0,0	0,0	45,0	14,3	26,1	25,7	128,0	0,0	50,4	390,0	0,0	0,0	15,5	0,0	0,0	0,0	0,0	4,0	0,0	0,0	10,8	0,0	5,5	13,1
ossil fuels	TWh	20,7	8,0	35,2	20,4	2,0	47,0	330,2	16,2	147,4	54,8	41,6	5,2	20,5	215,6	2,8	0,6	5,0	95,6	135,8	29,3	26,9	30,0	4,7	6,3
ydraulic net production	TWh	38,6	6,0	1,7	3,9	37,1	3,0	21,5	0,0	28,7	61,8	5,6	6,8	0,0	51,1	0,8	2,1	1,2	0,0	2,9	8,7	15,5	11,1	4,3	4,7
ther renewable net production	TWh	0,0	0,0	6,4	0,0	1,2	0,4	68,7	6,6	43,7	12,2	2,3	0,1	0,0	11,8	0,2	0,0	0,0	8,3	1,3	9,5	0,0	0,0	0,0	0,4
on-identifiable net production	TWh	9,5	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,4	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
otal net generation	TWh	68,8	14,0	88,3	38,5	66,5	76,0	548,4	22,8	270,7	518,8	49,5	12,0	36,0	278,5	3,8	2,7	6,3	107,9	139,9	47,5	53,3	41,1	14,4	24,4
consumption <sup>1</sup>	TWh	65.6	11.0	84.6	32,6	63.0	61.6	526,9	20.6	258,9	486,4	53,5	17,5	41,5	317.6	6,2	1.2	7.8	112,9	136.8	51,4	50.6	41.6	11,3	25,4
ariation (compared with 2008)	%	,-	-5,0		-5,4	-2,2	-5,5	-5,4	-5,0	-4,4	-1,6	-5,0	-2,0	0,6	-6,4	-7,2	-72,9	-9,8	-6,1	-4,2	-1,6		6,7	-10,6	-8,0
let generating capaci	ity as o	f 31 De	ecemb	er 2009	)2																				
GC nuclear	MW	0	0	5 902	2000	3 2 2 0	3597	20300	0	7465	63 130	0	0	1822	0	0	0	0	480	0	0	1300	0	700	1820
GC Fossil fuels	MW	6 344	1957	8 590	6523	355	10647	71 300	5 063	42918	26 158	8 284	1810	6 154	75400	498	210	907	22 902	29728	7834	8773	5115	1 315	2742
GC Hydro power	MW	11 853	2064	1413	2993	13464	2180	10400	9	19 044	25 341	3 200	2086	50	21375	1128	660	503	37	2327	4984	5904	2846	879	2478
GC Renewable energy sources	MW	985	0	1758	361	328	658	37 500	3 123	22 627	5 606	1 144	107	549	6506	80	0	0	3 031	719	3940	22	0	0	61
GC Other sources	MW	0	0	0	0	212	n.a.	0	23	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GC Total	MW	19182	4021	17663	11877	17579	17082	139 500	8218	92102	120235	12628	4003	8 5 7 5	103 281	1706	870	1410	26 450	32774	16758	15998	7961	2894	7101
epresentativity of the values	%	100	100	100	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	97	100	100	100	100

		DK	FI	15	NO	SE	EE	LI	LV	CY	GB	IE	NI	ENI
Net generation <sup>1</sup>														
Nuclear thermal	TWh	0,0	22,6	0,0	0,0	50	0,0	10,0	0,0	0,0	65,0	0,0	0,0	87
Fossil fuels	TWh	27,7	24,6	0,0	3,6	4,8	7,1	2,2	1,6	0,2	244,4	22,1	7,0	163
Hydraulic net production	TWh	0,0	12,6	12,3	128,2	65,3	0,0	1,1	3,4	0,0	6,1	1,2	0,0	54
Other renewable net production	TWh	6,7	8,4	4,6	1,0	13,6	0,4	0,2	0,1	0,0	1,1	3,1	0,8	20
Non-identifiable net production	TWh	0,0	0,6	0,0	0,0	0	0,0	0,0	0,3	0,0	0,0	0,1	0,0	1
Total net generation	TWh	34,4	68,7	16,8	132,8	133,7	7,5	13,5	5,4	0,2	316,6	26,6	7,8	327
Consumption <sup>1</sup>														
Consumption	TWh	34,0	80,8	16,3	121,6	138,5	7,1	9,6	7,2	0,1	314,6	26,2	8,8	3 2 3 0
Variation (compared with 2008)	%	-4,2	-7,4	-2,2	-5,6	-3,9	-4,4	-9,3	-7,3	2,8	-6,0	n.a.	n.a.	r
Net generating capaci	ity as o	f 31 D	ecembe	er 2009	<b>)</b> ²									
NGC nuclear	MW	0	2646	0	0	9354	0	1 183	0	0	13 920	0	0	1388
NGC Fossil fuels	MW	9 159	8815	120	900	5 5 0 2	2252	2 5 3 9	867	1 349	58 454	5461	2286	444
NGC Hydro power	MW	9	3074	1882	29617	16 203	4	850	1543	0	4 681	512	0	195
NGC Renewable energy sources	MW	4 151	2054	575	442	4661	167	89	41	0	1519	1260	304	1012
NGC Other sources	MW	44	85	0	0	0	0	62	0	0	0	186	0	(
NGC Total	MW	13363	16674	2577	30 959	35720	2 423	4723	2 451	1 349	78 574	7419	2590	8804

100 98 100

100 100 100

#### All values are calculated to represent

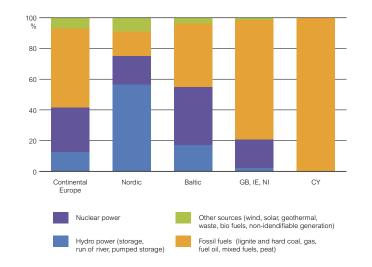
- 100% of the national values

  <sup>2</sup> All values are identical with the national values and their representativity
- <sup>3</sup> Official NGC values from E-Control as of 31 December 2006
- <sup>4</sup> The installed NGC fossil fuel power stations burning a mixture of fossil fuels and renewable energy sources totaled 1654 MW. Only 1387 MW of this capaclity is attibuted to fossil fuel.
- Calculation based on the ENTSO-E database differs from the official values
- from the Swiss Federal Office of Energy

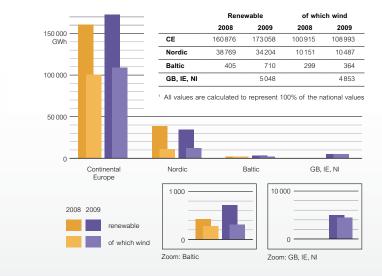
  6 Common / public supply
- NGC values as of 31 December 2008
   DK\_W represents the Western part of Denmark synchronously interconnected with ENTSO-E (Jutland and Funen)
- NGC Renewable includes equivalent capacity of biomass co-firing
   NGC data are provisional
- Operational data; NGC fossil fuel and renewable: Energy from co-firing (biomass combustion in lignite/hard coal power stations) is classified as energy from fossil fuels installations.

#### Generation

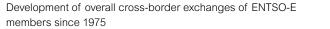
#### Generation mix

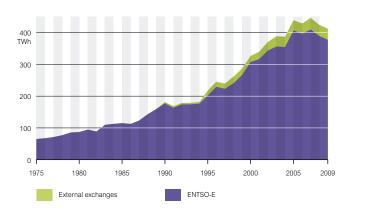


#### Renewable generation except hydro in GWh<sup>1</sup>



#### Development of exchanges





- Reliable Baltic data is available since 1995
- There were no exchanges between the Republic of Ireland and Northern Ireland before 1995
- External exchanges include Russia, Belarus, Morocco, Albania and Ukraine-West

#### Overview of overall electricity exchanges for 2009 in TWh

	All exchanges	External exchanges
ENTSO-E	375,7	37,2
RG Continental Europe	319,0	42,8
RG Nordic	51,7	21,9
RG Baltic	19,5	11,4
GB, IE, NI	11,5	3,6

#### External exchanges:

- ENTSO-E countries with AL, BY, MA, MD, RU, TN, UA, UA W
- Continental Europe countries with AL, BY, GB, MA, MD, NO, SE, TN, UA, UA\_W
- Nordic countries with DE, EE, NL, PL, RU
- Baltic countries with BY, FI, RUGB with FR

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Secretariat of ENTSO-E AISBL

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## Reliable. Sustainable. Connected.

ENTSO-E is the European Network of Transmission System Operators for Electricity, with 42 members across 34 European countries. Established on 19 December 2008, ENTSO-E has become fully operational in July 2009, ahead of the official schedule of the Third Energy Package.

ENTSO-E's legal raison d'être is Regulation (EC) 714/2009 on cross-border electricity exchanges. This Regulation assigns new tasks to ENTSO-E, such as the drafting of network codes that can become binding to system users; as well as EU-wide ten-year network development plans. Thus, ENTSO-E pursues primarily three objectives:

- $\bullet$  ensuring the secure and reliable operation of the European power transmission system;
- facilitating a secure integration of new generation sources, particularly growing amounts of renewable energy and thus contributing to the achievement of the EU's 20-20-20 goals;
- enhancing the integration of the internal electricity market through standardized market integration and transparency frameworks that facilitate competitive and truly integrated markets.

This Memo represents a short extract from a wide range of data and information, which is available from ENTSO-E's website (www.entsoe.eu) on its three main areas of activity: system operation, system development and market. In order to access our comprehensive market-related data base and market information, please also visit our transparency platform www.entsoe.net .

### Contact

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## **Grid information**

Number of 220 kV and ≥ 330 kV circuits on cross-frontier transmission lines as of 31 December 2009 between ENTSO-E countries

	СН	cz	DE	DK⁵	EE4	FR	GR	HR	ни	IT	LU	LV	ME	мк	NI <sup>2</sup>	NL	NO	PL	PT	RO	RS	SE <sup>5</sup>	SI	sĸ
AT	2/2	2/2	11/3	J.K			- Oik		2/1	1/-			""-				110			1.0	110	-	1/2	
ВА								7/2					2/1								1/1			
BE						2/3					2/-					-/4								
		BG					-/1							-/1						1/4	-/1			
		СН	5/7			5/5				5/5														
		CZ	-/4															2/2						2/3
			DE	2/3		2/4					8/-					-/6		2/2				-/1		
			DK⁵														2/1					2/2		
			EE									-/3												
				ES		2/2													3/4					
				FI⁴	-/-												1/-					1/3		
				FR						3/3														
220	kV/≥33	80 kV		GB <sup>2</sup>		2/-									2/-									
								GR		-/1				-/2										
								HR	-/2												-/1		2/3	
								HU												-/2	-/1			-/2
											IE				2/-									
																							1/1	
<b>3</b>				: I							LT	-/4												
Jver\	new C	ircuit I	engin	ırı km											ME						2/1			
Regio	onal gro	quo		220	kV		330 kV	,	380	–750 k\	,				MK						2/1			
	giv		0	f which		of v	which c			nich cal					NO	-/1						1/4		

Regional group	220 of which		330 kV of which o		380-79 of which	
Continental Europe <sup>1</sup>	120885	1965			111051	918
Nordic	4286	174			14400	1271
Baltic	184	0	2919	0	1541	0
GB <sup>2</sup> , IE, NI <sup>2</sup>	4468	653			8655	0
CY <sup>3</sup>	1227	120				

# <sup>2</sup> 275 kV instead of 220 kV

# Load flows night

16 December 2009, 3:00 a.m. CET

ENTSO-E members Not ENTSO-E members

Total = 45 333 MW

Sum of physical power flows: ENTSO-E = 41 263 MW



I = Import balance E = Export balance Sum of physical power flows: ENTSO-E = 39618 MW

Total = 43 850 MW

Values in MW

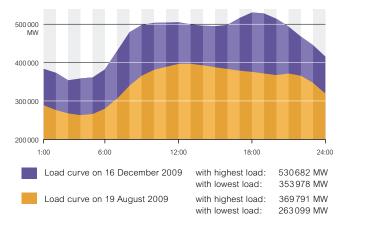
Load flows day

16 December 2009, 11:00 a.m. CET

# on the 3<sup>rd</sup> Wednesday 2009 ENTSO-E load diagram on the 3rd Wednesday of August and

Consumption

December 2009<sup>1</sup>



Maximum and minimum load of each country on 16 December 2009 in MW1

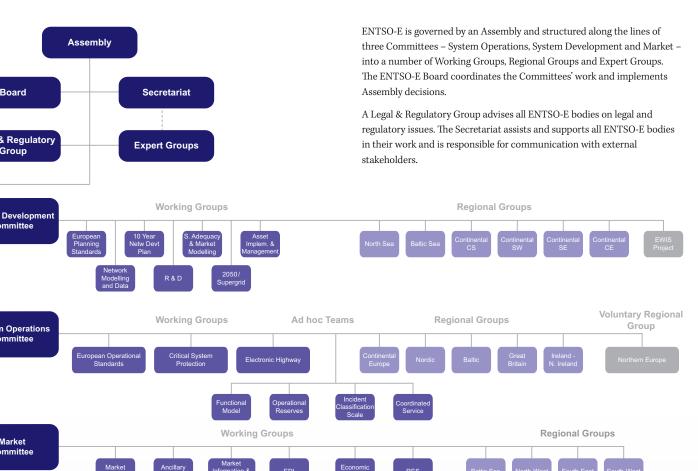
Country	Lowest value	Highest value	Country	Lowest value	Highest value
AT	6 186	9675	IE	2495	4594
ВА	1 097	1890	IS	1864	2045
BE	9808	13501	IT	27934	50963
BG	4 028	6207	LT	950	1630
СН	7 459	10261	LU	600	855
cz	7389	9836	LV	554	1 2 6 9
CY	392	756	ME <sup>2</sup>	415	606
DE	53 755	79111	MK	808	1312
DK	n.a.	n.a.	NI	851	1626
DK_W	1970	3545	NL	10068	17714
EE	977	1508	NO	15622	20521
ES	15710	44 058	PL	14792	22425
FI	11 520	13943	PT	5402	9241
FR	70 600	89719	RO	5735	8035
GB	32 033	55200	RS	4649	6923
GR	4 597	7864	SE	16235	23 133
HR	1 636	2948	SI	1 095	1 895
HU	4 171	6252	sĸ	3019	4056
			-		

<sup>1</sup> Values are calculated to represent 100 % of the national values <sup>2</sup> as of 17 December 2008

## **Members of ENTSO-E**

AT	Austria	TIWAG Netz	TIWAG Netz AG
		VERBUND APG	Verbund – Austrian Power Grid
		VKW-Netz	VKW-Netz AG
ВА	Bosnia Herzegovina	ISO BiH	Nezavisni operator sustava u Bosni i Hercegovini
BE	Belgium	Elia	Elia System Operator SA
ВG	Bulgaria	ESO	Electroenergien Sistemen Operator EAD
СН	Switzerland	swissgrid	swissgrid ag
CY	Cyprus	Cyprus TSO	Cyprus Transmission System Operator
CZ	Czech Republic	ČEPS	ČEPS, a.s.
DE	Germany	EnBW TNG	EnBW Transportnetze AG
		transpower	transpower stromübertragungs GmbH
		Amprion	Amprion GmbH
		50Hertz	50Hertz Transmission GmbH
DK	Denmark	Energinet.dk	Energinet.dk
EE	Estonia	Elering OÜ	Elering OÜ
ES	Spain	REE	Red Eléctrica de España S.A.
FI	Finland	Fingrid	Fingrid Oyj
FR	France	RTE	Réseau de Transport d'Electricité
GB	United Kingdom	National Grid	National Grid Electricity Transmission plc
		SONI (NI)	System Operation Northern Ireland Ltd
		SSE	Scottish and Southern Energy plc
		SPTransmission	Scottish Power Transmission plc
GR	Greece	HTSO	Hellenic Transmission System Operator S.A.
HR	Croatia	HEP-OPS	HEP-Operator prijenosnog sustava d.o.o.
HU	Hungary	MAVIR ZRt.	MAVIR Magyar Villamosenergia-ipari Átviteli Rendszerirányító Zártkörűen Működő Részvénytársaság
ΙE	Ireland	EirGrid	EirGrid plc
IS	Iceland	Landsnet	Landsnet hf
IT	Italy	Terna	Terna – Rete Elettrica Nazionale SpA
LT	Lithuania	Litgrid UAB	Litgrid UAB
LU	Luxembourg	Creos Luxembourg	Creos Luxembourg S.A.
LV	Latvia	Augstsprieguma tikls	AS Augstsprieguma tīkls
ME	Montenegro	AD Prenos	AD Prenos
MK	FYROM	MEPSO	Macedonian Transmission System Operator AD
NL	Netherlands	TenneT TSO	TenneT TSO B.V.
NO	Norway	Statnett	Statnett SF
PL	Poland	PSE Operator	PSE Operator S.A.
PT	Portugal	REN	Rede Eléctrica Nacional, S.A.
RO	Romania	Transelectrica	C.N. Transelectrica S.A.
RS	Serbia	EMS	JP Elektromreža Srbije
SE	Sweden	SVENSKA KRAFTNÄT	Affärsverket Svenska Kraftnät
SI	Slovenia	ELES	Elektro Slovenija d.o.o.
SK	Slovak Republic	SEPS	Slovenska elektrizacna prenosova sustava, a.s.

### Structure of ENTSO-E



#### ENTSO-E office holders

# President: Daniel Dobbeni,

Elia System Operator (BE) Vice President: Jukka Ruusunen,

#### Legal & Regulatory Group Chairwoman: Jacqueline van

Graeme Steele, National Grid (UK) Overbeek de Meyer, Tennet TSO (NE) Vice Chairwoman of the Board: Malgorzata Klawe, PSE Operator (PL)

#### Market Committee **System Development Committee** Chairman: Juha Kekkonen, Chairman: Jean Verseille, RTE (FR) Fingrid (FI)

Secretariat Secretary-General:

Konstantin Staschus

System Operations Committee

Amprion (DE)

Chairman: Klaus Kleinekorte,

Chairman of the Board:

<sup>1</sup> including data of AT year 2000, HR year 2004, 4 additional one 150 kV between FI and EE DE and DK W year 2008 5 285 kV instead 220 kV DC lines