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System information

Statistical database as of 31 August 2011

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Inventory of transmission network installations as of 31 December 2010

Lengths of AC circuits in km										
Country	< 220 kV	of which cable	220 kV	of which cable	330 kV	of which cable	380/400 kV	of which cable	750 kV	of which cable
AT ¹			1850	3			1388	54		
BA			1525	0			865	0		
BE			427	n.a.			1326	n.a.		
BG			2815	0			2327	0	85	0
CH			4918	23			1788	8		
CY ²	1227	120								
CZ			1909	0			3479	0		
DE			14616	39			20264	70		
DK			430	196			1263	371		
EE	3537	114	184	0	1540	0				
ES			17110	254			18765	55		
FI ³			2602	0			4275	0		
FR			26492	1004			21374	3		
GB			6077	476			11913	271		
GR			11732	267			4319	5		
HR			1210	0			1248	0		
HU			1481	0			2762	0	268	0
IE			1850	117			439	0		
IS			851	0						
IT			11284	431			10713	466		
LT	5007	39			1672	0				
LU			259	18						
LV	3946	63			1258	0				
ME			400	0			280	0		
MK			103	0			507	0		
NI	1282	85	828	4						
NL ⁴			613	2			2013	1		
NO ¹			445	0			8355	442		
PL ⁵			8004	1			5303	0	114	0
PT			3467	42			1973	0		
RO			4755	0			4867	0	159	0
RS			2234	0			1693	0		
SE ⁶			4469	30			10708	8		
SI			328	0			508	0		
SK			728	0			1521	0		
ENTSO-E⁷	14999	421	135996	2906	4470	0	146236	1754	626	0
UA_W ⁸			755	0	42	0	339	0	208	0

¹ Values as of 31 December 2009

² Lengths < 220 kV as of 31 December 2009

³ Additional 400 kV 33 km of DC overhead line and 100 km DC submarine cable.

⁴ Additionally DC 450 kV submarine cable 290 km.

⁵ Additionally 254km (total length) of 450kV DC submarine cable SwePol Link between Poland and Sweden.

⁶ Additionally 550 km of 750 kV HVDC of which 460 km cable.

⁷ ENTSO-E calculated sum of the member TSOs' countries

⁸ Ukraine West represent the so-called Burshtyn Island synchronously interconnected with ENTSO-E area.

Number of circuits < 220 kV, 220 kV and over 220 kV on cross frontier transmission lines

Number of < 220 kV and ≥ 220 kV circuits on cross-frontier transmission lines between ENTSO-E member TSOs' countries and UA_W :

	AT	BA	BE	BG	CH	CZ	DE	DK	EE	ES	FI	FR	GB	GR	HR	HU	IE	IT	LT	LU	LV	ME	MK	NI	NL	NO	PL	PT	RO	RS	SE	SI	SK	UA W				
AT					2 2	2 2	11 3									2 1	1 -															1 2						
BA															11 7 2							3 2 1							3 1 1									
BE												3 3								2 2 -					- 4													
BG														1									2 1					- 4	2 -	- 1								
CH					2 5 7						1 5 5						1 5 5																					
CZ					- 4																						7 2 2						2 3					
DE						1 2 3						- 2 4									- 8 -					- 5	1 2 -				- 1							
DK																										2 1				2 2								
EE											1 -											- 2																
ES												2 2 2															1 3 4											
FI																										1 -				1 3								
FR												2 -					1 3 3																					
GB																							- 2 -															
GR																							- 2															
HR															2 - 4														2 - 1	3 2 3								
HU																												- 2 1	1 -				- 2 2					
IE																								- 2 -														
IT																																1 2						
LT																						3 - 4																
ME																																						
MK																																						
NO																																						
PL																																						
RO																																						
SK																																						

< 220 kV
220 kV (including 275 kV)
330, 380, 400 kV and 750 kV

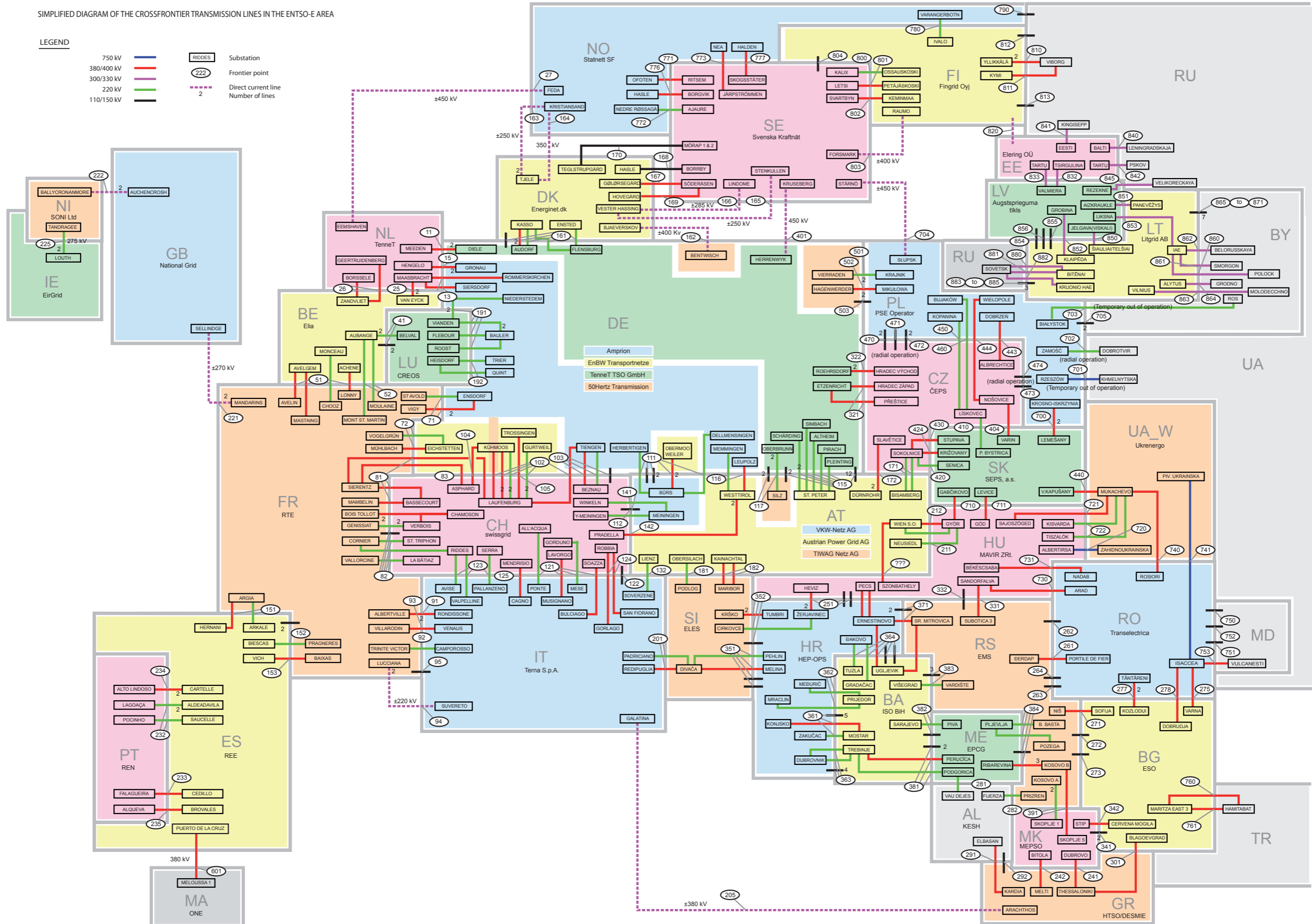
As of 31.12.2010

Simplified diagram of the cross-frontier transmission lines of the synchronous area of ENTSO-E as of 31 December 2010

SIMPLIFIED DIAGRAM OF THE CROSSFRONTIER TRANSMISSION LINES IN THE ENTSO-E AREA

LEGEND

- 750 kV —
- 380/400 kV —
- 300/330 kV —
- 220 kV —
- 110/150 kV —
- RIDDES Substation
- 222 Frontier point
- Direct current line
- 2 Number of lines



Observations	
[1]	Limited by phase shifting transformer in Meeden
[2]	Limited by phase shifting transformer in Meeden
[3]	DC submarine cable
[4]	Unit is MW instead of MVA
[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-Laufenbourg; Line owned and operated by EnBW in Germany
[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]	On the same tower as line No. 81 Laufenbourg-Sierentz 380 kV
[17]	From Kühmoos to Laufenbourg on the same tower
[18]	Limited by measuring transducer at Laufenbourg
[19]	From Kühmoos to Laufenbourg on the same tower
[20]	On the same tower as line Sierentz-Laufenbourg
[21]	On CH side 220 kV
[22]	Limited by switching devices in Austria
[23]	Disconnected till approx. 2010; afterwards line will be dismantled
[24]	Cable at Braunau
[25]	Cable at Braunau

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
Nr.							kV	kV	MVA	MVA	MVA	kV	MVA	kV
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
11.1.1	DE	Diele	TenneT TSO GmbH	NL	Meeden	TenneT TSO B.V.		380		1382	1000 [1]			
11.1.2	DE	Diele	TenneT TSO GmbH	NL	Meeden	TenneT TSO B.V.		380		1382	1000 [2]			
13.1.1	DE	Siersdorf	Amprion	NL	Maasbracht	TenneT TSO B.V.		380		1645				
13.1.2	DE	Rommerskirchen	Amprion	NL	Maasbracht	TenneT TSO B.V.		380		1698				
15.1.1	DE	Gronau	Amprion	NL	Hengelo	TenneT TSO B.V.		380		1645				
15.1.2	DE	Gronau	Amprion	NL	Hengelo	TenneT TSO B.V.		380		1645				
25.1.1	BE	Van Eyck	Elia	NL	Maasbracht	TenneT TSO B.V.		380		1207				
25.1.2	BE	Van Eyck	Elia	NL	Maasbracht	TenneT TSO B.V.		380		1270				
26.1.1	BE	Zandvliet	Elia	NL	Geertruidenberg	TenneT TSO B.V.		380		1476				
26.2.1	BE	Zandvliet	Elia	NL	Borssele	TenneT TSO B.V.		380		1476	450			
27.1.1	NO	Feda	Statnett	NL	Eemshaven	TenneT TSO B.V.		450		700 [3,4]				
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	Monceau	Elia	FR	Chooz	RTE		220		356				
51.2.1	BE	Avelgem	Elia	FR	Mastaing	RTE		380		1207				
51.2.2	BE	Avelgem	Elia	FR	Avelin	RTE		380		1367				
51.3.1	BE	Achène	Elia	FR	Lonny	RTE		380		1177				
52.1.1	BE	Aubange	Elia	FR	Moulaine	RTE		220		381				
52.2.1	BE	Aubange	Elia	FR	Mont St Martin	RTE		220		381				
71.1.1	DE	Ensdorf	Amprion	FR	Vigy	RTE		380		1790				
71.1.2	DE	Ensdorf	Amprion	FR	Vigy	RTE		380		1790				
71.2.1	DE	Ensdorf	Amprion	FR	St-Avoid	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		1684				
81.1.1	CH	Bassecourt	swissgrid	FR	Sierentz	RTE		380		1186				
81.2.1	CH	Laufenburg	swissgrid	FR	Sierentz	RTE		380		1167				
81.3.1	CH	Bassecourt	swissgrid	FR	Mambelin	RTE		380		1046				
82.1.1	CH	Verbois	swissgrid	FR	Bois-Tollot	RTE		380		1211	800	220 [6]		
82.1.2	CH	Chamoson	swissgrid	FR	Bois-Tollot	RTE		380		1409	600			
82.2.1	CH	Verbois	swissgrid	FR	Génissiat	RTE		220		315				11 [7]
82.2.2	CH	Verbois	swissgrid	FR	Génissiat	RTE		220		315				11 [8]
82.3.1	CH	Verbois	EOS	FR	Pougny	SFM C-P		130		52	42			11 [9]
82.4.1	CH	La Bâtiâz	swissgrid	FR	Vallorcine	RTE		220		266				
82.5.1	CH	Riddes	swissgrid	FR	Cornier	RTE		220		275				
82.6.1	CH	St-Triphon	swissgrid	FR	Cornier	RTE		220		275				
83.1.1 [10]	CH/DE	Asphard	swissgrid/EnBW Tr.netze Strom	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	Trinite Victor	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	
95.1.1	FR	Bonifacio	EDF	IT	Santa Teresa	Terna		150		53				
102.1.1 [15]	CH	Laufenburg	swissgrid	DE	Gurtweil	EnBW Transportnetze		220		469		220		
102.1.2	CH	Laufenburg	swissgrid	DE	Gurtweil	EnBW Transportnetze		220		469		220		
102.2.1 [16]	CH	Laufenburg	swissgrid	DE	Kühmoos	EnBW Transportnetze		220		410				
102.3.1 [17]	CH	Laufenburg	swissgrid	DE	Kühmoos	EnBW Transportnetze	380	220		430		220		
102.3.2	CH	Laufenburg	swissgrid	DE	Kühmoos	EnBW Transportnetze		380		1620	1580			
102.4.1	CH	Laufenburg	swissgrid	DE	Kühmoos	EnBW Transportnetze		380		1620	1580			
102.4.2	CH	Laufenburg	swissgrid	DE	Kühmoos	Amprion		380		1620	1264 [18]			
102.5.1 [19]	CH	Laufenburg	swissgrid	DE	Tiengen	Amprion		380		1131				
103.1.1	CH	Beznau	swissgrid	DE	Tiengen	Amprion		380		1158				
103.1.2	CH	Beznau	swissgrid	DE	Tiengen	Amprion	380	220		335				
103.1.3	CH	Klingnau	AWAG	DE	Tiengen	Amprion	380	110		57	40			
104.1.1 [20]	CH	Asphard	swissgrid	DE	Kühmoos	EnBW Transportnetze		380		1340				
105.1.1	CH	Laufenburg	swissgrid	DE	Trossingen	EnBW Transportnetze		380		1580				
107.1.1 [21]	CH	Laufenburg 220kV	swissgrid	DE	Laufenburg 110 kV	ED		110		200				
111.1.1	AT	Bürs	VIW	DE	Obermooweller	EnBW Transportnetze		380		1369				
111.1.2	AT	Bürs	VIW	DE	Obermooweller	EnBW Transportnetze		380		1369				
111.2.1	AT	Bürs	VIW	DE	Herbertingen	Amprion		220		389				
111.3.1	AT	Bürs	VIW	DE	Dellmensingen	Amprion		220		492	457 [22]			
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		127				
112.1.1	AT	Feldkirch	VKW -Netz	LI	Eschen	LKW		110		130				
115.1.1	AT	Braunau	APG	DE	Neuötting	TenneT TSO GmbH		110		90 [23]			82 [24]	
115.2.1	AT	Braunau	APG	DE	Stammham	TenneT TSO GmbH		110		102			82 [25]	
115.4.1	AT	Antiesenhofen	APG	DE	Eggfling	TenneT TSO GmbH		110		102				

*The conventional transmission capacity of cross-frontier tie-lines is based upon parameters standardised within former 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	
[26]	Transducer at Ering
[27]	Transducer at Ering
[28]	Isolator in St. Peter
[29]	Isolator in St. Peter
[30]	Only temporary line; from December 2005 till summer 2006; afterwards disconnected till approx.2010
[31]	No international interconnector
[32]	CFT blocker at St. Peter
[33]	No international interconnector
[34]	CFT blocker at St. Peter
[35]	Switching device at Oberbrunn
[36]	Switching device at Oberbrunn
[37]	Possible to lay a second circuit
[38]	Limited by transformer in Enstedt
[39]	Limited by transformer in Kassø
[40]	Transducer at Kassø
[41]	Transducer at Kassø
[42]	DC submarine and underground cable
[43]	DC submarine and underground cable
[44]	DC submarine and underground cable
[45]	Under water cable
[46]	Under water cable
[47]	Under water cable
[48]	Generator line in radial operation - interconnected operation impossible
[49]	Installed at Vianden
[50]	Generator line in radial operation - interconnected operation impossible
[51]	Installed at Vianden

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
Nr.							kV	kV	MVA	MVA	MVA	kV	MVA	kV
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
115.5.1	AT	St. Peter	APG	DE	Altheim	TenneT TSO GmbH		220		301				
115.6.1	AT	St. Peter	APG	DE	Simbach	TenneT TSO GmbH		220		301				
115.7.1	AT	St. Peter	APG	DE	Ering	TenneT TSO GmbH		110		152	137		114 [26]	
115.7.2	AT	St. Peter	APG	DE	Ering	TenneT TSO GmbH		110		152	137		114 [27]	
115.8.1	AT	St. Peter	APG	DE	Eggfing	TenneT TSO GmbH		110		105				
115.9.1	AT	St. Peter	APG	DE	Pirach	TenneT TSO GmbH		220		518	457 [28]			
115.10.1	AT	St. Peter	APG	DE	Pleinting	TenneT TSO GmbH		220		449	457 [29]			
115.11.1	AT	Ranna	EAGOO-Netz	DE	Passau/Hauzenberg	TenneT TSO GmbH		110		90 [30]				
115.12.1	AT	Oberaudorf	ÖBK	DE	Rosenheim	TenneT TSO GmbH		110		93				
115.13.1	AT	Oberaudorf	ÖBK	DE	Kiefersfelden	TenneT TSO GmbH		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	APG / EAGOO-Netz	DE	Passau	ÖBK		110		102				
115.16.1 [31]	AT	St. Peter	APG	DE	Schärding	ÖBK		220		301			229 [32]	
115.16.2 [33]	AT	St. Peter	APG	DE	Schärding	ÖBK		220		301			229 [34]	
115.17.1	AT	Kufstein	TIWAG-Netz	DE	Oberaudorf	TenneT TSO GmbH		110		90				
115.17.2	AT	Ebbs	TIWAG-Netz	DE	Oberaudorf	TenneT TSO GmbH		110		127				
116.1.1	AT	Westtirol	APG	DE	Leupolz	Amprion		380		1316				
116.2.1	AT	Westtirol	APG	DE	Memmingen	Amprion		220		762				
117.1.1	AT	Silz	TIWAG-Netz	DE	Oberbrunn	TenneT TSO GmbH		220		793	762 [35]			
117.1.2	AT	Silz	TIWAG-Netz	DE	Oberbrunn	TenneT TSO GmbH		220		793	762 [36]			
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	swissgrid	IT	Ponte	Terna		220		278				
121.2.1	CH	Gorduno	swissgrid	IT	Mese	Terna		220		278				
121.3.1	CH	Soazza	swissgrid	IT	Bulciago	Terna		380		1224				
121.4.1	CH	Lavorgo	swissgrid	IT	Musignano	Terna		380		1204				
122.1.1 [37]	CH	Campocologno	RE	IT	Poschiavino	Terna		150		103	42			
123.1.1	CH	Riddes	swissgrid	IT	Avise	Terna		220		309				
123.2.1	CH	Riddes	swissgrid	IT	Valpelline	Terna		220		309				
123.3.1	CH	Serra	swissgrid	IT	Pallanzeno	Terna		220		278				
124.1.1	CH	Robbia	swissgrid	IT	Gorlago	Terna		380		1340				
124.1.2	CH	Robbia	swissgrid	IT	San Fiorano	Terna		380		1340				
125.1.1	CH	Mendrisio	swissgrid	IT	Cagno	Terna		380		450			200	
132.1.1	AT	Lienz	APG	IT	Soverzene	Terna		220		257				
141.1.1	AT	Meiningen	VKW-Netz	CH	Y-Meiningen	swissgrid		220		501				
141.2.1	AT	Meiningen	VKW-Netz	CH	Winkeln	swissgrid		220		776				
142.1.1	AT	Westtirol	APG	CH	Pradella	swissgrid		380		1340				
142.2.1	AT	Westtirol	APG	CH	Pradella	swissgrid		380		1340				
151.1.1	ES	Hemani	REE	FR	Argia	RTE		380		1136				
151.2.1	ES	Irún	REE	FR	Errondenia	RTE		132		56				
151.3.1	ES	Arkale	REE	FR	Argia	RTE		220		340				
151.4.1	ES	Biescas	REE	FR	Pragnères	RTE		220		237				
152.1.1	ES	Benós	REE	FR	Lac d'Oo	RTE		110		63				
153.1.1	ES	Vich	REE	FR	Baixas	RTE		380		1105				
161.1.1	DE	Flensburg	TenneT TSO GmbH	DK	Ensted	Energinet.dk		220		332	305 [38]			
161.2.1	DE	Flensburg	TenneT TSO GmbH	DK	Kassø	Energinet.dk		220		332	305 [39]			
161.3.1	DE	Audorf	TenneT TSO GmbH	DK	Kassø	Energinet.dk		380		1078	658 [40]			
161.3.2	DE	Audorf	TenneT TSO GmbH	DK	Kassø	Energinet.dk		380		1078	658 [41]			
161.4.1	DE	Flensburg UW Nord	TenneT TSO GmbH	DK	Ensted	Energinet.dk		150		150				
162.1.1 [42]	DE	Bentwisch	50Hertz	DK	Bjæverskov	Energinet.dk		400		600				
163.1.1 [43]	NO	Kristiansand	Statnett SF	DK	Tjele	Energinet.dk		250		250				
163.1.2 [44]	NO	Kristiansand	Statnett SF	DK	Tjele	Energinet.dk		250		250				
164.1.1 [45]	NO	Kristiansand	Statnett SF	DK	Tjele	Energinet.dk		350		350				
165.1.1 [46]	SE	Stenkullen	Svenska Kraftnät	DK	Vester Hassing	Energinet.dk		125		125				
166.1.1 [47]	SE	Lindome	Svenska Kraftnät	DK	Vester Hassing	Energinet.dk		285		360				
167.1.1	SE	Söderåsen	Svenska Kraftnät	DK	Gørløsegård	Energinet.dk		400						
168.1.1	SE	Borrby	E.ON Elnät Sverige AB	DK	Bornholm	Energinet.dk		60		51				
169.1.1	SE	Söderåsen	Svenska Kraftnät	DK	Hovegård	Energinet.dk		400						
170.1.1	SE	Mörarp 1and 2	E.ON Elnät Sverige AB	DK	Teglstrupgård	Energinet.dk		130		311				
171.1.1	AT	Bisamberg	APG	CZ	Sokolnice	CEPS		220		250				
171.2.1	AT	Bisamberg	APG	CZ	Sokolnice	CEPS		220		250				
172.1.1	AT	Dürrrohr	APG	CZ	Slavetice	CEPS		380		1559				
172.1.2	AT	Dürrrohr	APG	CZ	Slavetice	CEPS		380		1559				
181.1.1	AT	Obersielach	APG	SI	Podlog	ELES		220		320				
182.1.1	AT	Kainachtal	APG	SI	Maribor	ELES		380		1164				
182.2.1	AT	Kainachtal	APG	SI	Maribor	ELES		380		1164				
191.1.1	DE	Niederstedem	Amprion	LU	Vianden	SEO		220		490	460 [48,49]			
191.1.2	DE	Niederstedem	Amprion	LU	Vianden	SEO		220		490	230			
191.2.1	DE	Bauler	Amprion	LU	Vianden	SEO		220		730	345 [50,51]			

*The conventional transmission capacity of cross-frontier tie-lines is based upon parameters standardised within former 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	
[52]	Generator line in radial operation - interconnected operation impossible
[53]	Installed at Vianden
[54]	The 400kV DC link between GR-IT is composed of an overhead line and a submarine cable
[55]	DC submarine cable
[56]	Unit is MW instead of MVA
[57]	DC submarine cable
[58]	Unit is MW instead of MVA
[59]	DC submarine cable
[60]	DC submarine cable
[61]	Due to Existing Constraints the following applies to the 275kV double circuit tie line (both 225.1.1 AND 225.2.1):IE Louth to NI Tandragee = 380MWNI Tandragee to IE Louth
[62]	Due to Existing Constraints the following applies to the 275kV double circuit tie line (both 225.1.1 AND 225.2.1):IE Louth to NI Tandragee = 380MWNI Tandragee to IE Louth
[63]	In May 2007 out of operation 150 kV line Bitola1-Amyndeo; from June 2007 the new 400 kV line Bitola2-Meliti in operation
[64]	Limited by the connected network
[65]	Nominal voltage in Croatia
[66]	Limited by the connected network
[67]	Nominal voltage in Croatia
[68]	Built for 750 kV
[69]	4500 MVA at 750 kV
[70]	Limited by the Albanian network
[71]	Capacity of current transformers at Bistrica
[72]	Disconnected in Serbia

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
Nr.							kV	kV	MVA	MVA	MVA	kV	MVA	kV
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
191.2.2	DE	Bauler	Amprion	LU	Vianden	SEO		220		730	230 [52,53]			
191.3.1	DE	Bauler	Amprion	LU	Flebour	Creos Luxembourg		220		490				
191.4.1	DE	Bauler	Amprion	LU	Roost	Creos Luxembourg		220		490				
192.1.1	DE	Trier	Amprion	LU	Heisdorf	Creos Luxembourg		220		490				
192.2.1	DE	Quint	Amprion	LU	Heisdorf	Creos Luxembourg		220		490				
201.1.1	IT	Redipuglia	Terna	SI	Divaca	ELES		380		1619				
201.2.1	IT	Padriciano	Terna	SI	Divaca	ELES		220		320				
205.1.1 [54]	IT	Galatina	Terna	GR	Arachthos	HTSO		380		500				
211.1.1	AT	Wien Süd-Ost	APG	HU	Győr	MAVIR		220		209				
211.1.2	AT	Neusiedl	APG	HU	Győr	MAVIR		220		209				
212.1.1	AT	Wien Süd-Ost	APG	HU	Győr	MAVIR		380		1514				
213.1.1	AT	Wien Süd-Ost	APG	HU	Szombathely	MAVIR		380		1514				
221.1.1	FR	Mandarins	RTE	GB	Sellindge	National Grid		270 [55]		1000 [56]				
221.2.1	FR	Mandarins	RTE	GB	Sellindge	National Grid		270 [57]		1000 [58]				
222.1.1	NI	Ballycronamore	SONI Ltd	GB	Auchencrosh	National Grid		250 [59]		250				
222.2.1	NI	Ballycronamore	SONI Ltd	GB	Auchencrosh	National Grid		250 [60]		250				
225.2.1	NI	Tandragee	SONI Ltd	IE	Louth	EirGrid		275		660 [61]				
225.2.1	NI	Tandragee	SONI Ltd	IE	Louth	EirGrid		275		660 [62]				
231.1.1	ES	Las Conchas	REE	PT	Lindoso	REN		132		90				
232.1.1	ES	Aldeadávila	REE	PT	Pocinho	REN		220		374				
232.2.1	ES	Aldeadávila	REE	PT	Pocinho	REN		220		374				
232.2.1	ES	Aldeadávila	REE	PT	Lagoaça	REN		400		1469				
232.3.1	ES	Saucele	REE	PT	Pocinho	REN		220		346				
233.1.1	ES	Cedillo	REE	PT	Falagueira	REN		380		1300				
234.1.1	ES	Cartelle	REE	PT	Alto Lindoso	REN		380		1330				
234.1.2	ES	Cartelle	REE	PT	Alto Lindoso	REN		380		1330				
235.1.1	ES	Brovales	REE	PT	Alqueva	REN		400		1280				
241.1.1	MK	Dubrovo	MEPSO	GR	Thessaloniki	HTSO		400		1300				
242.1.1 [63]	MK	Bitola	MEPSO	GR	Meliti	HTSO		400		1300				
251.1.1	HU	Lenti	MAVIR	HR	Nedeljanec	HEP-OPS		120		79	50 [64]	110 [65]		
251.2.1	HU	Siklos	MAVIR	HR	Donji Miholjac	HEP-OPS		120		114	50 [66]	110 [67]		
251.3.1	HU	Hévíz	MAVIR	HR	Zerjavinec	HEP-OPS		400		1246				
251.3.2	HU	Hévíz	MAVIR	HR	Zerjavinec	HEP-OPS		400		1246				
261.1.1	RS	Djerdap	EMS	RO	Portile de Fier	Transelectrica		400		1135			1107	
262.1.1	RS	Kikinda 1	EMS	RO	Jimbolia	Transelectrica		110		65			57	
263.1.1	RS	Kusijak	EMS	RO	Ostrovu Mare	Transelectrica		110		90				
264.1.1	RS	Sip	EMS	RO	Gura V aii	Transelectrica		110		87			19	
271.1.1	BG	Sofija Zapad	ESO	RS	Niš	EMS		380		1309				
272.1.1	BG	Breznik	ESO	RS	HE Vrla 1	EMS		110		97				
273.1.1	BG	Kula	ESO	RS	Zajecar	EMS		110		90				
275.1.1	RO	Isaccea	Transelectrica	BG	Vama	ESO	750	400 [68]		2168 [69]				
277.1.1	RO	Tantareni	Transelectrica	BG	Kozlodui	ESO		400		1300		1000		
277.1.2	RO	Tantareni	Transelectrica	BG	Kozlodui	ESO		400		1300		1107		
278.1.1	RO	Isaccea	Transelectrica	BG	Dobrudja	ESO		400		1135			830	
281.1.1	AL	Vau i Dejës	KESH	ME	Podgorica 2	AD Prenos		220		276				
282.1.1	AL	Fierza	KESH	RS	Prizren	EMS		220		270				
291.1.1	AL	Elbassan	KESH	GR	Kardia	HTSO		400		1300	250 [70]			
292.1.1	AL	Bistrica	KESH	GR	Mourtos	HTSO		150		120	40 [71]			
293.1.1	TR	Babaeski	TEIAS	GR	Nea Santa	HTSO		400		2000				
301.1.1	BG	Blagoevgrad	ESO	GR	Thessaloniki	HTSO		400		1300	700			
321.1.1	CZ	Hradec Zapad	CEPS	DE	Etzenricht	TenneT TSO GmbH		380		1295				
321.1.2	CZ	Prestice	CEPS	DE	Etzenricht	TenneT TSO GmbH		380		1569				
322.1.1	CZ	Hradec Vychod	CEPS	DE	Röhrsdorf	50Hertz		380		1386				
322.1.2	CZ	Hradec Vychod	CEPS	DE	Röhrsdorf	50Hertz		380		1386				
331.1.1	HU	Sándorfalva	MAVIR	RS	Subotica 3	EMS		400		1295	1050			
332.1.1	HU	Szeged	MAVIR	RS	Subotica	EMS		110		79 [72]	62			
341.1.1	BG	Skakavica	ESO	MK	Kriva Palanka	MEPSO		110		123				
341.2.1	BG	Petric	ESO	MK	Sušica	MEPSO		110		123				
342.1.1	BG	Cervena Mogila	ESO	MK	Stip	MEPSO		400		1309				
351.1.1	HR	Melina	HEP-OPS	SI	Divaca	ELES		380		1164				
351.2.1	HR	Pehlin	HEP-OPS	SI	Divaca	ELES		220		320				
351.3.1	HR	Buje	HEP-OPS	SI	Koper	ELES		110		76				
351.4.1	HR	Matulji	HEP-OPS	SI	Ilirska Bistrica	ELES		110		53				
352.1.1	HR	Tumbri	HEP-OPS	SI	Krško	ELES		380		1164				
352.1.2	HR	Tumbri	HEP-OPS	SI	Krško	ELES		380		1164				
352.2.1	HR	Zerjavinec	HEP-OPS	SI	Cirkovce	ELES		220		297				
352.3.1	HR	Nedeljanec	HEP-OPS	SI	Formin	ELES		110		101				
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				

*The conventional transmission capacity of cross-frontier tie-lines is based upon parameters standardised within former 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	
[73]	Destroyed line
[74]	Out of operation
[75]	Destroyed line and substation
[76]	Destroyed line
[77]	Destroyed line
[78]	New line 400 kV between RS (EMS) and BA (NOS) Ugljevik - Sremska Mitrovica is operational from EMS side
[79]	Line is destroyed, currently under construction
[80]	Line is destroyed, currently under construction
[81]	DC submarine cable
[82]	Monopol
[83]	Limited by the measuring transformer of current
[84]	Value for 30°C (no data for 35°C)
[85]	Value for 30°C (no data for 35°C)
[86]	Value for 30°C (no data for 35°C)
[87]	Limitation due to current transformer in Kudowa SS
[88]	Value for 30°C (no data for 35°C)
[89]	Limitation due to current part of combined current/voltage transformer in Pogwizdów SS
[90]	Value for 30°C (no data for 35°C)
[91]	Limitation due to current part of combined current/voltage transformer in Pogwizdów SS
[92]	Value for 30°C (no data for 35°C)
[93]	Limitation due to current transformer in Mnisztwo SS
[94]	Value for 30°C (no data for 35°C)
[95]	On Polish side 400 kV line (internal designation between 50Hertz and PSE Operator)
[96]	On Polish side 400 kV line (internal designation between 50Hertz and PSE Operator)
[97]	Value for 30°C (no data for 35°C)
[98]	Submarine cable
[99]	Submarine cable
[100]	Limited by current transformer at Krosno
[101]	Limited by current transformer at Krosno
[102]	Temporary out of operation
[103]	Limeted by HF attenuator at UA side
[104]	Radial operation
[105]	Temporary out of operation
[106]	Value for 30°C (no data for 35°C)
[107]	Submarine cable
[108]	Value for 30°C (no data for 35°C)
[109]	Value for 30°C (no data for 35°C)

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
Nr.							kV	kV	MVA	MVA	MVA	kV	MVA	kV
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
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			
362.1.1 [73]	BA	Jajce	NOS BiH	HR	Mraclin	HEP-OPS		220		297				
362.2.1 [74]	BA	Prijedor	NOS BiH	HR	M eduric	HEP-OPS		220		297				
363.1.1	BA	Trebinje	NOS BiH	HR	Dubrovnik	HEP-OPS		220		460				
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 [75]	BA	Ugljevik	NOS BiH	HR	Ernestinovo	HEP-OPS		400		1264				
364.2.1 [76]	BA	Gradacac	NOS BiH	HR	Đakovo	HEP-OPS		220		229				
364.3.1	BA	Tuzla	NOS BiH	HR	Đakovo	HEP-OPS		220		229				
364.4.1 [77]	BA	Bosanski Brod	NOS BiH	HR	Slavonski Brod 2	HEP-OPS		110		115				
364.5.1	BA	Orasje	NOS BiH	HR	Zupanja	HEP-OPS		110		76				
371.1.1	HR	Ernestinovo	HEP-OPS	RS	Sremska Mitrovica	EMS		380		1264				
371.2.1	HR	Nijemci	HEP-OPS	RS	Šid	EMS		110		76				
371.3.1	HR	Beli Manastir	HEP-OPS	RS	Apatin	EMS		110		78				
381.1.1	BA	Trebinje	NOS BiH	ME	Podgorica 2	CGES AD		380		1264				
381.2.1	BA	Trebinje	NOS BiH	ME	Perucica	CGES AD		220		276				
381.3.1	BA	Trebinje	NOS BiH	ME	Herceg Novi	CGES AD		110		90				
381.4.1	BA	Bileca	NOS BiH	ME	Vilusi	CGES AD		110		84				
382.1.1	BA	Sarajevo 20	NOS BiH	ME	Piva	CGES AD		220		366				
382.2.1	BA	Goražde	NOS BiH	ME	Pljevlja 1	CGES AD		110		90				
383.1.1	BA	Višegrad	NOS BiH	RS	Pozega	EMS		220		311				
383.2.1	BA	Bijeljina	NOS BiH	RS	Lešnica	EMS		110		123				
383.3.1	BA	Zvornik	NOS BiH	RS	HE Zvornik	EMS		110		123				
383.4.1	BA	Višegrad	NOS BiH	RS	Zamrsten	EMS		110		90				
383.5.1	BA	Ugljevik	NOS BiH	RS	Sremska Mitrovica	EMS		380		1264 [78]				
384.1.1	ME	Ribarevine	CGES AD	RS	Kosovo B	EMS		380		1264				
384.2.1	ME	Pljevlja 2	CGES AD	RS	Bajina Basta	EMS		220		350				
384.3.1	ME	Pljevlja 2	CGES AD	RS	Pozega	EMS		220		365				
384.4.1	ME	Pljevlja 1	CGES AD	RS	Zamrsten	EMS		110		70				
391.1.1 [79]	MK	Skopje 1	MEPSO	RS	Kosovo A	EMS		220		311				
391.2.1 [80]	MK	Skopje 1	MEPSO	RS	Kosovo A	EMS		220		311				
391.3.1	MK	Skopje 5	MEPSO	RS	Kosovo B	EMS		380		1218				
401.1.1 [81,82]	DE	Herrenwyk	TenneT TSO GmbH	SE	Kruseberg	Baltic Cable AB		400		600				
404.1.1	CZ	Nosovice	CEPS	SK	Varin	SEPS		400		1205				
410.1.1	CZ	Liskovec	CEPS	SK	Pov. Bystrica	SEPS		220		221				
420.1.1	CZ	Sokolnice	CEPS	SK	Senica	SEPS		220		213				
424.1.1	CZ	Sokolnice	CEPS	SK	Krizovany	SEPS		400		1205				
430.1.1	CZ	Sokolnice	CEPS	SK	Stupava	SEPS		400		1363				
440.1.1	SK	V.Kapusany	SEPS	UA_W	Mukachevo	NPC Ukrenergo		400		115	831 [83]			
443.1.1	CZ	Albrechtice	CEPS	PL	Dobrzeń	PSE Operator S.A.		400		1088				
444.1.1	CZ	Nošovice	CEPS	PL	Wielopole	PSE Operator S.A.		400		1088				
450.1.1	CZ	Liskovec	CEPS	PL	Kopanina	PSE Operator S.A.		220		399				
460.1.1	CZ	Liskovec	CEPS	PL	Bujaków	PSE Operator S.A.		220		399				
470.1.1	CZ	Poříčí	CEPS	PL	Boguszów	EnergiaPro S.A.		110		78 [84]				
470.1.2	CZ	Poříčí	CEZ Distribuce	PL	Boguszów	EnergiaPro S.A.		110		78 [85]				
471.1.1	CZ	Náchod	CEZ Distribuce	PL	Kudowa	EnergiaPro S.A.		110		123 [86]	57 [87]			
472.1.1	CZ	Darkov	CEZ Distribuce	PL	Pogwizdów	VE Distribution PL S.A.		110		123 [88]	114 [89]			
472.1.2	CZ	Darkov	CEZ Distribuce	PL	Pogwizdów	VE Distribution PL S.A.		110		123 [90]	114 [91]			
473.1.1	CZ	Trinec	CEZ Distribuce	PL	Mnisztwo	ENION Spółka Akcyjna		110		123 [92]	114 [93]			
474.1.1	CZ	Trinec	CEZ Distribuce	PL	Mnisztwo/Ustron	ENION Spółka Akcyjna		110		123 [94]				
501.1.1	DE	Vierraden	50Hertz	PL	Krajnik	PSE Operator S.A.		220		402				
501.1.2	DE	Vierraden	50Hertz	PL	Krajnik	PSE Operator S.A.		220		402				
502.1.1	DE	Hagenwerder	50Hertz	PL	Mikulowa	PSE Operator S.A.		380 [95]		1302				
502.1.2	DE	Hagenwerder	50Hertz	PL	Mikulowa	PSE Operator S.A.		380 [96]		1302				
503.1.1	DE	Neueibau	50Hertz	PL	Turów	EnergiaPro S.A.		110		39 [97]				
601.1.1 [98]	ES	Puerto de la Cruz	REE	MA	Melloussa 1	ONE		380		715				
601.1.2 [99]	ES	Puerto de la Cruz	REE	MA	Melloussa 2	ONE		380		715				
700.1.1	PL	Krosno Iskrzynia	PSE Operator S.A.	SK	Lemešany	SEPS		400		1252	831 [100]			
700.1.2	PL	Krosno Iskrzynia	PSE Operator S.A.	SK	Lemešany	SEPS		400		1252	831 [101]			
701.1.1 [102]	PL	Rzeszów	PSE Operator S.A.	UA	Chmielnicka	NPC Ukrenergo		750		2676	2595 [103]			
702.1.1 [104]	PL	Zamość	PSE Operator S.A.	UA	Dobrotvir	NPC Ukrenergo		220		279				
703.1.1 [105]	PL	Białystok	PSE Operator S.A.	BY	Ros	Grodnoenergo		220		158[106]				
704.1.1 [107]	PL	Stupsk	PSE Operator S.A.	SE	Ståmó	Svenska Kraftnät		450		600				
705.1.1	PL	Wólka Dobrynska	PGE Dystrybucja S.A.	BY	Brest	RUB Brestenergo		110		123 [108]				
705.1.2	PL	Wólka Dobrynska	PGE Dystrybucja S.A.	BY	Brest	RUB Brestenergo		110		123 [109]				

*The conventional transmission capacity of cross-frontier tie-lines is based upon parameters standardised within former 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	
[110]	Limited by the measuring transformer of current
[111]	Limited by the measuring transformer of current
[112]	Out of operation
[113]	Limited by HF attenuator at RO side
[114]	Passive island operation limit
[115]	Passive island operation limit
[116]	Passive island operation limit
[117]	Not in operation
[118]	DC submarine cable
[119]	Used only for import to Finland
[120]	Used only for import to Finland
[121]	Used only for import to Finland
[122]	Used only for import to Finland
[123]	Used only for import to Finland
[124]	DC submarine cable
[125]	Limited by the relay protection circuits
[126]	Limited by the relay protection circuits
[127]	Limited by the current transformers
[128]	Limited by the relay protection circuits
[129]	Limited by the relay protection circuits
[130]	Limited by the relay protection circuits
[131]	Limited by the relay protection circuits
[132]	Limited by the current transformers
[133]	Limited by the relay protection circuits
[134]	Former Klaipeda
[135]	Limited by the high frequency filters
[136]	Former Jurbarkas
[137]	Limited by the high frequency filters

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
Nr.							kV	kV	MVA	MVA	MVA	kV	MVA	kV
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
710.1.1	HU	Győr	MAVIR	SK	Gabcikovo	SEPS		400		1330				
711.1.1	HU	Göd	MAVIR	SK	Levice	SEPS		400		1330				
720.1.1	HU	Albertirsa	MAVIR	UA_W	Zahidno Ukrainaska	NPC Ukrenergo		750		4010		1400		
721.1.1	HU	Sajószöged	MAVIR	UA_W	Mukachevo	NPC Ukrenergo		400		1390		693 [110]		
722.1.1	HU	Kisvárd	MAVIR	UA_W	Mukachevo	NPC Ukrenergo		220		209		305		
722.1.2	HU	Tiszalök	MAVIR	UA_W	Mukachevo	NPC Ukrenergo		220		209		305		
730.1.1	HU	Sándorfalva	MAVIR	RO	Arad	TRANSELECTRICA		400		1135		1109		1107
731.1.1	HU	Békéscsaba	MAVIR	RO	Nadab	TRANSELECTRICA		400		1300		1385		
740.1.1	RO	Rosiori	Transelectrica	UA_W	Mukachevo	NPC Ukrenergo		400		1135 [111]				1107
741.1.1 [112]	RO	Isaccoea	Transelectrica	UA_W	PivdennoUkrainska AES	NPC Ukrenergo		750		4064		2100		2595 [113]
750.1.1	RO	Stânca	Transelectrica	MD	Costesti	Moldenergo		110		119				90 [114]
751.1.1	RO	Husi	Transelectrica	MD	Cioara	Moldenergo		110		87				65 [115]
752.1.1	RO	Tut ora	Transelectrica	MD	Ungheni	Moldenergo		110		87				76 [116]
753.1.1	RO	Issaccoea	Transelectrica	MD	Vulcanesti	Moldenergo		400		1135				830
760.1.1 [117]	BG	Maritsa3	ESO	TR	Babaeski	TEIAS		400		1309				
761.1.1	BG	Maritsa3	ESO	TR	Hamitabat	TEIAS		400		1962				
770.1.1	NO	Sildvik	Statnett SF	SE	Tornehamm	VE Eldistribution AB		130		70				
771.1.1	NO	Ofoten	Statnett SF	SE	Ritsem	Svenska Kraftnät		400		880				
772.1.1	NO	Rössåga	Statnett SF	SE	Ajaure	Svenska Kraftnät		220		250				
773.1.1	NO	Nea	Statnett SF	SE	Järpströmmen	Svenska Kraftnät		400		500				
774.1.1	NO	Eidskog	Statnett SF	SE	Charlottenberg	Fortum Distribution		130						
775.1.1	NO	Lutufallet	Statnett SF	SE	Höljes	Fortum Distribution		130						
776.1.1	NO	Hasle	Statnett SF	SE	Borgvik	Svenska Kraftnät		400		1510				
777.1.1	NO	Halden	Statnett SF	SE	Skogssäter	Svenska Kraftnät		400		2000				
780.1.1	NO	Varangerbotn	Statnett SF	FI	Ivalo	Fingrid		220		100				
790.1.1	NO	Kirkenes	Statnett SF	RU	Boris Gleb	JSC FGC UES		154						
800.1.1	FI	Ossauskoski	Fingrid	SE	Kalix	Svenska Kraftnät		220						
801.1.1	FI	Petäjäskoski	Fingrid Oyj	SE	Letsi	Svenska Kraftnät		400						
802.1.1	FI	Keminmaa	Fingrid	SE	Svarbyn	Svenska Kraftnät		400						
803.1.1 [118]	FI	Raumo	Fingrid	SE	Forsmark	Svenska Kraftnät		400		550				
804.1.1	FI	Tingsbacka (Åland)	Kraftnät Åland AB	SE	Senneby	VE Eldistribution AB		110		80				
810.1.1 [119]	FI	Yliikkala	Fingrid	RU	Viborg	JSC FGC UES		400						
810.1.2 [120]	FI	Yliikkala	Fingrid	RU	Viborg	JSC FGC UES		400						
811.1.1 [121]	FI	Kymi	Fingrid	RU	Viborg	JSC FGC UES		400						
812.1.1 [122]	FI	Nellimö	Inergia Oy	RU	Kaitakoski	JSC FGC UES		110		60				
813.1.1 [123]	FI	Imatra	Fortum Corporation	RU	GES 10	JSC FGC UES		110		100				
820.1.1 [124]	FI	Espoo	Fingrid	EE	Harku	Elering OÜ		150		350				
832.1.1	LV	Valmiera	Augstsprieguma tikls	EE	Tsirgullina	Elering OÜ		330		350				
833.1.1	LV	Valmiera	Augstsprieguma tikls	EE	Tartu	Elering OÜ		330		350				
840.1.1	RU	Leningradskaja	JSC FGC UES	EE	Balti	Elering OÜ		330		590				
841.1.1	RU	Kingisepp	JSC FGC UES	EE	Eesti	Elering OÜ		330		393				
842.1.1	RU	Pskov	JSC FGC UES	EE	Taru	Elering OÜ		330		389				
845.1.1	RU	Velikoreckaya	JSC FGC UES	LV	Rezekne	Augstsprieguma tikls		330		350				
850.1.1	LT	Šiauliai/Telšiai	LITGRID AB	LV	Jelgava (Viskali)	Augstsprieguma tikls		330		714		572 [125]		
851.1.1	LT	Panevežys	LITGRID AB	LV	Aizkraukle	Augstsprieguma tikls		330		714		686 [126]		
852.1.1	LT	Klaipeda	LITGRID AB	LV	Grobina	Augstsprieguma tikls		330		714		572 [127]		
853.1.1	LT	IAE	LITGRID AB	LV	Liksna	Augstsprieguma tikls		330		830				
854.1.1	LT	Paroveja	LITGRID AB	LV	Nereta	Augstsprieguma tikls		110		75				
855.1.1	LT	Zarasai	LITGRID AB	LV	Daugavpils	Augstsprieguma tikls		110		86				
856.1.1	LT	IAE	LITGRID AB	LV	Daugavpils	Augstsprieguma tikls		110		102				
860.1.1	LT	IAE	LITGRID AB	BY	Polock	Belenergo		330		966		857 [128]		
861.1.1	LT	IAE	LITGRID AB	BY	Smorgon	Belenergo		330		830				
862.1.1	LT	IAE	LITGRID AB	BY	Belorusskaya	Belenergo		330		1786		857 [129]		
863.1.1	LT	Vilnius	LITGRID AB	BY	Molodechno	Belenergo		330		714				
864.1.1	LT	Alytus	LITGRID AB	BY	Grodno	Belenergo		330		714				
865.1.1	LT	IAE	LITGRID AB	BY	Opsa	Belenergo		110		63				
866.1.1	LT	IAE	LITGRID AB	BY	Vidzi	Belenergo		110		63				
867.1.1	LT	Didžiasalis	LITGRID AB	BY	Kaziani	Belenergo		110		44		29 [130]		
868.1.1	LT	Pabrade	LITGRID AB	BY	Podolci	Belenergo		110		44		30 [131]		
869.1.1	LT	Kalveliai	LITGRID AB	BY	Asmena	Belenergo		110		63		38 [132]		
870.1.1	LT	Šalčininkai	LITGRID AB	BY	Voronovo	Belenergo		110		86		46 [133]		
871.1.1	LT	Leipalingis	LITGRID AB	BY	Grodno	Belenergo		110		75				
880.1.1	LT	Bit enai [134]	LITGRID AB	RU	Sovetsk	UES-SO-CDA		330		714		572 [135]		
881.1.1	LT	Bit enai [136]	LITGRID AB	RU	Sovetsk	UES-SO-CDA		330		714		572 [137]		
882.1.1	LT	Kruonio HAE	LITGRID AB	RU	Sovetsk	UES-SO-CDA		330		714				
883.1.1	LT	Kybartai	LITGRID AB	RU	Nesterovo	UES-SO-CDA		110		75				
884.1.1	LT	Pagėgiai	LITGRID AB	RU	Sovetsk	UES-SO-CDA		110		75				
885.1.1	LT	Pagėgiai	LITGRID AB	RU	Sovetsk	UES-SO-CDA		110		75				

*The conventional transmission capacity of cross-frontier tie-lines is based upon parameters standardised within former 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.

Abbreviations used of grid operators

AT	Austria	APG VKW - Netz AG TIWAG-Netz	Austrian Power Grid AG VKW - Netz AG TIWAG Netz AG (since January 2011 Austrian Power Grid AG)	NO	Norway	Statnett	Statnett SF
BA	Bosnia - Herzegovina	NOS BiH	Nezavisni operator sustava u Bosni i Hercegovini	PL	Poland	PSE Operator	PSE Operator S.A.
BE	Belgium	Elia	Elia System Operator SA	PT	Portugal	REN	Rede Eléctrica Nacional, S.A.
BG	Bulgaria	ESO	Electroenergien Sistemen Operator EAD	RO	Romania	Transelectrica	C.N. Transelectrica S.A.
CH	Switzerland	swissgrid	swissgrid ag	RS	Serbia	EMS	JP Elektromreža Srbije
CZ	Czech Republic	CEPS	CEPS, a.s.	SE	Sweden	Svenska Kraftnät	Affärsverket Svenska Kraftnät
DE	Germany	Amprion EnBW Transportnetze TenneT TSO GmbH 50Hertz	Amprion GmbH EnBW Transportnetze AG TenneT GmbH 50Hertz Transmission GmbH	SI	Slovenia	ELES	Elektro Slovenija d.o.o.
DK	Denmark	Energinet.dk	Energinet.dk	SK	Slovak Republic	SEPS	Slovenska elektrizacna prenosova sustava, a.s.
EE	Estonia	Elering OÜ	Elering OÜ (since April 2011 Elering AS)	UA_W	Ukraine West	NPC Ukrenergo	NPC Ukrenergo
ES	Spain	REE	Red Eléctrica de España S.A.	AL	Albania	KESH	Albanian Electroenergetic Corporation
FI	Finland	Fingrid	Fingrid Oyj	BY	Belarus	Grodnoenergo	Grodnoenergo
FR	France	RTE	Réseau de Transport d'Electricité	MA	Morocco	ONE	Office National de l'Electricité
GB	Great Britain	National Grid SONI (NI) SSE SP Transmission	The National Grid Company plc System Operation Northern Ireland Ltd Scottish and Southern Energy plc Scottish and Power Transmission plc	MD	Republic of Moldavia	Moldenergo	Moldenergo
GR	Greece	HTSO	Hellenic Transmission System Operator S.A.	RU	Russia	JSC FGC UES	Federal Grid Company
HR	Croatia	HEP-OPS	HEP-Operator prijenosnog sustava d.o.o.	TR	Republic of Turkey	TEIAS	Türkiye Elektrik İletim A.S.
HU	Hungary	MAVIR	MAVIR Magyar Villamosenergia-ipari Átviteli Rendszertároló Zártkörűen Működő Részvénytársaság	UA	Ukraine	NPC Ukrenergo	NPC Ukrenergo
IE	Ireland	EirGrid	EirGrid plc				
IT	Italy	Terna	Terna - Rete Elettrica Nazionale SpA				
LT	Lithuania	LITGRID AB	LITGRID AB				
LU	Luxembourg	Creos Luxembourg	Creos Luxembourg S.A.				
LV	Latvia	Augstspriegumatīkls	AS Augstsprieguma tīkls				
ME	Montenegro	CGES AD	Crnogorski elektroprenosni sistem AD				
MK	FYROM	MEPSO	Macedonian Transmission System Operator AD				
NL	The Netherlands	TenneT TSO B.V.	TenneT TSO B.V.				

Unavailability of international tie lines - yearly overview 2010

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 (TenneT TSO GmbH)	NL - Meeden (TenneT TSO B.V.)	380	1382	R10	979											979	
13.1.1	DE - Siersdorf (Amprion)	NL - Maasbracht (TenneT TSO B.V.)	380	1645	R1	591				591								
13.1.2	DE - Rommerskirchen (Amprion)	NL - Maasbracht (TenneT TSO B.V.)	380	1698	R2,R7	839				245	594							
15.1.1	DE - Gronau (Amprion)	NL - Hengelo (TenneT TSO B.V.)	380	1645	R1	3390		362				3028						
15.1.2	DE - Gronau (Amprion)	NL - Hengelo (TenneT TSO B.V.)	380	1645	R1	4215						2660	1555					
25.1.1	BE - Van Eyck (Elia)	NL - Maasbracht (TenneT TSO B.V.)	380	1207	R1	930									930			
25.1.2	BE - Van Eyck (Elia)	NL - Maasbracht (TenneT TSO B.V.)	380	1270	R1	1023			1023									
26.2.1	BE - Zandvliet (Elia)	NL - Borssele (TenneT TSO B.V.)	380	1476	R2	577			89	488								
27.1.1	NL - Eemshaven (TenneT TSO B.V.)	NO - Fedaa (Statnett SF)	450	700	R1,R2,R9	133919	422	38880	43140	37440	14037							
41.1.2	BE - Aubange (Elia)	LU - Belval (SOTEL)	220	358	R4	29952			29952									
51.1.1	BE - Monceau (Elia)	FR - Chooz (RTE)	220	356	R1	4782						4782						
51.2.1	BE - Avelgem (Elia)	FR - Mastaing (RTE)	380	1207	R1,R2	832			12	608						205	7	
51.2.2	BE - Avelgem (Elia)	FR - Avelin (RTE)	380	1367	R1,R2	13272			69		13195						8	
51.3.1	BE - Achene (Elia)	FR - Lonny (RTE)	380	1177	R1	11949			9			8757				3183		
52.1.1	BE - Aubange (Elia)	FR - Moulaine (RTE)	220	381	R1,R2,R3,R4	60808	12105	34261			7619		11	6379		433		
52.2.1	BE - Aubange (Elia)	FR - Mont St Martin (RTE)	220	381	R3,R7	41528							41452				76	
71.1.1	DE - Uchtelfangen (Amprion)	FR - Vigy (RTE)	380	1790	R3,R4	18135			9						18126			
71.1.2	DE - Uchtelfangen (Amprion)	FR - Vigy (RTE)	380	1790	R3,R4	10765			9						10756			
71.2.1	DE - Ensdorf (Amprion)	FR - St-Avold (RTE)	220	261	R1,R4,R9	146392	11997	40320	44580				26700	5336	6223	11236		
72.1.1	DE - Eichstetten (EnBW Transportnetze)	FR - Vogelgrün (RTE)	220	338	R1	4095	3484										611	
72.1.2	DE - Eichstetten (EnBW Transportnetze)	FR - Muhlbach (RTE)	380	1684	R1,R9	732					4						648	80
81.1.1	CH - Bassecourt (swissgrid)	FR - Sierentz (RTE)	380	1186	R1	27023			527			13952	12544					
81.2.1	CH - Laufenburg (swissgrid)	FR - Sierentz (RTE)	380	1167	R1,R2	28959		26312				607	2040					
81.3.1	CH - Bassecourt (swissgrid)	FR - Mambelin (RTE)	380	1046	R1,R2,R9	2138	1086		483									569
82.1.1	CH - Verbois (swissgrid)	FR - Bois-Tollot (RTE)	380	1211	R1	2610									25134	976		
82.1.2	CH - Chamoson (swissgrid)	FR - Bois-Tollot (RTE)	380	1409	R1,R9	18624	5198	474	339	338	3420		7506	1349				
82.2.1	CH - Verbois (swissgrid)	FR - Génissiat (RTE)	220	315	R1	1744							1744					
82.2.2	CH - Verbois (swissgrid)	FR - Génissiat (RTE)	220	315	R1,R6	3312					202		310					
82.4.1	CH - La Bâliaz (swissgrid)	FR - Vallorcine (RTE)	220	266	R1	22109											12505	9604
82.5.1	CH - Riddes (swissgrid)	FR - Cornier (RTE)	220	275	R1,R4,R8,R9	60189		1294		2101	1424	3768	5786			18765	27051	
82.6.1	CH - St-Triphon (swissgrid)	FR - Cornier (RTE)	220	275	R1,R9	2700				2140						560		
91.1.1	FR - Albertville (RTE)	IT - Rondissone (Terna)	380	1244	R1	14925					10953	3972						
91.1.2	FR - Albertville (RTE)	IT - Rondissone (Terna)	380	1244	R1,R8	10588					6216							4372
92.1.1	FR - Trinite Victor (RTE)	IT - Camporosso (Terna)	220	320	R1	5759				4742							1017	
93.1.1	FR - Villarodin (RTE)	IT - Venaus (Terna)	380	1237	R1	60960								44160	16800			
102.1.1	CH - Laufenburg (swissgrid)	DE - Gurtweil (EnBW Transportnetze)	220	469	R1	8342							3329		5013			
102.1.2	CH - Laufenburg (swissgrid)	DE - Gurtweil (EnBW Transportnetze)	220	469	R1	4596							2694		1560	342		
102.2.1	CH - Laufenburg (swissgrid)	DE - Kühmoos (EnBW Transportnetze)	220	410	R1	6228						3349	2879					
102.3.1	CH - Laufenburg (swissgrid)	DE - Kühmoos (EnBW Transportnetze)	220	430	R1,R9	4669						1290	3156			223		
102.3.2	CH - Laufenburg (swissgrid)	DE - Kühmoos (EnBW Transportnetze)	380	1620	R2,R9	948								633		315		
102.4.1	CH - Laufenburg (swissgrid)	DE - Kühmoos (EnBW Transportnetze)	380	1620	R1	9329				1163		3368	4798					
102.4.2	CH - Laufenburg (swissgrid)	DE - Kühmoos (Amprion)	380	1620	R3,R9	32371				6374	25857				140			
102.5.1	CH - Laufenburg (swissgrid)	DE - Tiengen (Amprion)	380	1131	R1,R9	32017	14695	413		16552								357
103.1.1	CH - Beznau (swissgrid)	DE - Tiengen (Amprion)	380	1158	R2,R9	40884					5828	35056						
103.1.2	CH - Beznau (swissgrid)	DE - Tiengen (Amprion)	220	335	R1,R4,R9	47049				16550	999	29478			22			
105.1.1	CH - Laufenburg (swissgrid)	DE - Trossingen (EnBW Transportnetze)	380	1580	R1	3808				717		3011						80
107.1.1	CH - Laufenburg 220 kV (swissgrid)	DE - Laufenburg 110 kV (ED)	110	200	R1	3352												3352
111.1.1	AT - Bürs (VIW)	DE - Obermoosweiler (EnBW Transportnetze)	380	1369	R1,R9	1000								881		119		
111.1.2	AT - Bürs (VIW)	DE - Obermoosweiler (EnBW Transportnetze)	380	1369	R1,R9	851								590				
111.2.1	AT - Bürs (VIW)	DE - Herberlingen (Amprion)	220	389	R1,R3,R7,R9	68093			322	351	113	2393	25515	20575	15388		3436	
111.3.1	AT - Bürs (VIW)	DE - Dellmensingen (Amprion)	220	492	R1,R2	95785				556		4350	43465	5664	963	39942	845	
115.5.1	AT - St. Peter (APG)	DE - Altheim (TenneT TSO GmbH)	220	301	R1	188								188				
115.6.1	AT - St. Peter (APG)	DE - Simbach (TenneT TSO GmbH)	220	301	R1	233								233				
115.9.1	AT - St. Peter (APG)	DE - Pirach (TenneT TSO GmbH)	220	518	R1	9176							153	204		2085	6734	
115.10.1	AT - St. Peter (APG)	DE - Pleinting (TenneT TSO GmbH)	220	449	R1	756								63	168		525	
116.1.1	AT - Westtirol (APG)	DE - Leupolz (Amprion)	380	1316	R1,R9	1318						945	277	96				
116.2.1	AT - Westtirol (APG)	DE - Memmingen (Amprion)	220	762	R1,R2	510							261		4849			
117.1.1	AT - Silz (TIWAG-Netz)	DE - Oberbrunn (TenneT TSO GmbH)	220	793	R1	5327				953	943				1712		553	1166
117.1.2	AT - Silz (TIWAG-Netz)	DE - Oberbrunn (TenneT TSO GmbH)	220	793	R1	3512			341	221	912		112	582		1123	221	
121.1.1	CH - All'Acqua (swissgrid)	IT - Ponte (Terna)	220	278	R6,R9	1002					143	604	255					
121.2.1	CH - Gorduno (swissgrid)	IT - Mese (Terna)	220	278	R1,R4,R9	15274				310		1204	6686	689		6385		
121.3.1	CH - Soazza (swissgrid)	IT - Bulciago (Terna)	380	1224	R1,R2	4291					3693						598	
121.4.1	CH - Lavorgo (swissgrid)	IT - Musignano (Terna)	380	1204	R1	16415								16415				

Reasons: R1 - Maintenance, R2 - Repair, R3 - New construction, R4 - Overload (also calculated), R5 - False operation, R6 - Failure in protection device or other element, R7 - Outside impacts (animals, trees, fire, avalanche,...), R8 - Very exceptional conditions (weather, natural disaster,...), R9 - Other reasons, R10 - Unknown reasons

Unavailability of international tie lines - yearly overview 2010

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]
123.1.1	CH - Riddes (swissgrid)	IT - Avise (Terna)	220	309	R1,R2,R9	10061		2001	4770		722	1658			910			
123.2.1	CH - Riddes (swissgrid)	IT - Valpelline (Terna)	220	309	R1,R9	23587	791		725		722	1303	3265		16569	212		
123.3.1	CH - Serra (swissgrid)	IT - Pallanzeno (Terna)	220	278	R1,R4,R9	50874			1327			1215	39388	8308		636		
124.1.1	CH - Robbia (swissgrid)	IT - Gorlago (Terna)	380	1340	R9	3158				3103						55		
124.1.2	CH - Robbia (swissgrid)	IT - San Fiorano (Terna)	380	1340	R1	14922								14922				
125.1.1	CH - Mendrisio (swissgrid)	IT - Cagno (Terna)	380	450	R1	5940								3540	2400			
132.1.1	AT - Lienz (APG)	IT - Soverzene (Terna)	220	257	R1,R9	5640							660	4980				
141.1.1	AT - Meiningen (VKW-Netz)	CH - Y-Meiningen (swissgrid)	220	501	R1	1644							1644					
141.2.1	AT - Meiningen (VKW-Netz)	CH - Winkeln (swissgrid)	220	776	R1,R9	9903	14		2047				1655			6187		
142.1.1	AT - Westtirol (APG)	CH - Pradella (swissgrid)	380	1340	R1,R9	2974					922	2001		51				
142.2.1	AT - Westtirol (APG)	CH - Pradella (swissgrid)	380	1340	R1,R9	8828			775	665	5705			73			1610	
151.1.1	ES - Hernani (REE)	FR - Argia (RTE)	380	1136	R2	6213					6213							
151.2.1	ES - Irún (REE)	FR - Errondenia (RTE)	132	56	R1	13320			13320									
151.3.1	ES - Arkale (REE)	FR - Argia (RTE)	220	340	R2,R10	5174				4662			123	389				
151.4.1	ES - Biescas (REE)	FR - Pragnères (RTE)	220	237	R1,R2,R8	18219			1397	528		16283	11					
152.1.1	ES - Benós (REE)	FR - Lac d'Oo (RTE)	110	63	R2,R10	1590	1330		242				18					
153.1.1	ES - Vich (REE)	FR - Baixas (RTE)	380	1105	R4,R8	18									13		5	
161.1.1	DE - Flensburg (TenneT TSO GmbH)	DK - Ensted (Energinet.dk)	220	332	R10	647						525				122		
161.2.1	DE - Flensburg (TenneT TSO GmbH)	DK - Kassa (Energinet.dk)	220	332	R10	5234						499	4735					
161.3.1	DE - Audorf (TenneT TSO GmbH)	DK - Kassa (Energinet.dk)	380	1078	R1,R4	2495					409	2086						
161.4.1	DE - Flensburg UW Nord (TenneT TSO GmbH)	DK - Ensted (Energinet.dk)	220	150	R4,R8	1500					1500							
171.1.1	AT - Bisamberg (APG)	CZ - Sokolnice (CEPS)	220	250	R1,R9	6490					5870					620		
171.2.1	AT - Bisamberg (APG)	CZ - Sokolnice (CEPS)	220	250	R1,R9	5816					1016	4180				620		
172.1.1	AT - Dürnrohr (APG)	CZ - Slavetice (CEPS)	380	1559	R2	4712								4712				
172.1.2	AT - Dürnrohr (APG)	CZ - Slavetice (CEPS)	380	1559	R2,R9	3672						3247			425			
182.2.1	AT - Kainachtal (APG)	SI - Maribor (ELES)	380	1514	R8	4							4					
191.3.1	DE - Bauler (Amprion)	LU - Flebour (Creos Luxembourg)	220	490	R1	546			546									
191.4.1	DE - Bauler (Amprion)	LU - Roost (Creos Luxembourg)	220	490	R1	990				953						37		
192.1.1	DE - Trier (Amprion)	LU - Heisdorf (Creos Luxembourg)	220	490	R1	493			493									
192.2.1	DE - Quint (Amprion)	LU - Heisdorf (Creos Luxembourg)	220	490	R1,R9	15595			522	5110	6083		1737			2143		
201.1.1	IT - Redipuglia (Terna)	SI - Divača (ELES)	380	1619	R1	43740								43740				
201.2.1	IT - Padriciano (Terna)	SI - Divača (ELES)	220	305	R9	51				51								
205.1.1	IT - Galatina (Terna)	GR - Arachthos (HTSO)	380	500	R1,R8,R10	119552	1313	8	439	24638	44640	28800	638	321	16375		1495	885
221.1.1	GB - Sellindge (National Grid)	FR - Mandarins (RTE)	270	1000	R1,R6	66792				1484	506			990	43992	17780		2040
221.2.1	GB - Sellindge (National Grid)	FR - Mandarins (RTE)	270	1000	R1,R2,R6,R7,R9	54121	470	702	1825	8745	120	16980	131	45	12604	9212	2687	600
222.1.1	GB - Auchencrosh (National Grid)	NI - Ballycronamore (SONI Ltd)	250	250	R1,R2,R3,R8,R9	126213	9	11	40			16410	9568		30859	44699	24617	
222.2.1	GB - Auchencrosh (National Grid)	NI - Ballycronamore (SONI Ltd)	250	250	R1,R3,R8,R9	33858	121		49			24120	9568					
231.1.1	ES - Las Conchas (REE)	PT - Lindoso (REN)	132	90	R1	2502	1828							430	244			
232.1.1	ES - Aldeadávila (REE)	PT - Lagoaça 3 (REN)	220	374	R1,R2,R3	40967	381	429	334		6076			12220	18133		3394	
232.2.1	ES - Aldeadávila (REE)	PT - Lagoaça 2 (REN)	220	374	R3,R8	13768					854	1122	507		11045	240		
232.3.1	ES - Saucelle (REE)	PT - Pociinho (REN)	220	346	R1,R3	32221					598				31623			
233.1.1	ES - Cedillo (REE)	PT - Falaqueira (REN)	380	1300	R1	2485			1863	622								
234.1.1	ES - Cartelle (REE)	PT - Alto Lindoso (REN)	380	1330	R2	520							81		439			
234.1.2	ES - Cartelle (REE)	PT - Alto Lindoso (REN)	380	1330	R2	593						179			414			
235.1.1	ES - Brovales (REE)	PT - Algueva (REN)	400	1280	R9	549												549
241.1.1	MK - Dubrovo (MEPSO)	GR - Thessaloniki (HTSO)	400	1300	R1,R10	1103					991			69		43		
242.1.1	MK - Bitola (MEPSO)	GR - Meliti (HTSO)	400	1300	R1	2661					2378							283
261.1.1	RS - Dierdap (EMS)	RO - Portile de Fier (TRANSELECTRICA)	400	1135	R1	5787									4783	1004		
277.1.1	RO - Tântareni (TRANSELECTRICA)	BG - Kozlodui (ESO)	400	1300	R1	52707						26440				25762	505	
277.1.2	RO - Tântareni (TRANSELECTRICA)	BG - Kozlodui (ESO)	400	1300	R1	26755						6797	19649					309
278.1.1	RO - Isaccea (TRANSELECTRICA)	BG - Dobrudja (ESO)	400	1135	R1	75172						1326		12502	23975	26880	6809	3680
291.1.1	AL - Elbassan (KESH)	GR - Kardla (HTSO)	400	1300	R1	20927			10295						10632			
292.1.1	AL - Bistrica (KESH)	GR - Mourtos (HTSO)	400	120	R1	783								783				
293.1.1	GR - Didymoticho (HTSO)	TR - Babaeski (TEIAS)	400	185	R1,R2,R10	2631									139	1491	593	408
301.1.1	BG - Blagoevgrad (ESO)	GR - Thessaloniki (HTSO)	400	1300	R1,R6	9373						8862				511	0	
321.1.1	CZ - Hradec Zapad (CEPS)	DE - Etzenricht (TenneT TSO GmbH)	400	1295	R1	9785			271	9050	464							
321.1.2	CZ - Prestice (CEPS)	DE - Etzenricht (TenneT TSO GmbH)	400	1569	R1	9512					4968							4544
322.1.1	CZ - Hradec Vychod (CEPS)	DE - Röhrsdorf (50Hertz)	400	1386	R1,R9	11644								11202	442			
322.1.2	CZ - Hradec Vychod (CEPS)	DE - Röhrsdorf (50Hertz)	400	1386	R1,R2,R9	12970								12518	452			
351.1.1	HR - Melina (HEP-OPS)	SI - Divaca (ELES)	400	1264	R2,R3,R9	810	521		4			9				276		
351.2.1	HR - Pehlin (HEP-OPS)	SI - Divaca (ELES)	220	366	R6	1456								1456				
351.3.1	HR - Buje (HEP-OPS)	SI - Koper (ELES)	110	89	R8	3			3									
352.2.1	HR - Zreljavinec (HEP-OPS)	SI - Cirkovce (ELES)	220	297	R10	24												24

Reasons: R1 - Maintenance, R2 - Repair, R3 - New construction, R4 - Overload (also calculated), R5 - False operation, R6 - Failure in protection device or other element, R7 - Outside impacts (animals, trees, fire, avalanche,...), R8 - Very exceptional conditions (weather, natural disaster,...), R9 - Other reasons, R10 - Unknown reasons

Unavailability of international tie lines - yearly overview 2010

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]
391.1.1	MK - Skopje 1 (MEPSO)	RS - Kosovo A (EMS)	220	311	R9	525600	44640	40320	44580	43200	44640	43200	44640	44640	43200	44700	43200	44640
391.2.1	MK - Skopje 1 (MEPSO)	RS - Kosovo A (EMS)	220	311	R9	525600	44640	40320	44580	43200	44640	43200	44640	44640	43200	44700	43200	44640
401.1.1	DE - Herrenwyk (TenneT TSO GmbH)	SE - Kruseberg (Sydkraft/Vattenfall)	400	600	R1,R4,R10	4454					1350	128				478	2378	120
404.1.1	CZ - Nosovice (CEPS)	SK - Varin (SEPS)	400	1205	R1	6246			6246									
410.1.1	CZ - Liskovec (CEPS)	SK - Pov. Bystrica (SEPS)	220	221	R2,R6	27562				1881			14950	10731				
420.1.1	CZ - Sokolnice (CEPS)	SK - Senica (SEPS)	220	213	R1,R2	6830	301									6529		
424.1.1	CZ - Sokolnice (CEPS)	SK - Krizovany (SEPS)	400	1205	R1,R2,R9	34793	1043		66		893	28142	4649					
430.1.1	CZ - Sokolnice (CEPS)	SK - Stupava (SEPS)	400	1363	R2,R7	9106				6768	2191	147						
440.1.1	UA_W - Mukachevo (NPC Ukrenerg)	SK - V.Kapusany (SEPS)	400	1115	R1	12665			6247						6418			
443.1.1	CZ - Albrechtice (CEPS)	PL - Dobrzeń (PSE Operator S.A.)	400	1088	R1	27238						25425		1654			159	
444.1.1	CZ - Nošovice (CEPS)	PL - Wielopole (PSE Operator S.A.)	400	1088	R1	9518						7338	411	1789				
450.1.1	CZ - Liskovec (CEPS)	PL - Kopanina (PSE Operator S.A.)	220	399	R1	8719			4743		519			3457				
460.1.1	CZ - Liskovec (CEPS)	PL - Bujaków (PSE Operator S.A.)	220	399	R1,R2,R9	3570			2470		521	335			244			
501.1.1	DE - Vierraden (50Hertz)	PL - Krajinik (PSE Operator S.A.)	220	402	R1	4037							2370	1667				
501.1.2	DE - Vierraden (50Hertz)	PL - Krajinik (PSE Operator S.A.)	220	402	R1	2797							2797					
502.1.1	DE - Hagenwerder (50Hertz)	PL - Mikulowa (PSE Operator S.A.)	380	1302	R1	27919				1823		13877	12219					
502.1.2	DE - Hagenwerder (50Hertz)	PL - Mikulowa (PSE Operator S.A.)	380	1302	R1	8329				737		113				763	6716	
601.1.1	ES - Puerto de la Cruz (REE)	MA - Melloussa 1 (ONE)	380		R1,R3	4608		1583	69	465	1524	440		527				
601.1.2	ES - Puerto de la Cruz (REE)	MA - Melloussa 2 (ONE)	380		R1,R2	3471				2761	193			517				
700.1.1	PL - Krosno Iskrzynia (PSE Operator S.A.)	SK - Lemešany (SEPS)	400	1252	R1,R6,R10	42265			248				24	61	35219	6713		
700.1.2	PL - Krosno Iskrzynia (PSE Operator S.A.)	SK - Lemešany (SEPS)	400	1252	R1,R2	42399			22	444					35218	6715		
704.1.1	PL - Stupsk (PSE Operator S.A.)	SE - Starnö (SvK)	450	600	R1	30085				2853	368	18462	1951		6451			
710.1.1	HU - Győr (MAVIR)	SK - Gabčíkovo (SEPS)	400	1330	R2	12184	3308							2339	6537			
711.1.1	HU - Gőd (MAVIR)	SK - Levice (SEPS)	400	1330	R2	6289				6026			263					
720.1.1	HU - Albertirsa (MAVIR)	UA_W - Zahidno Ukrainka (NPC Ukrenerg)	750	4010	R1	70833			11093	43200	16540							
721.1.1	HU - Sajószöged (MAVIR)	UA_W - Mukachevo (NPC Ukrenerg)	400	1390	R1	16280						2516	962	6482			6320	
722.1.1	HU - Kiszvárd (MAVIR)	UA_W - Mukachevo (NPC Ukrenerg)	220	209	R1	19274					1075	5124	7864			385	4826	
722.1.2	HU - Tiszalök (MAVIR)	UA_W - Mukachevo (NPC Ukrenerg)	220	209	R1	13893							7600			6293		
730.1.1	HU - Sandorfalva (MAVIR)	RO - Arad (TRANSELECTRICA)	400	1135	R1	4284					4284							
731.1.1	HU - Békéscsaba (MAVIR)	RO - Nadab (TRANSELECTRICA)	400	1300	R1	6474	520										5954	
740.1.1	RO - Rosiori (TRANSELECTRICA)	UA_W - Mukachevo (NPC Ukrenerg)	400	1135	R1	9998			6480						3518			
803.1.1	FI - Raumo (Fingrid Oyj)	SE - Forsmark (Svenska Kraftnat)	400	550	R1,R3,R9,R10	11165					2250	103	133			7637		1042
832.1.1	LV - Valmiera (AS Augstsprieguma tikls)	EE - Tsiguliina (Elering AS)	330	350	R1,R9	2400		2040			240				120			
833.1.1	LV - Valmiera (AS Augstsprieguma tikls)	EE - Tartu (Elering AS)	330		R1	240					240							
840.1.1	EE - Balti (Elering AS)	RU - Leningradskaja (JSC FGC UES)	330		R6,R9	1079	0			80	420			59				540
841.1.1	EE - Eesti (Elering AS)	RU - Kingisepp (JSC FGC UES)	330		R6,R9	238						59			59		120	
842.1.1	EE - Taru (Elering AS)	RU - Pskov (JSC FGC UES)	330		R6	120						120						
845.1.1	LV - Rezekne (AS Augstsprieguma tikls)	RU - Velikoreckaja (JSC FGC UES)	330		R1,R9	24240				480	7500					16260		
850.1.1	LT - Šiauliai/Telšiai (LITGRID AB)	LV - Jelgava (Augstsprieguma tikls)	330	714	R1,R9	7052					586	3685	2366				415	
851.1.1	LT - Panevėžys (LITGRID AB)	LV - Aizkraukle (Augstsprieguma tikls)	330	714	R1,R2,R9	35751	171		1954		775	257			6201	19630	6763	
852.1.1	LT - Klaipėda (LITGRID AB)	LV - Grobina (Augstsprieguma tikls)	330	714	R1,R2	22516					540			294	21682			
853.1.1	LT - IAE (LITGRID AB)	LV - Līksna (Augstsprieguma tikls)	330	830	R1,R2	36394					7720		9346		5163	14165		
854.1.1	LT - Parovėja (LITGRID AB)	LV - Nereta (Augstsprieguma tikls)	110	75	R1	354									354			
855.1.1	LT - Zarasai (LITGRID AB)	LV - Daugavpils (Augstsprieguma tikls)	110	86	R1,R2,R9	12732	4593				174	3282						4683
856.1.1	LT - IAE (LITGRID AB)	LV - Daugavpils (Augstsprieguma tikls)	110	102	R1,R9	6787			1905		208							4674
860.1.1	LT - IAE (LITGRID AB)	BY - Polock (Belenergo)	330	966	R1,R2	14949			258	2090	1022	5430					2225	3924
861.1.1	LT - IAE (LITGRID AB)	BY - Smorgon (Belenergo)	330	830	R1,R2	27132			6161	3647					12312			5012
862.1.1	LT - IAE (LITGRID AB)	BY - Belorusskaja (Belenergo)	330	1786	R1,R2,R9	56741				13908		20365	11748			10720		
863.1.1	LT - Vilnius (LITGRID AB)	BY - Molodechno (Belenergo)	330	714	R1,R2	60046						42660	12637				4749	
864.1.1	LT - Alytus (LITGRID AB)	BY - Grodno (Belenergo)	330	714	R1	9559				3351					6208			
865.1.1	LT - IAE (LITGRID AB)	BY - Opsa (Belenergo)	110	63	R1,R2	35866		3469	3203		6102		16922				6170	
866.1.1	LT - IAE (LITGRID AB)	BY - Vidzi (Belenergo)	110	63	R1	21408		3470			6420		4594				6924	
867.1.1	LT - Didžiulis (LITGRID AB)	BY - Kaziani (Belenergo)	110	44	R1	19449								15435	4014			
868.1.1	LT - Pabrada (LITGRID AB)	BY - Podolci (Belenergo)	110	44	R2,R3,R9	131003		1905					5847			35411	43200	44640
869.1.1	LT - Kalveliai (LITGRID AB)	BY - Asmena (Belenergo)	110	63	R1	21242				1627				3508	15197	910		
870.1.1	LT - Šalčininkai (LITGRID AB)	BY - Voronovo (Belenergo)	110	86	R2	3301									3301			
871.1.1	LT - Leipalingis (LITGRID AB)	BY - Grodno (Belenergo)	110	75	R2	12071						3366		4038	4667			
880.1.1	LT - Klaipėda (LITGRID AB)	RU - Sovetsk (UES-SO-CDA)	330	714	R1,R2,R3	47070						14291	1821	6085		19212		5661
881.1.1	LT - Jurbarkas (LITGRID AB)	RU - Sovetsk (UES-SO-CDA)	330	714	R1,R3,R9	73892				16632	19770		3380	6190	12310	10607		5003
882.1.1	LT - Kruonio HAE (LITGRID AB)	RU - Sovetsk (UES-SO-CDA)	330	714	R1,R9	54985	8797		7273	7166	6645	8410	8507	8187				
883.1.1	LT - Kybartai (LITGRID AB)	RU - Nesterovo (UES-SO-CDA)	110	75	R1,R2	3729		1756				1793		180				
884.1.1	LT - Pagėgiai (LITGRID AB)	RU - Sovetsk (UES-SO-CDA)	110	75	R1,R9	9170					3050			2276	3844			
885.1.1	LT - Pagėgiai (LITGRID AB)	RU - Sovetsk (UES-SO-CDA)	110	75	R1,R2	10639					4577				6062			

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