

## Observations

[ 1 ]	Limited by phase shifting transformer in Meeden
[ 2 ]	Limited by phase shifting transformer in Meeden
[ 3 ]	Transformer in Borssele
[ 4 ]	Former October 2005 in FR Avelin
[ 5 ]	Transducer
[ 6 ]	Installed in Verbois
[ 7 ]	Cross-border power station ( 220/130 )
[ 8 ]	Cross-border power station ( 220/130 )
[ 9 ]	Cross-border power station ( 220/130 )
[ 10 ]	Line property EnBW Netz in Germany partially on the same tower as line Asphard-Kühmoos or Sierentz-Laufenburg
[ 11 ]	DC link with three connections
[ 12 ]	Transforming station of Lucciana in Corsica
[ 13 ]	DC link with three connections
[ 14 ]	Transforming station of Lucciana in Corsica
[ 15 ]	Partially on the same tower as the Laufenbourg-Engstlatt line (No. 105.1)
[ 16 ]	Transducer
[ 17 ]	Transducer
[ 18 ]	On the same tower as line No. 81 Laufenbourg-Sierentz 380 kV
[ 19 ]	Transducer
[ 20 ]	From Kühmoos to Laufenbourg on the same tower
[ 21 ]	Disconnecter
[ 22 ]	Limited by measuring transducer at Laufenbourg
[ 23 ]	From Kühmoos to Laufenbourg on the same tower
[ 24 ]	On the same tower as line Sierentz-Laufenburg
[ 25 ]	Limited by switching devices in Austria
[ 26 ]	Cable at Braunau
[ 27 ]	Cable at Braunau

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Circuit ID [Frontier point.Line.Circuit]	Connection between:						Voltage of the circuit		Conventional transmission capacity of the connection (thermal)*		Limited by the transformers or by the substations			
	From substation			to substation			Forecast	Present	Forecast	Present	of circuits		of lines	
	Country	Name	Operated by	Country	Name	Operated by					at	Voltage	Transmission capacity	Voltage
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
11.1.1	DE	Diele	E.ON Netz	NL	Meeden	TenneT		380		1382	1000 [1]			
11.1.2	DE	Diele	E.ON Netz	NL	Meeden	TenneT		380		1382	1000 [2]			
13.1.1	DE	Siersdorf	RWE Transportnetz Strom	NL	Maasbracht	TenneT		380		1645				
13.1.2	DE	Rommerskirchen	RWE Transportnetz Strom	NL	Maasbracht	TenneT		380		1698				
15.1.1	DE	Gronau	RWE Transportnetz Strom	NL	Hengelo	TenneT		380		1790				
15.1.2	DE	Gronau	RWE Transportnetz Strom	NL	Hengelo	TenneT		380		1790				
25.1.1	BE	Gramme	Elia	NL	Maasbracht	TenneT		380		1207				
25.1.2	BE	Meerhout	Elia	NL	Maasbracht	TenneT		380		1270				
26.1.1	BE	Zandvliet	Elia	NL	Geertruidenberg	TenneT		380		1476				
26.2.1	BE	Zandvliet	Elia	NL	Borssele	TenneT		380		1476	450 [3]			
41.1.1	BE	Aubange	Elia	LU	Belval	SOTEL		220		358				
41.1.2	BE	Aubange	Elia	LU	Belval	SOTEL		220		358				
41.2.1	BE	Aubange	Elia	LU	Belval	SOTEL		150		157	100			
41.3.1	BE	Aubange	Elia	LU	Belval	SOTEL		150		157	100			
51.1.1	BE	Jamiolle	Elia	FR	Chooz	RTE		220		356	290	150		
51.2.1	BE	Avelgem	Elia	FR	Mastaing [4]	RTE		380		1207				
51.2.2	BE	Avelgem	Elia	FR	Avelin	RTE		380		1367				
51.3.1	BE	Achène	Elia	FR	Lonny	RTE		380		1207				
52.1.1	BE	Aubange	Elia	FR	Moulaine	RTE		220		286				
71.1.1	DE	Uchtelfangen	RWE Transportnetz Strom	FR	Vigy	RTE		380		1790				
71.1.2	DE	Uchtelfangen	RWE Transportnetz Strom	FR	Vigy	RTE		380		1790				
71.2.1	DE	Ensdorf	RWE Transportnetz Strom	FR	St-Avold	RTE		220		261				
72.1.1	DE	Eichstetten	EnBW Transportnetze	FR	Vogelgrün	RTE	380	220		338 [5]		220		
72.1.2	DE	Eichstetten	EnBW Transportnetze	FR	Muhlbach	RTE		380		1751				
81.1.1	CH	Bassecourt	BKW	FR	Sierentz	RTE		380		186				
81.2.1	CH	Laufenburg	EGL Grid	FR	Sierentz	RTE		380		1167				
81.3.1	CH	Bassecourt	BKW	FR	Mambelin	RTE		380		1046				
82.1.1	CH	Verbois	EOS	FR	Bois-Tollot	RTE		380		1211	800	220 [6]		
82.1.2	CH	Chamoson	EOS	FR	Bois-Tollot	RTE		380		1409	600			
82.2.1	CH	Verbois	EOS	FR	Génissiat	RTE		220		315				11[7]
82.2.2	CH	Verbois	EOS	FR	Génissiat	RTE		220		315				11[8]
82.3.1	CH	Verbois	EOS	FR	Chancy-Pougny	SFRM C-P		130		52	42			11[9]
82.4.1	CH	La Bâtiâz	Atel	FR	Vallorcine	RTE		220		266				
82.5.1	CH	Riddes	EGL Grid	FR	Cornier	RTE		220		275				
82.6.1	CH	St-Triphon	EOS	FR	Cornier	RTE		220		275				
83.1.1 [10]	CH/DE	Asphard	Atel/NOK /EnBW Transp.netze	FR	Sierentz	RTE		380		1167				
91.1.1	FR	Albertville	RTE	IT	Rondissone	Terna		380		1244				
91.1.2	FR	Albertville	RTE	IT	Rondissone	Terna		380		1244				
92.1.1	FR	Le Broc Carros	RTE	IT	Camporosso	Terna		220		320				
93.1.1	FR	Villarodin	RTE	IT	Venaus	Terna		380		956				
94.1.1 [11]	FR	Lucciana	EDF	IT	Suvereto	Terna		220 [12]		300			50	
94.1.2 [13]	FR	Lucciana	EDF	IT	Suvereto	Terna		220 [14]		300			50	
102.1.1 [15]	CH	Laufenburg	EGL Grid	DE	Gurtweil	EnBW Transportnetze		220		485	457 [16]	220		
102.1.2	CH	Laufenburg	EGL Grid	DE	Gurtweil	EnBW Transportnetze		220		469	457 [17]	220		
102.2.1 [18]	CH	Laufenburg	EGL Grid	DE	Kühmoos	EnBW Transportnetze		220		469	457 [19]	220		
102.3.1 [20]	CH	Laufenburg	EGL Grid	DE	Kühmoos	EnBW Transportnetze	380	220		469	476 [21]	220		
102.3.2	CH	Laufenburg	EGL Grid	DE	Kühmoos	EnBW Transportnetze		380		1620	1264			
102.4.1	CH	Laufenburg	EGL Grid	DE	Kühmoos	EnBW Transportnetze		380		1620	1580			
102.4.2	CH	Laufenburg	EGL Grid	DE	Kühmoos	RWE Transportnetz Strom		380		1620	1264 [22]			
102.5.1 [23]	CH	Laufenburg	EGL Grid	DE	Tiengen	RWE Transportnetz Strom		380		1131				
103.1.1	CH	Beznau	NOK	DE	Tiengen	RWE Transportnetz Strom		380		1158				
103.1.2	CH	Beznau	NOK	DE	Tiengen	RWE Transportnetz Strom	380	220		335				
103.1.3	CH	Klingnau	AWAG	DE	Tiengen	RWE Transportnetz Strom	380	110		57	40			
104.1.1 [24]	CH	Asphard	Atel/NOK	DE	Kühmoos	EnBW Transportnetze		380		1340				
105.1.1	CH	Laufenburg	EGL Grid	DE	Engstlatt	EnBW Transportnetze		380		1675				
107.1.1	CH	Laufenburg 220kV	EGL Grid	DE	Laufenburg 110 kV	ED		220/110		200				
111.1.1	AT	Bürs	VIW	DE	Obermooweiler	EnBW Transportnetze		380		1369				
111.1.2	AT	Bürs	VIW	DE	Obermooweiler	EnBW Transportnetze		380		1369				
111.2.1	AT	Bürs	VIW	DE	Herbertingen	RWE Transportnetz Strom	380	220		389				
111.3.1	AT	Bürs	VIW	DE	Dellmensingen	RWE Transportnetz Strom	380	220		492	457 [25]			
111.4.1	AT	Rieden	VKW -Netz	DE	Lindau	VKW -Netz		110		84				
111.4.2	AT	Hörbranz	VKW -Netz	DE	Lindau	VKW -Netz		110		84				
111.5.1	AT	Vorderwald	VKW -Netz	DE	Weiler	VKW -Netz		110		141				
115.1.1	AT	Braunau	ÖBK	DE	Neuötting	E.ON Netz		110		102			82 [26]	
115.2.1	AT	Braunau	ÖBK	DE	Stammham	E.ON Netz		110		102			82 [27]	
115.3.1	AT	Ranshofen	Verbund - APG	DE	Neuötting	E.ON Netz		110		90				
115.4.1	AT	Antiesenhofen	Verbund - APG	DE	Egglfing	E.ON Netz		110		102				

\*The conventional transmission capacity of cross-frontier tie-lines is based upon parameters standardised within UCTE for the calculation of the thermal load capability of each line. For aerial lines these are : ambient temperature of + 35°C, wind velocity of 0,56 m/s at a right angle to the line as well as the voltage value stated in column 10 or 11. The conditions relevant to system operation in various countries at various time of the year can strongly differ from those above. Because the real allowable load capability of the line depends on many other factors, such as load flow distribution, upholding of voltage, real ambient conditions, limits of stability, n-1 security, etc., the conventional transmission capacity has no relevance from the point of view of system operation or economics but allows just a comparison of order of magnitude of the various lines. Adding together the conventional transmission capacity of several tie-lines does not allow to infer on the real total transmission capability and leads to irrelevant results from the point of view of system operation.

## Observations

[ 28 ]	Transducer at Ering
[ 29 ]	Transducer at Ering
[ 30 ]	Isolator in St. Peter
[ 31 ]	Isolator in St. Peter
[ 32 ]	Only Temporary line; from December 2006 toll 2006; afterwards disconnected till approx.2010
[ 33 ]	No international interconnector
[ 34 ]	CFT blocker at St. Peter
[ 35 ]	No international interconnector
[ 36 ]	CFT blocker at St. Peter
[ 37 ]	Switching device at Oberbrunn
[ 38 ]	Switching device at Oberbrunn
[ 39 ]	Line only crosses German territory without any electrical interconnection between Austria/Germany
[ 40 ]	Line complete in Austria
[ 41 ]	Possible to lay a second circuit
[ 42 ]	Possible to lay a second circuit
[ 43 ]	New substation with 400kV near spanish frontier: replace Cantegrit
[ 44 ]	New substation with 225kV near Spanish frontier: replace Mouguerre
[ 45 ]	Limited by transformer in Enstedt
[ 46 ]	Limited by transformer in Kassø / DK
[ 47 ]	Transducer at Kassø / DK
[ 48 ]	Transducer at Kassø
[ 49 ]	Monopol
[ 50 ]	DC submarine and underground cable
[ 51 ]	DC submarine and underground cable
[ 52 ]	DC submarine and underground cable
[ 53 ]	Under water cable
[ 54 ]	Under water cable
[ 55 ]	Under water cable
[ 56 ]	Limited by high-frequency coil
[ 57 ]	Generator line in radial operation - interconnected operation impossible
[ 58 ]	Installed at Vianden
[ 59 ]	Generator line in radial operation - interconnected operation impossible
[ 60 ]	Installed at Vianden
[ 61 ]	Generator line in radial operation - interconnected operation impossible
[ 62 ]	Installed at Vianden

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Circuit ID [Frontier point.Line.Circuit]	Connection between:						Voltage of the circuit		Conventional transmission capacity of the connection (thermal)*		Limited by the transformers or by the substations			
	From substation			to substation			Forecast	Present	Forecast	Present	of circuits		of lines	
	Country	Name	Operated by	Country	Name	Operated by					at	Voltage	Transmission capacity	Voltage
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
115.5.1	AT	St. Peter	Verbund - APG	DE	Altheim	E.ON Netz		220		301				
115.6.1	AT	St. Peter	Verbund - APG	DE	Simbach	E.ON Netz		220		301				
115.7.1	AT	St. Peter	Verbund - APG	DE	Ering	E.ON Netz		110		152	137		114 [28]	
115.7.2	AT	St. Peter	Verbund - APG	DE	Ering	E.ON Netz		110		152	137		114 [29]	
115.8.1	AT	St. Peter	Verbund - APG	DE	Eggfing	E.ON Netz		110		105				
115.9.1	AT	St. Peter	Verbund - APG	DE	Pirach	E.ON Netz		220		518	457 [30]			
115.10.1	AT	St. Peter	Verbund - APG	DE	Pleinting	E.ON Netz		220		518	457 [31]			
115.11.1	AT	Ranna	EAGOO-Netz	DE	Passau/Hauzenberg	E.ON Netz		110		90 [32]				
115.12.1	AT	Oberaudorf	ÖBK	DE	Rosenheim	E.ON Netz		110		93				
115.13.1	AT	Oberaudorf	ÖBK	DE	Kiefersfelden	E.ON Netz		110		102				
115.14.1	AT	Antiesenhofen	EAGOO-Netz	DE	Weidach	Thüga		110		130				
115.14.2	AT	Antiesenhofen	EAGOO-Netz	DE	Weidach	Thüga		110		130				
115.15.1	AT	Aigerding	Verbund - APG/EAGOO-Netz	DE	Passau	ÖBK		110		102				
115.16.1 [33]	AT	St. Peter	Verbund - APG	DE	Schärding	ÖBK		220		301			229 [34]	
115.16.2 [35]	AT	St. Peter	Verbund - APG	DE	Schärding	ÖBK		220		301			229 [36]	
115.17.1	AT	Kufstein	TIWAG-Netz	DE	Oberaudorf	ÖBK		110		90				
115.17.2	AT	Ebbs	TIWAG-Netz	DE	Oberaudorf	ÖBK		110		127				
116.1.1	AT	Westtirol	Verbund - APG	DE	Leupolz	RWE Transportnetz Strom		380	380	1316				
116.2.1	AT	Westtirol	Verbund - APG	DE	Memmingen	RWE Transportnetz Strom		380	220	762				
117.1.1	AT	Silz	TIWAG-Netz	DE	Oberbrunn	E.ON Netz		220		793	762 [37]			
117.1.2	AT	Silz	TIWAG-Netz	DE	Oberbrunn	E.ON Netz		220		793	762 [38]			
117.2.1	AT	Kufstein	TIWAG-Netz	DE	Oberaudorf	TIWAG-Netz		110		90 [39]				
117.2.2	AT	Ebbs	TIWAG-Netz	DE	Oberaudorf	TIWAG-Netz		110		127[40]				
117.3.1	AT	Reutte	TIWAG-Netz	DE	Füssen	EW Reutte		110		127				
117.3.2	AT	Reutte	TIWAG-Netz	DE	Füssen	EW Reutte		110		127				
121.1.1	CH	All'Acqua	Atel	IT	Ponte	Terna		220		278				
121.2.1	CH	Gorduno	Atel	IT	Mese	Terna		220		278				
121.3.1	CH	Soazza	EGL Grid	IT	Bulciago	Terna		380		1224				
121.4.1	CH	Lavorgo	Atel	IT	Musignano	Terna		380		1204				
122.1.1[41]	CH	Campocologno	RE	IT	Poschiavino	Terna		150		103	42			
123.1.1	CH	Riddes	EGL Grid	IT	Avise	Terna		220		309				
123.2.1	CH	Riddes	EGL Grid	IT	Valpelline	Terna		220		309				
123.3.1	CH	Serra	RHOWAG	IT	Pallanzeno	Terna		220		278				
124.1.1	CH	Robbia	RE	IT	Gorlago	Terna		380		1340				
124.1.2	CH	Robbia	RE	IT	San Fiorano	Terna		380		1340				
132.1.1	AT	Lienz	Verbund - APG	IT	Soverzene	Terna		220		257				
141.1.1 [42]	AT	Meiningen	VKW-Netz	CH	Y-Rehag	NOK		380	220	501				
141.2.1	AT	Meiningen	VKW-Netz	CH	Winkeln	NOK		380	220	776				
142.1.1	AT	Westtirol	Verbund - APG	CH	Pradella	EGL Grid			380	1340				
142.2.1	AT	Westtirol	Verbund - APG	CH	Pradella	EGL Grid			380	1340				
151.1.1	ES	Hernani	REE	FR	Argia [43]	RTE			380	1136				
151.2.1	ES	Irún	REE	FR	Errondenia	RTE			132	56				
151.3.1	ES	Arkale	REE	FR	Argia [43]	RTE			220	340				
151.4.1	ES	Biescas	REE	FR	Pragnères	RTE			220	257				
152.1.1	ES	Benós	REE	FR	Lac d'Oo	RTE			110	63				
153.1.1	ES	Vic	REE	FR	Baixas	RTE			380	1105				
161.1.1 [45]	DE	Flensburg	E.ON Netz	DK_W	Ensted	Energinet.dk			220	332	305			
161.2.1	DE	Flensburg	E.ON Netz	DK_W	Kassø	Energinet.dk			220	332	305 [46]			
161.3.1	DE	Audorf	E.ON Netz	DK_W	Kassø	Energinet.dk			380	1078	658 [47]			
161.3.2	DE	Audorf	E.ON Netz	DK_W	Kassø	Energinet.dk			380	1078	658 [48]			
161.4.1	DE	Flensburg UW Nord	E.ON Netz	DK_W	Ensted	Energinet.dk			150	150				
162.1.1 [49]	DE	Bentwisch	VE Transmission	DK_E	Bjæverskov	Energinet.dk			400	600 [50]				
163.1.1	NO	Kristiansand	Statnett	DK_W	Tjele	Energinet.dk				250 [51]				
163.1.2	NO	Kristiansand	Statnett	DK_W	Tjele	Energinet.dk				250 [52]				
164.1.1	NO	Kristiansand	Statnett	DK_W	Tjele	Energinet.dk				350 [53]				
165.1.1	SE	Stenkullen	Svenska Kraftnät	DK_W	Vester Hassing	Energinet.dk				125 [54]				
166.1.1	SE	Lindome	Svenska Kraftnät	DK_W	Vester Hassing	Energinet.dk				360 [55]				
171.1.1	AT	Bisamberg	Verbund - APG	CZ	Sokolnice	CEPS		220		269				
171.2.1	AT	Bisamberg	Verbund - APG	CZ	Sokolnice	CEPS		220		269				
172.1.1	AT	Dürnrohr	Verbund - APG	CZ	Slavetice	CEPS		380		1711	1386 [56]			
181.1.1	AT	Obersielach	Verbund - APG	SI	Podlog	ELES		220		351				
182.1.1	AT	Kainachtal	Verbund - APG	SI	Maribor	ELES		380		1514	450			
182.2.1	AT	Kainachtal	Verbund - APG	SI	Maribor	ELES		380		1514	450			
191.1.1	DE	Niederstedem	RWE Transportnetz Strom	LU	Vianden	SEO		220		490	460 [57,58]			
191.1.2	DE	Niederstedem	RWE Transportnetz Strom	LU	Vianden	SEO		220		490	230			
191.2.1	DE	Bauler	RWE Transportnetz Strom	LU	Vianden	SEO		220		730	345 [59,60]			
191.2.2	DE	Bauler	RWE Transportnetz Strom	LU	Vianden	SEO		220		730	230 [61,62]			

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## Observations

[ 63 ]	The 400kV DC link between GR-IT is composed of an overhead line and a submarine cable
[ 64 ]	In Hungary 2 systems in parallel operation
[ 65 ]	DC submarine cable
[ 66 ]	Unit is MW instead of MVA
[ 67 ]	DC submarine cable
[ 68 ]	Unit is MW instead of MVA
[ 69 ]	Limited by the connected network
[ 70 ]	Nominal voltage in Croatia
[ 71 ]	Limited by the connected network
[ 72 ]	Nominal voltage in Croatia
[ 73 ]	Built for 750 kV
[ 74 ]	4500 MVA at 750 kV
[ 75 ]	The limitation is 750MW
[ 76 ]	Limited by the Albanian network
[ 77 ]	Capacity of current transformers at Bistrica
[ 78 ]	Limitating installations in CZ
[ 79 ]	Limitating installations in Etzenricht
[ 80 ]	Limited by disconnector / CEPS
[ 81 ]	Limited by disconnector / CEPS
[ 82 ]	Disconnected in Yugoslavia

T 9

T 9

Circuit ID [Frontier point.Line.Circuit]	Connection between:						Voltage of the circuit		Conventional transmission capacity of the connection (thermal)*		Limited by the transformers or by the substations			
	From substation			to substation			Forecast	Present	Forecast	Present	of circuits		of lines	
	Country	Name	Operated by	Country	Name	Operated by					at	Voltage	Transmission capacity	Voltage
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
191.3.1	DE	Bauler	RWE Transportnetz Strom	LU	Flebour	CEGEDEL Net SA		220		490				
191.4.1	DE	Bauler	RWE Transportnetz Strom	LU	Roost	CEGEDEL Net SA		220		490				
192.1.1	DE	Trier	RWE Transportnetz Strom	LU	Heisdorf	CEGEDEL Net SA		220		490				
192.2.1	DE	Quint	RWE Transportnetz Strom	LU	Heisdorf	CEGEDEL Net SA		220		490				
201.1.1	IT	Redipuglia	Tema	SI	Divaca	ELES		380		169				
201.2.1	IT	Padriciano	Tema	SI	Divaca	ELES		220		305				
205.1.1 [63]	IT	Galatina	Tema	GR	Arachthos	HTSO		380		500				
211.1.1	AT	Wien Süd-Ost	Verbund - APG	HU	Győr	MAVIR		220		305				
211.1.2	AT	Neusiedel	Verbund - APG	HU	Győr	MAVIR		220		305				
212.1.1 [64]	AT	Wien Süd-Ost	Verbund - APG	HU	Győr	MAVIR		380		154				
221.1.1	FR	Mandarins	RTE	GB	Sellindge	National Grid		270 [65]		1000 [66]				
221.2.1	FR	Mandarins	RTE	GB	Sellindge	National Grid		270 [67]		1000 [68]				
231.1.1	ES	Las Conchas	REE	PT	Lindoso	REN		132		90				
232.1.1	ES	Aldeadávila	REE	PT	Bemposta	REN		220		321				
232.2.1	ES	Aldeadávila	REE	PT	Pocinho	REN		220		321				
232.3.1	ES	Saucelle	REE	PT	Pocinho	REN		220		321				
233.1.1	ES	Cedillo	REE	PT	Falagueira	REN		380		1150				
234.1.1	ES	Cartelle	REE	PT	Alto Lindoso	REN		380		1036				
234.1.2	ES	Cartelle	REE	PT	Alto Lindoso	REN		380		1036				
235.1.1	ES	Balboa	REE	PT	Alqueva	REN		400		1258				
241.1.1	MK	Dubrovo	MEPSO	GR	Thessaloniki	HTSO		400		1300				
242.1.1	MK	Bitola	MEPSO	GR	Amyndeo	HTSO		150		120	100			
251.1.1	HU	Lenti	MAVIR	HR	Nedeljanec	HEP-OPS		120		82	50 [69]	110 [70]		
251.2.1	HU	Siklos	MAVIR	HR	Donji Mihaljac	HEP-OPS		120		114	50 [71]	110 [72]		
251.3.1	HU	Héviz	MAVIR	HR	Zerjavinec	HEP-OPS		400		1246				
251.3.2	HU	Héviz	MAVIR	HR	Zerjavinec	HEP-OPS		400		1246				
261.1.1	CS	Djerdap	EMS	RO	Portile de Fier	TRANSELECTRICA		380		1200				
261.2.1	CS	Sip	EMS	RO	Gura Vaii	TRANSELECTRICA		110		90				
262.1.1	CS	Kikinda 1	EMS	RO	Jimbolia	TRANSELECTRICA		110		55				
263.1.1	CS	Kusijak	EMS	RO	Ostrovu Mare	TRANSELECTRICA		110		115				
271.1.1	BG	Sofija Zapad	NEK	CS	Niš	EMS		380		1264				
272.1.1	BG	Breznik	NEK	CS	HE Vrla 1	EMS		110		90				
273.1.1	BG	Kula	NEK	CS	Zajecar	EMS		110		90				
275.1.1	RO	Isaccea	TRANSELECTRICA	BG	Varna	NEK	750	400 [73]	4500	2300 [74]			750 [75]	
275.2.1	RO	Isaccea	TRANSELECTRICA	BG	Dobrudja	NEK		400		1660			830	
276.1.1	RO	Isalnita	TRANSELECTRICA	BG	Kozlodui	NEK		220		330				
277.1.1	RO	Tântareni	TRANSELECTRICA	BG	Kozlodui	NEK		400		1200		1000		
277.1.2	RO	Tântareni	TRANSELECTRICA	BG	Kozlodui	NEK		400		1200				
281.1.1	AL	Vau i Dejës	KESH	CS	Podgorica	EP CG		220		276				
282.1.1	AL	Fierza	KESH	CS	Prizren	EMS		220		311				
291.1.1	AL	Elbassan	KESH	GR	Kardia	HTSO		400		1300	250 [76]			
292.1.1	AL	Bistrica	KESH	GR	Mourtos	HTSO		150		120	40 [77]			
301.1.1	BG	Blagoevgrad	NEK	GR	Thessaloniki	HTSO		400		1300	700			
321.1.1	CZ	Hradec Zapad	CEPS	DE	Etzenricht	E.ON Netz		380		1386	1316 [78]			
321.1.2	CZ	Prestice	CEPS	DE	Etzenricht	E.ON Netz		380		1579 [79]				
322.1.1	CZ	Hradec Vychod	CEPS	DE	Röhrsdorf	VE Transmission		380		1476	1320 [80]			
322.1.2	CZ	Hradec Vychod	CEPS	DE	Röhrsdorf	VE Transmission		380		1476	1320 [81]			
331.1.1	HU	Sándorfalva	MAVIR	CS	Subotica 3	EMS		380		1264	1050			
332.1.1	HU	Szeged	MAVIR	CS	Subotica	EMS		120		86 [82]				
341.1.1	BG	Skavica	NEK	MK	Kriva Palanka	MEPSO		110		123				
341.2.1	BG	Petric	NEK	MK	Sušica	MEPSO		110		123				
351.1.1	HR	Melina	HEP-OPS	SI	Divaca	ELES		380		1264				
351.2.1	HR	Pehlin	HEP-OPS	SI	Divaca	ELES		220		366				
351.3.1	HR	Buje	HEP-OPS	SI	Koper	ELES		110		89				
351.4.1	HR	Matulji	HEP-OPS	SI	Ilirska Bistrica	ELES		110		53				
352.1.1	HR	Tumbri	HEP-OPS	SI	Krško	ELES		380		1316				
352.1.2	HR	Tumbri	HEP-OPS	SI	Krško	ELES		380		1316				
352.2.1	HR	Žrjavinec	HEP-OPS	SI	Cirkovce	ELES		220		297				
352.3.1	HR	Nedeljanec	HEP-OPS	SI	Formin	ELES		110		115				
361.1.1	BA	Mostar	NOS BiH	HR	Konjsko	HEP-OPS		400		1316				
361.2.1	BA	Mostar	NOS BiH	HR	Zakucac	HEP-OPS		220		311				
361.3.1	BA	Grahovo	NOS BiH	HR	Knin	HEP-OPS		110		90				
361.4.1	BA	Buško Blato	NOS BiH	HR	Kraljevac	HEP-OPS		110		115				
361.5.1	BA	Buško Blato	NOS BiH	HR	Peruca	HEP-OPS		110		90				
361.6.1	BA	Grude	NOS BiH	HR	Imotski	HEP-OPS		110		72				
361.7.1	BA	Kulen Vakuf	NOS BiH	HR	Gracac	HEP-OPS		110		120	101			

\*The conventional transmission capacity of cross-frontier tie-lines is based upon parameters standardised within UCTE for the calculation of the thermal load capability of each line. For arial lines these are : ambient temperature of + 35°C, wind velocity of 0,56 m/s at a right angle to the line as well as the voltage value stated in column 10 or 11. The conditions relevant to system operation in various countries at various time of the year can strongly differ from those above. Because the real allowable load capability of the line depends on many other factors, such as load flow distribution, upholding of voltage, real ambient conditions, limits of stability, n-1 security, etc., the conventional transmission capacity has no relevance from the point of view of system operation or economics but allows just a comparison of order of magnitude of the various lines. Adding together the conventional transmission capacity of several tie-lines does not allow to infer on the real total transmission capability and leads to irrelevant results from the point of view of system operation.

## Observations

[ 83 ]	Destroyed line
[ 84 ]	Out of operation
[ 85 ]	Destroyed line and substation
[ 86 ]	Destroyed line
[ 87 ]	Destroyed line
[ 88 ]	New line 400 kV between CS (EMS) and BA (NOS) Ugljevik - Sremska Mitrovica is operational from EMS side
[ 89 ]	Line is destroyed, currently under construction
[ 90 ]	Line is destroyed, currently under construction
[ 91 ]	Monopol
[ 92 ]	Limited by the measuring transformer of current
[ 93 ]	Limited by the connections among equipments
[ 94 ]	Limited by the measuring transformer of current
[ 95 ]	Limited by the measuring transformer of current
[ 96 ]	Submarine cable
[ 97 ]	Limited by current transformer at Krosno
[ 98 ]	Limited by the measuring current transformer
[ 99 ]	Limited by current transformer at Krosno
[ 100 ]	Limited by the measuring current transformer
[ 101 ]	Limited by HF attenuator at UA side
[ 102 ]	Out of operation
[ 103 ]	Radial operation
[ 104 ]	Out of operation
[ 105 ]	Submarine cable
[ 106 ]	Limited by the measuring transformer of current
[ 107 ]	Limited by HF attenuator
[ 108 ]	Limited by the measuring transformer of current
[ 109 ]	Limited by HF attenuator
[ 110 ]	Limited by HF attenuator
[ 111 ]	Out of operation / substation local automatic equipment
[ 112 ]	Out of operation / substation local automatic equipment
[ 113 ]	Limited by HF attenuator
[ 114 ]	Not in operation
[ 115 ]	Limitation 900 MW

T 9

Circuit ID [Frontier point.Line.Circuit]	Connection between:						Voltage of the circuit		Conventional transmission capacity of the connection (thermal)*		Limited by the transformers or by the substations of circuits of lines			
	From substation			to substation			Forecast	Present	Forecast	Present	at	Voltage	Transmission capacity	Voltage
	Country	Name	Operated by	Country	Name	Operated by								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
362.1.1	BA	Jajce	NOS BiH	HR	Mraclin	HEP-OPS		220		297[83]				
362.2.1	BA	Prijedor	NOS BiH	HR	Meduric	HEP-OPS		220		297				
363.1.1	BA	Trebinje	NOS BiH	HR	Dubrovnik	HEP-OPS		220		460 [84]				
363.2.1	BA	Trebinje	NOS BiH	HR	Dubrovnik	HEP-OPS		220		460				
363.3.1	BA	Capljina	NOS BiH	HR	Opuzen	HEP-OPS		110		84				
363.4.1	BA	Neum	NOS BiH	HR	Opuzen	HEP-OPS		110		84				
363.5.1	BA	Neum	NOS BiH	HR	Ston	HEP-OPS		110		76				
363.6.1	BA	Trebinje	NOS BiH	HR	Komolac	HEP-OPS		110		84				
364.1.1	BA	Ugljevik	NOS BiH	HR	Ernestinovo	HEP-OPS		400		1264 [85]				
364.2.1	BA	Gradacac	NOS BiH	HR	Đakovo	HEP-OPS		220		229 [86]				
364.3.1	BA	Tuzla	NOS BiH	HR	Đakovo	HEP-OPS		220		229				
364.4.1	BA	Bosanski Brod	NOS BiH	HR	Slavonski Brod 2	HEP-OPS		110		115[87]				
364.5.1	BA	Orasje	NOS BiH	HR	Županja	HEP-OPS		110		76				
371.1.1	HR	Ernestinovo	HEP-OPS	CS	Sremska Mitrovica	EM S		380		1264				
371.2.1	HR	Nijemci	HEP-OPS	CS	Šid	EM S		110		76				
371.3.1	HR	Beli Manastir	HEP-OPS	CS	Apatin	EM S		110		78				
381.1.1	BA	Trebinje	NOS BiH	CS	Podgorica	EP CG		380		1264				
381.2.1	BA	Trebinje	NOS BiH	CS	Perucica	EP CG		220		276				
381.3.1	BA	Trebinje	NOS BiH	CS	Herceg Novi	EP CG		110		90				
381.4.1	BA	Bileca	NOS BiH	CS	Vilusi	EP CG		110		84				
382.1.1	BA	Sarajevo 20	NOS BiH	CS	Piva	EP CG		220		366				
382.2.1	BA	Goražde	NOS BiH	CS	Pljevlja	EP CG		110		90				
383.1.1	BA	Višegrad	NOS BiH	CS	Požega	EM S		220		311				
383.2.1	BA	Bijeljina	NOS BiH	CS	Lešnica	EM S		110		123				
383.3.1	BA	Zvornik	NOS BiH	CS	HE Zvornik	EM S		110		123				
383.4.1	BA	Višegrad	NOS BiH	CS	Potpec	EM S		110		123				
383.5.1	BA	Ugljevik	NOS BiH	CS	Sremska Mitrovica	EM S		380		1264 [88]				
391.1.1	MK	Skopje 1	MEPSO	CS	Kosovo A	EM S		220		311 [89]				
391.2.1	MK	Skopje 1	MEPSO	CS	Kosovo A	EM S		220		311 [90]				
391.3.1	MK	Skopje 5	MEPSO	CS	Kosovo B	EM S		380		1218				
401.1.1 [91]	DE	Herrenwyk	E.ON Netz	SE	Kruseberg	Sydkraft/Vattenfall		450		600				
404.1.1	CZ	Nosovice	CEPS	SK	Varin	SEPS		400		1465	1386 [92]			
410.1.1	CZ	Liskovec	CEPS	SK	Pov. Bystrica	SEPS		220		269				
420.1.1	CZ	Sokolnice	CEPS	SK	Senica	SEPS		220		318				
424.1.1	CZ	Sokolnice	CEPS	SK	Krizovany	SEPS		400		1503	1323 [93]			
430.1.1	CZ	Sokolnice	CEPS	SK	Stupava	SEPS		400		1559	831 [94]			
440.1.1	SK	V.Kapusany	SEPS	UA_W	Mukachevo	NPC Ukrenergo		400		1186	693 [95]			
443.1.1	CZ	Albrechtice	CEPS	PL	Dobrzeń	PSE-Operator SA		400		1088				
444.1.1	CZ	Nošovice	CEPS	PL	Wielopole	PSE-Operator SA		400		1088				
450.1.1	CZ	Liskovec	CEPS	PL	Kopanina	PSE-Operator SA		220		399				
460.1.1	CZ	Liskovec	CEPS	PL	Bujakov	PSE-Operator SA		220		399				
501.1.1	DE	Vierraden	VE Transmission	PL	Krajnik	PSE-Operator SA		220		400				
501.1.2	DE	Vierraden	VE Transmission	PL	Krajnik	PSE-Operator SA		220		400				
502.1.1	DE	Hagenwerder	VE Transmission	PL	Mikulowa	PSE-Operator SA		380		1302				
502.1.2	DE	Hagenwerder	VE Transmission	PL	Mikulowa	PSE-Operator SA		380		1302				
601.1.1 [96]	ES	Pinar del Rey	REE	MA	Melloussa	ONE		380		730				
700.1.1	PL	Krosno Iskrzynia	PSE-Operator SA	SK	Lemešany	SEPS		400		1252	831 [97,98]			
700.1.2	PL	Krosno Iskrzynia	PSE-Operator SA	SK	Lemešany	SEPS		400		1252	831 [99,100]			
701.1.1	PL	Rzeszów	PSE-Operator SA	UA	Khmelnitska	NPC Ukrenergo		750		2595 [101]	1949 [102]			
702.1.1	PL	Zamosc	PSE-Operator SA	UA	Dobrotvir	NPC Ukrenergo		220		309 [103]				
703.1.1	PL	Białystok	PSE-Operator SA	BY	Ros	Grodnoenergo		220		215 [104]				
704.1.1	PL	Slupsk	PSE-Operator SA	SE	Stámó	SvK		450		600 [105]				
710.1.1	HU	Győr	MAVIR	SK	Gabcikovo	SEPS		400		1246				
711.1.1	HU	Göd	MAVIR	SK	Levice	SEPS		400		1246	1108 [106]			
720.1.1	HU	Albertirsa	MAVIR	UA_W	Zahidno Ukrainska	NPC Ukrenergo		750		4000	2146 [107]			
721.1.1	HU	Sajószöged	MAVIR	UA_W	Mukacevo	NPC Ukrenergo		400		1635	693 [108]			
722.1.1	HU	Kisvárd	MAVIR	UA_W	Mukacevo	NPC Ukrenergo		220		312	305 [109]			
722.1.2	HU	Tiszalök	MAVIR	UA_W	Mukacevo	NPC Ukrenergo		220		312	305 [110]			
730.1.1	HU	Sándorfalva	MAVIR	RO	Arad	TRANSELECTRICA		400		1200				
740.1.1	RO	Rosiori	TRANSELECTRICA	UA_W	Mukacevo	NPC Ukrenergo		400		550 [111]				
741.1.1	RO	Isaccea	TRANSELECTRICA	UA_W	PivdennoUkrainska AES	NPC Ukrenergo		750		4500 [112]	2100 [113]			
750.1.1	RO	Stânca	TRANSELECTRICA	MD	Costesti	Moldenergo		110		55				
751.1.1	RO	Husi	TRANSELECTRICA	MD	Cioara	Moldenergo		110		55				
752.1.1	RO	Tutora	TRANSELECTRICA	MD	Ungheni	Moldenergo		110		55				
753.1.1	RO	Issaccea	TRANSELECTRICA	MD	Vulcanesti	Moldenergo		400		1200				
760.1.1	BG	Maritsa3	NEK	TR	Babaeski	TEIAS		400		1309 [114]	900			
761.1.1	BG	Maritsa3	NEK	TR	Hamitabat	TEIAS		400	1715	900 [115]				

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## Abbreviations used of grid operators

<b>Austria</b>	APG TIWAG Netz AG VKW - Netz AG	Verbund - Austria Power Grid AG Tiroler Wasserkraft AG VKW - Netz AG	<b>Denmark West</b>	Energinet.dk	Energinet.dk
<b>Bosnia - Herzegovina</b>	ISO BiH	Nezavisni operator sustava u Bosni i Hercegovini	<b>Denmark East</b>	Energinet.dk	Energinet.dk
<b>Belgium</b>	Elia	Elia System Operator SA/NV	<b>Ukraine West</b>	NPC Ukrenergo	NPC Ukrenergo
<b>Bulgaria</b>	NEK	Natsionalna Elektricheska Kompania EAD	<b>Albania</b>	KESH	Albanian Electroenergetic Corporation
<b>Switzerland</b>	ATEL BKW UTN EGL Grid EOS ETRANS NOK RE	Aare -Tessin Ltd. for Electricity BKW Übertragungsnetz AG EGL Grid AG Energy Ouest Suisse ETRANS Ltd. Nordostschweizerische Kraftwerke AG Rätia Energie	<b>Belarus</b>	Grodnoenergo	Grodnoenergo
<b>Serbia &amp; Montenegro</b>	EPCG EPS	Elektroprivreda Crne Gore JP Elektromreža Srbije	<b>Great Britain</b>	National Grid	The National Grid Company plc
<b>Czech Republic</b>	CEPS	CEPS a.s.	<b>Morocco</b>	ONE	Office National de l'Electricité
<b>Germany</b>	E.ON Netz EnBW Transportnetze RWE Transportnetz Strom VE Transmission	E.ON Netz GmbH EnBW Transportnetze AG RWE Transportnetz Strom GmbH Vattenfall Europe Transmission GmbH	<b>Republic of Moldavia</b>	Moldenergo	Moldenergo
<b>Spain</b>	REE	Red Eléctrica de España S.A.	<b>Norway</b>	Statnett	Statnett
<b>France</b>	RTE	RTE Gestionnaire du Réseau de Transport d'Electricité	<b>Republic of Turkey</b>	TEIAS	Türkiye Elektrik İletim A.S.
<b>Greece</b>	HTSO / DESMIE	Hellenic Transmission System Operator/ Diachristis Elinikou Sistimatos Metaforas Ilektrikis Energias	<b>Sweden</b>	SYDKRAFT VATTENFALL SvK	Sydkraft AB Vattenfall AB Svenska Kraftnät
<b>Croatia</b>	HEP	HEP-Operator prijenosnog sustava d.o.o.			
<b>Hungary</b>	MAVIR ZRt	MAVIR Magyar Villamosenergia-ipari Rendszerirányító Zártkörűen Működő Részvénytársaság			
<b>Italy</b>	Terna S.p.A.	Terna - Rete Elettrica Nazionale SpA			
<b>Luxembourg</b>	CEGEDEL Net S.A.	Compagnie Grand Ducale d'Electricité du Luxembourg			
<b>FYROM</b>	MEPSO	Elektrostopanstvo na Makedonija AD, Skopje			
<b>The Netherlands</b>	TenneT	TenneT TSO B.V.			
<b>Poland</b>	PSE-Operator S.A.	Operator Systemu Przesylowego			
<b>Portugal</b>	REN	Rede Eléctrica Nacional, S.A.			
<b>Romania</b>	TRANSELECTRICA	C.N. Transelectrica S.A.			
<b>Slovenia</b>	ELES	Elektro Slovenija			
<b>Slovak Republic</b>	SEPS	Slovenska elektrizacna prenosova sustava, a.s.			

Circuit ID	From substation	To substation	Voltage [kV]	Thermal conventional transmission capacity [ MVA ]	Major Reason	Time whole year [min]	January [min]	February [min]	March [min]	April [min]	May [min]	June [min]	July [min]	August [min]	September [min]	October [min]	November [min]	December [min]
11.1.1	DE - Diele ( E.ON Netz )	NL - Meeden ( TenneT )	380	1382	R1	3153			484	1793		565			311			
11.1.2	DE - Conneforde ( E.ON Netz )	NL - Meeden ( TenneT )	380	1382	R1	2043			2043									
13.1.1	DE - Siersdorf ( RWE Transportnetz Strom )	NL - Maasbracht ( TenneT )	380	1645	R9, R10	13718											121	
13.1.2	DE - Rommerskirchen ( RWE Transportnetz Strom )	NL - Maasbracht ( TenneT )	380	1698	R1, R10	23635					13597						602	
15.1.1	DE - Gronau W ( RWE Transportnetz Strom )	NL - Hengelo ( TenneT )	380	1790	R1	4952								4814			138	
15.1.2	DE - Gronau Z ( RWE Transportnetz Strom )	NL - Hengelo ( TenneT )	380	1790	R1	4815								4815				
25.1.1	BE - Gramme ( Elia )	NL - Maasbracht ( TenneT )	380	1207	R1	4332									4332			
25.1.2	NL - Maasbracht ( TenneT )	BE - Meerhout ( Elia )	380	1270	R1	14952						14952						
26.1.1	BE - Zandvliet ( Elia )	NL - Geertruidenberg ( TenneT )	380	1476	R8	2677											2677	
26.2.1	BE - Zandvliet ( Elia )	NL - Borssele ( TenneT )	380	1476	R1, R2, R8	11491									2670		7468	1353
41.2.1	BE - Aubange ( Elia )	LU - Belval ( SOTEL )	150	157	R1, R6	39225					5514	31374		1880	457			
41.3.1	BE - Aubange ( Elia )	LU - Belval ( SOTEL )	150	157	R1	35617				2656	7231	24840	890					
51.1.1	BE - Jamiole ( Elia )	FR - Chooz ( RTE )	220	356	R1, R3	11734			11220						514			
51.2.1	BE - Avelgem ( Elia )	FR - Mastaing ( )	380	1207	R3	20920				13590						7330		
51.3.1	BE - Achène ( Elia )	FR - Lonny ( RTE )	380	1207	R1	1002				485					517			
52.1.1	BE - Aubange ( Elia )	FR - Moulaine ( RTE )	220	286	R1	5193												210
71.1.1	DE - Uchtelfangen ( RWE Transportnetz Strom )	FR - Vigy ( RTE )	380	1790	R1	4513			2312							4983		
71.1.2	DE - Uchtelfangen ( RWE Transportnetz Strom )	FR - Vigy ( RTE )	380	1790	R1, R2	6373			5160							1213		
71.2.1	DE - Ens Dorf ( RWE Transportnetz Strom )	FR - St-Avoid ( RTE )	220	261	R1	3652	1627								2025			
72.1.1	DE - Eichstetten ( EnBW Transportnetze )	FR - Vogelgrün ( RTE )	220	338	R1, R4, R9	37094			17344			4828					14922	
72.1.2	DE - Eichstetten ( EnBW Transportnetze )	FR - Muhlbach ( RTE )	380	1751	R1	4969			4969									
81.1.1	FR - Sierentz ( RTE )	CH - Bassecourt ( BKW )	380	1186	R1, R2, R10	14405	579				616		6495		6173		542	
81.2.1	CH - Laufenburg ( EGL Grid )	FR - Sierentz ( RTE )	380	1167	R1, R9	99092		5					29793	44640	22445		2209	
81.3.1	CH - Bassecourt ( BKW )	FR - Mambelin ( RTE )	380	1046	R1	10244	6307	415	3522									
82.1.1	FR - Bois-Tollot ( RTE )	CH - Verbois ( EOS )	380	1211	R10	6352						6352						
82.1.2	FR - Bois-Tollot ( RTE )	CH - Chamoson ( EOS )	380	1409	R1	39228		555			4003	8843	9591		6706	9530		
82.2.1	CH - Verbois ( EOS )	FR - Génissiat ( RTE )	220	280	R10	470									470			
82.2.2	FR - Génissiat ( RTE )	CH - Verbois ( EOS )	220	280	R1	1967									1967			
82.4.1	FR - Vallorcine ( RTE )	CH - La Bâtière ( Atel )	220	266	R10	6265							6265					
82.5.1	CH - Riddes ( EGL Grid )	FR - Cornier ( RTE )	220	275	R1	4105				3454					651			
82.6.1	CH - St-Triphon ( EOS )	FR - Cornier ( RTE )	220	275	R1	5215		360								4855		
83.1.1	FR - Sierentz ( RTE )	CH - Asphard ( Atel/NOK/EnBW TN )	380	1167	R1	15												15
91.1.1	FR - Albertville ( RTE )	IT - Rondissone ( Terna )	380	1150	R1	540					540							
91.1.2	FR - Albertville ( RTE )	IT - Rondissone ( Terna )	380	1150	R1, R8	799	185				614							
92.1.1	FR - Le Broc Carros ( RTE )	IT - Camporosso ( Terna )	220	335	R1, R8	18290			18060				230					
93.1.1	FR - Villardoin ( RTE )	IT - Venaus ( Terna )	380	879	R1, R8	302							111				191	
94.1.1	FR - Lucciana ( EDF )	IT - Suvereto ( Terna )	220	300	R1	26519									6779	19740		
102.1.1	CH - Laufenburg ( EGL Grid )	DE - Gurtweil ( EnBW Transportnetze )	220	485	R1	892			892									
102.1.2	CH - Laufenburg ( EGL Grid )	DE - Gurtweil ( EnBW Transportnetze )	220	485	R1, R10	5069			1805		3264							
102.2.1	CH - Laufenburg ( EGL Grid )	DE - Kühmoos ( EnBW Transportnetze )	220	295	R2, R9	14227								13967	2		258	
102.3.1	DE - Kühmoos ( EnBW Transportnetze )	CH - Laufenburg ( EGL Grid )	220	485	R1, R2	28486								28227			259	
102.3.2	DE - Kühmoos ( EnBW Transportnetze )	CH - Laufenburg ( EGL Grid )	380	1620	R1, R7	54326	844		35577	909	8760					6083	2153	
102.4.1	DE - Kühmoos ( EnBW Transportnetze )	CH - Laufenburg ( EGL Grid )	380	1620	R1, R2, R9, R10	60610	844		35574	815	8889			7691		6083	714	
102.4.2	DE - Kühmoos ( RWE Transportnetz Strom )	CH - Laufenburg ( EGL Grid )	380	1580	R4	7705								7705				
102.5.1	DE - Tiengen ( RWE Transportnetz Strom )	CH - Laufenburg ( EGL Grid )	380	1158	R1, R2	348					296						52	
103.1.1	CH - Beznau ( NOK )	DE - Tiengen ( RWE Transportnetz Strom )	380	1158	R1, R9	36644	600			447		481		3825	31291			
103.1.2	CH - Beznau ( NOK )	DE - Tiengen ( RWE Transportnetz Strom )	220	335	R1, R9	27005	592	160	3349			6861		3796	12247			
104.1.1	CH - Asphard ( Atel/NOK )	DE - Kühmoos ( EnBW Transportnetze )	380	1340	R1, R9	1912	614									1298		
105.1.1	DE - Engstlatt ( EnBW Transportnetze )	CH - Laufenburg ( EGL Grid )	380	1675	R1, R2, R9	10826					296	585	3561			6384		
111.1.1	DE - Obermoosweiler ( EnBW Transportnetze )	AT - Bürs ( VIW )	380	1369	R1	109											109	
111.1.2	DE - Obermoosweiler ( EnBW Transportnetze )	AT - Bürs ( VIW )	380	1369	R1	1003			783								220	
111.2.1	AT - Bürs ( VIW )	DE - Herberlingen ( RWE Tr.Netz Strom )	220	389	R1, R9, R10	55402		445		12702		450		477	11186		932	29210
111.3.1	DE - Dellmensingen ( RWE Tr.Netz Strom )	AT - Bürs ( VIW )	220	492	R1, R10	12067		622	3656	7044		273		472				
115.5.1	DE - Altheim ( E.ON Netz )	AT - St. Peter ( Verbund-APG )	220	301	R1, R7	15006	3052			577			305		3311	5331	1286	1144
115.6.1	DE - Simbach ( E.ON Netz )	AT - St. Peter ( Verbund-APG )	220	301	R1, R2, R3, R9	13144	624			534			276		2948	5330	1286	2146
115.9.1	AT - St. Peter ( Verbund-APG )	DE - Pirach ( E.ON Netz )	220	518	R1	9271	1120		2454			1010	686	3022	602	277	100	
115.10.1	AT - St. Peter ( Verbund-APG )	DE - Pleinting ( E.ON Netz )	220	518	R1, R9	1893	589		712				18		500		74	
116.1.1	AT - Westtirol ( Verbund-APG )	DE - Leupolz ( RWE Transportnetz Strom )	380	1316	R9	569											569	
116.2.1	AT - Westtirol ( Verbund-APG )	DE - Memmingen ( RWE Tr.Netz Strom )	220	762	R1	6945			1278	3598					1238		831	
117.1.1	AT - Silz ( TIWAG )	DE - Oberbrunn ( E.ON Netz )	220	793	R9	1968			570			1040						
117.1.2	AT - Silz ( TIWAG )	DE - Oberbrunn ( E.ON Netz )	220	793	R1, R2	4931			3789			1142			90		268	
121.1.1	CH - Airolo ( Atel )	IT - Ponte ( Terna )	220	257	R1, R9, R10	22156						5330	975		6074	9777		
121.2.1	CH - Gorduno ( Atel )	IT - Mese ( Terna )	220	257	R1	21102				7621		13481						
121.3.1	CH - Soazza ( EGL Grid )	IT - Bulciago ( Terna )	380	1142	R1, R10	974						514			460			
121.4.1	IT - Musignano ( Terna )	CH - LAVORGO ( Atel )	380	1118	R1	16319								3896				
123.1.1	IT - Avise ( Terna )	CH - Riddes ( EGL Grid )	220	290	R1, R8	18219			1192				14929		2098			
123.2.1	CH - Riddes ( EGL Grid )	IT - Valpelline ( Terna )	220	290	R10	273									273			
123.3.1	CH - Serra ( RHOWAG )	IT - Pallanzeno ( Terna )	220	257	R1, R2, R7	7251			201			118				6295		637
124.1.1	CH - Robbia ( RE )	IT - Gorlago ( Terna )	380	1340	R1, R2, R10	25502								15199	2167		8136	
124.1.2	CH - Robbia ( RE )	IT - San Fiorano ( Terna )	380	1340	R2, R9	28214								149	16533	2160	9372	

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**R5 - False operation**, **R6 - Failure in protection device or other element**,  
**R9 - Other reasons**, **R10 - Unknown reasons**

Circuit ID	From substation	To substation	Voltage [kV]	Thermal conventional transmission capacity [ MVA ]	Major Reason	Time whole year [min]	January [min]	February [min]	March [min]	April [min]	May [min]	June [min]	July [min]	August [min]	September [min]	October [min]	November [min]	December [min]
132.1.1	IT - Soverzene ( Terna )	AT - Lienz ( Verbund-APG )	220	257	R1, R9, R10	19840	122		2249		354		9645	6792	101	577		
141.1.1	CH - Y-Rehag ( NOK )	AT - Meiningen ( VKW-ÜN )	220	501	R1, R5, R10	14899					586	1035		529		1921	540	10288
141.2.1	AT - Meiningen ( VKW-ÜN )	CH - Winkeln ( NOK )	220	776	R1	2592									498	201		1893
142.1.1	AT - Westtirol ( Verbund-APG )	CH - Pradella ( EGL Grid )	380	1340	R1	5624							4509					1115
142.2.1	AT - Westtirol ( Verbund-APG )	CH - Pradella ( EGL Grid )	380	1340	R1	6953							5774					1179
151.1.1	ES - Hernani ( REE )	FR - Argia ( RTE )	380	1136	R1	511				511								
151.2.1	ES - Irún ( REE )	FR - Errondenia ( RTE )	132	59	R1, R9	32305			15267	11097								5941
151.3.1	ES - Arkale ( REE )	FR - Argia ( RTE )	220	340	R1	516					516							
151.4.1	ES - Biescas ( REE )	FR - Pragnères ( RTE )	220	247	R1, R2	2656								2019		637		
152.1.1	ES - Benós ( REE )	FR - Lac d'Oo ( RTE )	110	76	R1, R2	16548						16117					431	
153.1.1	ES - Vic ( REE )	FR - Baixas ( RTE )	380	1105	R1	4900			4900									
161.1.1	DE - Flensburg ( E.ON Netz )	DK_W - Ensted ( Energinet.dk )	220	332	R1, R9	30613									16819	8009		
161.2.1	DE - Flensburg ( E.ON Netz )	DK_W - Kassa ( Energinet.dk )	220	332	R1, R10	12598			53			5291			9145			
161.3.1	DE - Audorf ( E.ON Netz )	DK_W - Kassa ( Energinet.dk )	380	1382	R1, R2	12473				3394					9079			
162.1.1	DE - Bentwisch ( VE Transmission )	DK_E - Bjæverskov ( Energinet.dk )	400	600	R2, R9, R10	640	300	243								97		
163.1.1	DK_W - Tjele ( Energinet.dk )	NO - Kristiansand ( Stanett )	150		R1, R2, R8	9279	5512	1711							2056			
163.1.2	DK_W - Tjele ( Energinet.dk )	NO - Kristiansand ( Stanett )	150		R1, R10	2076				20					2056			
164.1.1	DK_W - Tjele ( Energinet.dk )	NO - Kristiansand ( Stanett )	300		R4, R5, R6	218912	44		93		5855	43200	44640	44640	43200	37240		
165.1.1	DK_W - Vester Hassing ( Energinet.dk )	SE - Stenkullen ( Svenska Kraftnet )	130		R2 - R8	35796	1169	979	51	163	2180	139	11	46	78	11675	16140	3165
166.1.1	DK_W - Vester Hassing ( Energinet.dk )	SE - Lindome ( Svenska Kraftnet )	130		R5, R9, R10	20968		2649	14905		2380				293	261	360	120
171.1.1	AT - Bisamberg ( Verbund-APG )	CZ - Sokolnice ( CEPS )	220	269	R1	6245			218		6027							
171.2.1	AT - Bisamberg ( Verbund-APG )	CZ - Sokolnice ( CEPS )	220	269	R1, R7	6396				239	6007							
172.1.1	AT - Dürnberg ( Verbund-APG )	CZ - Slavetice ( CEPS )	380	1711	R1	36331							36331					
181.1.1	AT - Obersielach ( Verbund-APG )	SI - Podlog ( ELES )	220	351	R1	15120				13918			547		288			367
182.1.1	AT - Kainachtal ( Verbund-APG )	SI - Maribor ( ELES )	380	1514	R1	5572						4772	800					
182.2.1	AT - Kainachtal ( Verbund-APG )	SI - Maribor ( ELES )	380	1514	R1	7306						6798	508					
191.4.1	DE - Bauler ( RWE Transportnetz Strom )	LU - Flebour ( CEGEDEL Net SA )	220	490	R1, R10	8155				443	7712							
191.4.2	DE - Bauler ( RWE Transportnetz Strom )	LU - Roost ( CEGEDEL Net SA )	220	490	R1	3455						3281	174					
192.1.1	DE - Trier ( RWE Transportnetz Strom )	LU - Heisdorf ( CEGEDEL Net SA )	220	490	R1, R7, R10	82531	428	395	68			2775	7039	4704	14210	44640	8272	
192.2.1	LU - Heisdorf ( CEGEDEL Net SA )	DE - Quint ( RWE Transportnetz Strom )	220	490	R1	69057		245				4920	5216	15753	19902		19668	3353
201.1.1	IT - Redipuglia ( Terna )	SI - Divaca ( ELES )	380	1712	R1	15000								15000				
201.2.1	SI - Divaca ( ELES )	IT - Padriciano ( Terna )	220	330	R1, R4, R9	26228			24639					1584		5		
205.1.1	IT - Galatina ( Terna )	GR - Arachthos ( HTSO )	380	500	R1, R4, R6	30602			399	600	12322	17215					66	
211.1.1	HU - Győr ( MAVIR )	AT - Wien Süd-Ost ( Verbund-APG )	220	305	R1	44223					4099	16306			1060		22590	368
211.1.2	AT - Neusiedl ( Verbund-APG )	HU - Győr ( MAVIR )	220	305	R1	37114						13933	654				22527	
212.1.1	AT - Wien Süd-Ost ( Verbund-APG )	HU - Győr ( MAVIR )	380	1514	R1	19739					12550	4766		2423				
221.1.1	FR - Mandarins ( RTE )	GB - Sellindge ( National Grid )	270		R1, R2, R10	10587			505				300	933	8249		600	
221.2.1	FR - Mandarins ( RTE )	GB - Sellindge ( National Grid )	270		R1, R6, R9	17478	3135					8853	3426	900	69	480	615	
232.1.1	ES - Aldeadávila ( REE )	PT - Bemposta ( REN )	220	268	R1, R9	436										220	216	
232.2.1	PT - Pocinho ( REN )	ES - Aldeadávila ( REE )	220	268	R1	1900						1900						
232.3.1	ES - Saucelle ( REE )	PT - Pocinho ( REN )	220	268	R1	3571								3571				
233.1.1	ES - Cedillo ( REE )	PT - Falagueira ( REN )	380	707	R1	440								440				
234.1.1	ES - Cartelle ( REE )	PT - Alto Lindoso ( REN )	380	1036	R1	28086								27987				99
234.1.2	ES - Cartelle ( REE )	PT - Alto Lindoso ( REN )	380	1360	R1	27983								27983				
235.1.1	ES - Balboa ( REE )	PT - Alqueva ( REN )			R1, R9	11065			9266						1799			
241.1.1	GR - Thessaloniki ( HTSO )	MK - Dubrovo ( MEPSO )	380	1300	R1	17752									9659	8093		
242.1.1	GR - Amyndeon ( HTSO )	MK - Bitola ( MEPSO )	150	120	R1, R9	18130			300				21		9659	8150		
261.1.1	CS - Djerdap ( EMS )	RO - Portile de Fier ( TRANSELECTRICA )	380	1264	R1, R4, R5	16206	60					14		3420			5605	7107
261.2.1	RO - Guravai ( TRANSELECTRICA )	CS - Sip ( EMS )	110	90	R1	480								480				
271.1.1	CS - Niš ( EMS )	BG - Sofija Zapad ( NEK )	380	1264	R1, R5	19884						27		11616	8241			
275.2.1	RO - Isaccea ( TRANSELECTRICA )	BG - Dobruja ( NEK )			R1	25018								11159	13859			
276.1.1	RO - Isalnita ( TRANSELECTRICA )	BG - Kozlodui ( NEK )	220	360	R1	2640							2640					
277.1.1	RO - Tântareni ( TRANSELECTRICA )	BG - Kozlodui ( NEK )	400	1450	R1	12300						10440						
277.1.2	RO - Tântareni ( TRANSELECTRICA )	BG - Kozlodui ( NEK )	400	1450	R1	25979						5459	18480		2040			
281.1.1	CS - Podgorica ( EP CG )	AL - Vau i Dejës ( KESH )	220	311	R1, R5	1914	176		884	44			96	128	38		548	
282.1.1	CS - Prizren ( EMS )	AL - Fierza ( KESH )	220	311	R1, R2, R5, R10	52562		305	110	597		10722		40491			96	241
291.1.1	AL - Elbassan ( KESH )	GR - Kardhia ( HTSO )	400	1300	R1	6485				6485								
301.1.1	BG - Blagoevgrad ( NEK )	GR - Thessaloniki ( HTSO )	400	1300	R1, R8	18359		67				18292						
321.1.1	CZ - Hradec Zapad ( CEPS )	DE - Etzenricht ( E.ON Netz )	400	1639	R1	6300								6300				
321.1.2	CZ - Prestice ( CEPS )	DE - Etzenricht ( E.ON Netz )	380	1645	R1, R9	6241							6193	48				
322.1.1	CZ - Hradec Vychod ( CEPS )	DE - Röhrsdorf ( VE Transmission )	380	1476	R1, R9, R10	8255			1600	1697	3460			14		514	970	
322.1.2	CZ - Hradec Vychod ( CEPS )	DE - Röhrsdorf ( VE Transmission )	380	1476	R1, R7, R10	8279			1968	552	3945					514	1300	
331.1.1	CS - Subotica 3 ( EMS )	HU - Sándorfalva ( MAVIR )	380	1246	R2	102												
351.1.1	HR - Melina ( HEP )	SI - Divaca ( ELES )	380	1264	R1, R2, R9	7961				112	70	7749						
351.2.1	HR - Pehlin ( HEP )	SI - Divaca ( ELES )	220	366	R8	3											3	
351.4.1	HR - Matulji ( HEP )	SI - Ilirska Bistrica ( ELES )	110	53	R9	9			9									
352.1.1	SI - Krško ( ELES )	HR - Tumbri ( HEP )	380	1316	R9	1350										1350		
352.2.1	SI - Cirkovce ( ELES )	HR - Mraclin ( HEP )	220	297	R9	360	360											
361.1.1	HR - Konjsko ( HEP )	BA - Mostar ( NOS BiH )	400	1316	R9	8779	5176	3603										

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Circuit ID	From substation	To substation	Voltage [kV]	Thermal conventional transmission capacity [ MVA ]	Major Reason	Time whole year [min]	January [min]	February [min]	March [min]	April [min]	May [min]	June [min]	July [min]	August [min]	September [min]	October [min]	November [min]	December [min]
361.2.1	BA - Mostar ( NOS BiH )	HR - Zakucac ( HEP )	220	311	R2, R4, R9	17239	2	2677	14560									
362.2.1	BA - Prijedor ( NOS BiH )	HR - Meduric ( HEP )	220	297	R1, R9, R10	914	274	283	357									
363.3.1	BA - Capljina ( NOS BiH )	HR - Opuzen ( HEP )	110	84	R8	27		27										
363.4.1	BA - Neum ( NOS BiH )	HR - Opuzen ( HEP )	110	84	R8	4		4										
363.5.1	BA - Neum ( NOS BiH )	HR - Ston ( HEP )	110	76	R1	280			280									
363.6.1	BA - Trebinje ( NOS BiH )	HR - Komolac ( HEP )	110	84	R2, R8, R9	2886		2886										
364.3.1	BA - Tuzla ( NOS BiH )	HR - Đakovo ( HEP )	220	229	R9	25			25									
364.5.1	BA - Orasje ( NOS BiH )	HR - Zupanja ( HEP )	110	76	R2	238			238									
371.2.1	HR - Njemci ( HEP )	CS - Šid ( EMS )	110	76	R9	20	20											
371.3.1	HR - Beli Manastir ( HEP )	CS - Apatin ( EMS )	110	78	R1, R2	606	550		56									
381.1.1	CS - Podgorica ( EP CG )	BA - Trebinje ( NOS BiH )	380	1264	R1, R2, R5	5921	44	153	226	8			5461	5	24			
381.2.1	CS - Perucica ( EP CG )	BA - Trebinje ( NOS BiH )	220	311	R1, R5, R7	13563		811			48	9712	1361	931	249	7	444	
381.3.1	CS - Herceg Novi ( EP CG )	BA - Trebinje ( NOS BiH )	110	90	R1, R2, R5	23646	3090			12774	1193	1729	731	141	1645	197	478	1668
381.4.1	CS - Vilusi ( EP CG )	BA - Bileca ( NOS BiH )	110	84	R1, R2, R5	2940						1071	877	361	16	610	5	
382.1.1	CS - Piva ( EP CG )	BA - Sarajevo 20 ( NOS BiH )	220	366	R1, R5, R9	34645						601	1644	2066	1354	554		28426
383.1.1	CS - Požega ( EMS )	BA - Višegrad ( NOS BiH )	220	311	R2	187												187
383.3.1	CS - HE Zvornik ( EMS )	BA - Zvornik ( NOS BiH )	110	123	R1, R2	3961						3961						
383.4.1	CS - Potpec ( EMS )	BA - Višegrad ( NOS BiH )	110	123	R2	482							482					
391.1.1	CS - Kosovo A ( EMS )	MK - Skopje 1 ( MEPSO )	220	311	R9, R10	525600	44640	40320	44640	43200	44640	43200	44640	44640	43200	44640	43200	44640
391.2.1	CS - Kosovo A ( EMS )	MK - Skopje 1 ( MEPSO )	220	311	R9, R10	525600	44640	40320	44640	43200	44640	43200	44640	44640	43200	44640	43200	44640
391.3.1	CS - Kosovo B ( EMS )	MK - Skopje 4 ( MEPSO )	380	1264	R1, R6	9829				39			455		9335			
401.1.1	DE - Herrenwyk ( E.ON Netz )	SE - Kruseberg ( Sydkraft/Vattenfall )	450	600	R1, R4-R7	11125			156			167		2327	6406		1512	557
404.1.1	CZ - Nošovice ( CEPS )	SK - Varin ( SEPS )	400	1465	R1,R2,R6,R9	30159	1850	3			15480	12452			133		72	169
410.1.1	CZ - Lieskovec ( CEPS )	SK - Pov. Bystrica ( SEPS )	220	269	R1, R8	16297	28								6039	10230		
420.1.1	CZ - Sokolnice ( CEPS )	SK - Senica ( SEPS )	220	318	R1, R9	51517			25364	24118					2035			
424.1.1	CZ - Sokolnice ( CEPS )	SK - Krizovany ( SEPS )	400	1503	R1, R2, R9	17480		631		1899								14950
430.1.1	CZ - Sokolnice ( CEPS )	SK - Stupava ( SEPS )	400	1711	R1, R2	19312					397				5293			
440.1.1	SK - V.Kapusany ( CEPS )	UA_W - Mukacevo ( NPC Ukrenergo )	400	1186	R1, R2, R10	12947				6393			13			6541		
443.1.1	CZ - Albrechtice ( CEPS )	PL - Dobrzyń ( PSE Operator SA )	400	1212	R1, R2, R3	5741	90				616			5035				
444.1.1	CZ - Nošovice ( CEPS )	PL - Wielopole ( PSE Operator SA )	400	1212	R1, R2	1162						705			457			
450.1.1	CZ - Lieskovec ( CEPS )	PL - Kapanina ( PSE Operator SA )	220	400	R1	2224					1716				508			
460.1.1	CZ - Lieskovec ( CEPS )	PL - Bujaków ( PSE Operator SA )	220	400	R1, R2	3506						2195	1311					
501.1.1	DE - Vierraden ( VE Transmission )	PL - Krajnik ( PSE Operator SA )	220	392	R1, R2	7187		278						4710			1814	385
501.1.2	DE - Vierraden ( VE Transmission )	PL - Krajnik ( PSE Operator SA )	220	392	R1, R10	5771										3560		2211
502.1.1	DE - Hagenwerder ( VE Transmission )	PL - Mikulowa ( PSE Operator SA )	380	1427	R1	2739				2739								
502.1.2	DE - Hagenwerder ( VE Transmission )	PL - Mikulowa ( PSE Operator SA )	380	1427	R1, R2	3980				2537	403					1040		
601.1.1	ES - Pinar del Rey ( REE )	MA - Melloussa ( ONE )	380	730	R1	6483		541					249	1695	673	360	2153	812
700.1.1	PL - Krosno Iskrzynia ( PSE SA )	SK - Lemešany ( SEPS )	400	1434	R1, R2	38705	502							38203				
700.1.2	PL - Krosno Iskrzynia ( PSE SA )	SK - Lemešany ( SEPS )	400	1434	R1, R2	38721	519							38202				
702.1.1	PL - Zamosc ( PSE Operator SA )	UA_W - Dobrotvor ( NPC Ukrenergo )	220	168	R1, R9	19482				4311	5160	2870			5713			1428
704.1.1	PL - Slupsk ( PSE Operator SA )	SE - Stårmo ( SvK )	450	600	R1,R2,R8,R9	53602		2937	27				40	24113	6294		17774	2417
710.1.1	HU - Győr ( MAVIR )	SK - Gabčíkova ( SEPS )	400	1246	R1, R2, R10	43357				16187				293	20869	6008		
711.1.1	SK - Levice ( SEPS )	HU - Gőd ( MAVIR )	400	1246	R1	12055								11875			180	
720.1.1	HU - Albertirsa ( MAVIR )	UA_W - Zahidno Ukrainska ( NPC Ukrenergo )	750	4000	R1, R9	52947						8331	44190	426				
721.1.1	HU - Sajószöged ( MAVIR )	UA_W - Mukacevo ( NPC Ukrenergo )	400	1635	R1	26985						26610						375
722.1.1	HU - Kisvarda ( MAVIR )	UA_W - Mukacevo ( NPC Ukrenergo )	220	275	R1	56692									16904	39788		
722.1.2	HU - Tiszalök ( MAVIR )	UA_W - Mukacevo ( NPC Ukrenergo )	220	275	R1	29184					21224	7960						
740.1.1	RO - Rosiori ( TRANSELECTRICA )	UA_W - Mukacevo ( NPC Ukrenergo )	400	1400	R1	37560	23935	775	3929	2295					6626			
741.1.1	RO - Isaccea ( TRANSELECTRICA )	UA_W - Niwnitschnoi Ukr. ( NPC Ukrenergo )	750	4000	R1	1320		1320										
750.1.1	RO - Stånca ( TRANSELECTRICA )	MD - Costesti ( Moldenergo )	110	90	R1	6000								6000				
752.1.1	RO - Husi ( TRANSELECTRICA )	MD - Ungheni ( Moldenergo )	400	90	R1	4860									4860			
753.1.1	RO - Isaccea ( TRANSELECTRICA )	MD - Vulcanesti ( Moldenergo )	1700	1700	R1	10104			4044		4860		240				960	

Reasons: R1 - Maintenance, R2 - Repair, R3 - New construction, R7 - Outside impacts (animals, trees, fire, avalance,...),

R4 - Overload (also calculated), R8 - Very exceptional conditions (weather, natural disaster,...),

R5 - False operation, R6 - Failure in prodection device or other element, R9 - Other reasons, R10 - Unknown reasons

Country	Circuit length (km)				Transformers 400kV → 220kV	
	220 kV	of which cable	400 kV	of which cable	Number	Capacity GVA
AT <sup>1</sup>	3765	5	2474	56	13	10,8
BA	1507	0	766	0	7	3,0
BE	400	0	1324	0	6	2,0
BG	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
CH	4956	20	1780	0	18	10,0
CS	2598	0	1814	0	13	5,2
CZ	1922	0	3421	0	4	2
DE <sup>3</sup>	16300	30	19400	60	91	53,5
ES	16846	110	16458	41	95	52,0
FR	26319	906	21008	3	208	106,0
GR	11029	177	4156	160	45	13,0
HR <sup>2</sup>	1145	0	1159	0	4	2,0
HU	1188	0	2364	0	3	1,5
IT	11387	860	10528	317	51	20,5
LU	236	6	0	0	0	0,0
MK <sup>4</sup>	70	0	397	0	0	0,0
NL	683	6	2003	0	4	2,5
PL	7908	0	4919	245	15	6,8
PT	2854	19	1501	0	7	3,2
RO	4132	0	4630	0	22	9,0
SI <sup>2</sup>	328	0	510	0	3	1,2
SK	962	0	1753	0	3	1,4
<b>UCTE</b>	<b>116534</b>	<b>2139</b>	<b>102365</b>	<b>882</b>	<b>608</b>	<b>303,6</b>
DK_W	39	0	833	14	0	0,0
UA_W	594	0	590 <sup>5</sup>	0	6 <sup>5</sup>	2,3 <sup>5</sup>

<sup>1</sup> Values as of 31 December 2000

<sup>2</sup> Values as of 31 December 2004

<sup>3</sup> Values transformers of power units as of 31 December 2000

<sup>4</sup> Values as of 31 December 2003

<sup>5</sup> Including 330 kV and 750 kV equipment

Country	Transformers 220kV → < 220kV				Transformers 400kV → < 220kV			
	of power units		in the network		of power units		in the network	
	Number	Capacity GVA	Number	Capacity GVA	Number	Capacity GVA	Number	Capacity GVA
AT <sup>1</sup>	64	7,1	67	11,5	3	1,2	13	3,9
BA	15	2,0	15	2,0	3	1,0	7	2,0
BE	3	1,0	24	3,0	14	8,0	27	12,0
BG	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
CH	104	4,5	143	21,3	8	4,3	3	0,6
CS	23	4,6	51	7,7	11	4,9	13	3,8
CZ	5	1,1	20	4,0	33	11,3	42	11,6
DE <sup>3</sup>	111	31,0	394	74,4	100	62,0	211	60,3
ES	0	0,0	0	0,0	0	0,0	57	16,0
FR	232	30,0	798	83,0	103	86,0	55	13,0
GR	90	8,0	414	17,0	17	5,0	0	0,0
HR <sup>2</sup>	7	1,3	21	3,2	2	0,3	7	2,4
HU	0	0,0	26	4,2	0	0,0	24	5,5
IT	112	23,0	153	25,5	120	36,2	216	55,6
LU	11	1,8	19	2,7	0	0,0	0	0,0
MK <sup>4</sup>	0	0,0	4	0,6	2	0,5	7	2,1
NL	9	3,2	25	4,4	6	3,6	35	16,1
PL	58	13,9	113	18,0	25	8,6	36	9,6
PT	61	4,1	64	7,8	19	4,4	16	4,5
RO	45	9,1	91	17,6	13	5,3	22	10,5
SI <sup>2</sup>	0	0,0	15	2,3	0	0,0	5	1,5
SK	8	1,5	13	2,6	20	4,1	19	5,0
<b>UCTE</b>	<b>953</b>	<b>147,2</b>	<b>2450</b>	<b>312,6</b>	<b>466</b>	<b>235,4</b>	<b>773</b>	<b>224,2</b>
DK_W	0	0,0	2	0,7	4	1,6	18	7,5
UA_W	7	1,8	14	1,9	5 <sup>5</sup>	1,3 <sup>5</sup>	1 <sup>5</sup>	1,0 <sup>5</sup>



Country	Name of line	Voltage	Main characteristics
BE - FR	Second circuit of the line Avelgem - Avelin	380 kV	Second circuit, 23 km, AC line
IT - CH	San Fiorano - Filisur	380 kV	
	San Fiorano - Robbia	380 kV	
	Gorlago - Sils/Pradella	380 kV	
	Ponte - Airolo/Fiesch	380 kV	
DE - AT	Hauzenberg - Ranna-Passau 147	110 kV	Interconnection between APG power system and E.ON Netz



Country	Name of line or equipment	Voltage in kV	Main characteristics
BA	Kakanj - Prijedor	220	Single circuit line. This line was damaged during the war.
BE	Koksijde	150/36	Additional transformator
	Zeebrugge	150	GIS station
	Cable Izegem-Oostrozebeke	150	AC cable, 8.1 km
	Aubange	220/150/5	New transformer replacing an existing one
	Second circuit of the Baisy-Thy-Corbais	150	Second circuit, 13.3 km, AC line
	Second circuit of the line Beerst-Koksijde	150	Second circuit, 15 km, AC line
	Awirs	220/70	Additional transformator
CH	"Nufenen" line All' Acqua - Ulrichen	380	AC double circuit line in 220 kV operation. Using this line topological changes have been introduced resulting in the creation on the T-connection: Fiesch/Airola-Ponte and the circuit Mörel-Airolo
CS	Sremska Mitrovica - Ugljevik	380	Single line, AC, 35 km
CZ	Cebin T401	400/110	New 350 MVA transformer
DE	Connection Eula	380	Double circuit, AC, < 1km
	Connection Weida	380	Double circuit, AC, 2km
	Connection Röhrsdorf - Weida	380	Upgrading of an AC-circuit from 220 to 380 kV, 61 km
	Connection Schönewalde	380	Double circuit, AC, < 1km
	Connection Großschwabhausen	380	Single circuit, AC, 4 km
ES	E/S Morella L/Aragón - La Plana	400	0.469 km
	E/S Olmedo L/Muearra - Lastras	400	0.562 km
	E/S La Espulga L/Ascó - Begues	400	2 x 1.46 km
	L Sentmenat - Can Barba 2	400	0.2 km
	E/S La Lora L/Barcina - Herrera	400	0.8 km
	E/S Rubió L/Pierola - Pobla	220	2 x 0.2 km
	E/S Jundiz L/Mercedes - PuenteIarrá	220	2 x 0.105 km
	E/S Camino Fregacedos		
	L/Moralja -T Fortuna I	220	2.4 km
	E/S Poligono L/Los Ramos - Tajo	220	2 x 4.35 km
	E/S Aljarafe L/Quintos - Santiponce	220	2 x 0.455 km
	L Cartelle - Frieria	220	18.5 km
	E/S Chantada L/Belesar - Castrelo	220	2 x 2.25 km
	L San Sebastian de los Reyes - AENA	220	3.5 km
	E/S Vilafranca L/Constanti - Viladecans	220	2 x 0.082km
	Substation Espulga	400	
	Substation Lora	400	
	Substation El Cereal	400	
	Substation Torremendo	400	

Country	Name of line or equipment	Voltage in kV	Main characteristics
ES	Substation Chantada	220	
	Substation Villafranca del Penedés	220	
	Substation Poligono	220	
	Substation Aljarafe	220	
FR	Avelgem - Avelin 2	400	Length of the line: 19.6 km
	Avelgem - Mastaing 1	400	Length of the line: 0.5 km
	Lonny - Mastaing 2	400	Length of the line: 0.5 km
	Cantegrit - Saucats 2	400	Length of the line: 71.9 km
	Cantegrit - Saucats 3	400	Length of the line: 71.8 km
GR	HT s/s Magiko	150	New substation
	HT s/s Sapka	150	New substation
	HT s/s Andros	150	New substation
	EHT s/s Enthes	400	New power plant cc-natural gas
	HT s/s Didyma	150	New substation
	HT s/s Panachaiko	150	New substation
IT	Feroletto - Rizziconi	380	Single line 68 km
	Pian della Speranza - Montaldo	380	Single line 117 km
	Suvereto - Valmontone	380	Single line 270 km
	Altomonte - Ferroletto	380	Single line 108 km
	Porto Tolle - Forli	380	
	Ravenna Canale 353 - Forli	380	
	Ravenna Canale 316 - Forli	380	
	Ferrara Focomorto - Ravenna Canale	380	
	Vellai/Soverzene - Lienz	220	Single line 140 km
	Airola - Fiesch	220	Single line 59 km
	Ottana - Busachi	220	
	Villasor - Busachi	220	
	Ponte - Airola Fiesch	220	
	PL	Tarnów - Krosno Iskrzynia	400
RO	Sibiu Sud Transformer	400/110	250 MVA
SK	Choke coils	10.5	2x45 MVAr new
	Substation Senica	220	Reconstruction
	Line V 273	220	Exchange of wires