APPENDIX 1

CROSS-BORDER TIE-LINES WITHIN THE EUROPEAN POWER POOLS

1. INTERCONNECTIONS IN THE UCTE POOL

Note: in the following tables all circuits of the cross-border lines are listed.

AUSTRIA

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MVA]
Austria	Austria-Germany	Bürs	Obermooweiler	AC	380	1369
	Austria-Germany	Bürs	Obermooweiler	AC	380	1369
	Austria-Germany	Bürs	Herbertingen	AC	220	389
	Austria-Germany	Bürs	Dellmensingen	AC	220	492
	Austria-Germany	Rieden	Lindau	AC	110	84
	Austria-Germany	Hörbranz	Lindau	AC	110	84
	Austria-Germany	Vorderwald	Weiler	AC	110	141
	Austria-Germany	Braunau	Neuötting	AC	110	102
	Austria-Germany	Braunau	Stammham	AC	110	102
	Austria-Germany	Ranshofen	Neuötting	AC	110	90
	Austria-Germany	Ranshofen	Neuötting	AC	110	90
	Austria-Germany	Antiesenhofen	Egglfing	AC	110	102
	Austria-Germany	St. Peter	Altheim	AC	220	301
	Austria-Germany	St. Peter	Simbach	AC	220	301
	Austria-Germany	St. Peter	Ering	AC	110	152
	Austria-Germany	St. Peter	Ering	AC	110	152
	Austria-Germany	St. Peter	Egglfing	AC	110	105
	Austria-Germany	St. Peter	Pirach	AC	220	518
	Austria-Germany	St. Peter	Pleinting	AC	220	518
	Austria-Germany	Ranna	Passau	AC	110	90
	Austria-Germany	Ranna	Passau	AC	110	90
	Austria-Germany	Oberaudorf	Rosenheim	AC	110	93
	Austria-Germany	Oberaudorf	Kiefersfelden	AC	110	102
	Austria-Germany	Antiesenhofen	Weidach	AC	110	130
	Austria-Germany	Antiesenhofen	Weidach	AC	110	130
	Austria-Germany	Aigerding	Passau	AC	110	102
	Austria-Germany	St. Peter	Schärding	AC	220	301
	Austria-Germany	St. Peter	Schärding	AC	220	301
	Austria-Germany	Kufstein	Oberaudorf	AC	110	90
	Austria-Germany	Ebbs	Oberaudorf	AC	110	127
	Austria-Germany	Westtirol	Leupolz	AC	380	1316
	Austria-Germany	Westtirol	Memmingen	AC	220	762
	Austria-Germany	Silz	Oberbrunn	AC	220	793
	Austria-Germany	Silz	Oberbrunn	AC	220	793
	Austria-Germany	Reutte	Füssen	AC	110	127
	Austria-Germany	Reutte	Füssen	AC	110	127
	Austria-Italy	Lienz	Soverzene	AC	220	257
	Austria-Switzerland	Meiningen	Y-Rehag	AC	220	501

	Austria-Switzerland	Meiningen	Winkeln	AC	220	776
	Austria-Switzerland	Westtirol	Pradella	AC	380	1340
	Austria-Switzerland	Westtirol	Pradella	AC	380	1340
	Austria-Czech. R.	Bisamberg	Sokolnice	AC	220	269
	Austria-Czech. R.	Bisamberg	Sokolnice	AC	220	269
	Austria-Czech. R.	Dürnrohr	Slavetice	AC	380	1711
	Austria-Slovenia	Obersielach	Podlog	AC	220	351
	Austria-Slovenia	Kainachtal	Maribor	AC	380	1514
	Austria-Slovenia	Kainachtal	Maribor	AC	380	1514
	Austria-Hungary	Wien Süd-Ost	Györ	AC	220	305
	Austria-Hungary	Neusiedl	Györ	AC	220	305
	Austria-Hungary	Wien Süd-Ost	Györ	AC	380	1514

BELGIUM

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MVA]
Belgium	Belgium-Netherlands	Gramme	Maasbracht	AC	380	1207
	Belgium-Netherlands	Meerhout	Maasbracht	AC	380	1270
	Belgium-Netherlands	Zandvliet	Geertruidenberg	AC	380	1476
	Belgium-Netherlands	Zandvliet	Borssele	AC	380	1476
	Belgium-Netherlands	Maldegem	Oostburg	AC	150	139
	Belgium-Luxembourg	Aubange	Belval	AC	220	358
	Belgium-Luxembourg	Aubange	Belval	AC	220	358
	Belgium-Luxembourg	Aubange	Belval	AC	150	157
	Belgium-Luxembourg	Aubange	Belval	AC	150	157
	Belgium-France	Jamiolle	Chooz	AC	220	356
	Belgium-France	Avelgem	Avelin	AC	380	1109
	Belgium-France	Achène	Lonny	AC	380	1229
	Belgium-France	Aubange	Moulaine	AC	220	286

BOSNIA-HERZEGOVINA

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MVA]
Bosnia-H.	Bosnia - H.-Croatia	Mostar	Konjsko	AC	400	1316
	Bosnia - H.-Croatia	Mostar	Zakucac	AC	220	311
	Bosnia - H.-Croatia	Grahovo	Knin	AC	110	90
	Bosnia - H.-Croatia	Buško Blato	Kraljevac	AC	110	115
	Bosnia - H.-Croatia	Buško Blato	Peruca	AC	110	90
	Bosnia - H.-Croatia	Grude	Imotski	AC	110	72
	Bosnia - H.-Croatia	Kulen Vakuf	Gracac	AC	110	120
	Bosnia - H.-Croatia	Jajce	Mraclin	AC	220	297
	Bosnia - H.-Croatia	Prijedor	Meðuriæ	AC	220	297
	Bosnia - H.-Croatia	Trebinje	Dubrovnik	AC	220	460
	Bosnia - H.-Croatia	Trebinje	Dubrovnik	AC	220	460
	Bosnia - H.-Croatia	Capljina	Opuzen	AC	110	84
	Bosnia - H.-Croatia	Neum	Opuzen	AC	110	84
	Bosnia - H.-Croatia	Neum	Ston	AC	110	76
	Bosnia - H.-Croatia	Trebinje	Komolac	AC	110	84
	Bosnia - H.-Croatia	Ugljevik	Ernestinovo	AC	400	831
	Bosnia - H.-Croatia	Gradacac	Đakovo	AC	220	229
	Bosnia - H.-Croatia	Tuzla	Đakovo	AC	220	229
	Bosni - H.-Croatia	Bosanski Brod	Slavonski Brod 2	AC	110	115
	Bosni - H.-Croatia	Orasje	Županja	AC	110	76
	Bosni - H.-Serbia /M.	Trebinje	Podgorica	AC	380	1264
	Bosni - H.-Serbia /M.	Trebinje	Perucica	AC	220	311
	Bosni - H.-Serbia /M.	Trebinje	Herceg Novi	AC	110	90
	Bosni - H.-Serbia /M.	Bileca	Vilusi	AC	110	84
	Bosni - H.-Serbia /M.	Sarajevo 20	Piva	AC	220	366
	Bosni - H.-Serbia /M.	Goražde	Pljevlja	AC	110	90
	Bosni - H.-Serbia /M.	Višegrad	Požega	AC	220	311
	Bosni - H.-Serbia /M.	Bijeljina	Lešnica	AC	110	123
	Bosni - H.-Serbia /M.	Zvornik	HE Zvornik	AC	110	123
	Bosni - H.-Serbia /M.	Višegrad	Potpec	AC	110	123

BULGARIA

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MVA]
Bulgaria	Bulgaria - Serbi/M.	Sofija Zapad	Niš	AC	380	1264
	Bulgaria – Serbi/M.	Breznik	HE Vrla 1	AC	110	90
	Bulgaria – Serbi/M.	Kula	Zajecar	AC	110	90
	Romania- Bulgaria	Isaccea	Dobr. Varna	AC	400	1715
	Romania- Bulgaria	Isalnita	Kozlodui	AC	220	360
	Romania- Bulgaria	Tântăreni	Kozlodui	AC	400	1309
	Romania- Bulgaria	Tântăreni	Kozlodui	AC	400	1309
	Bulgaria –Greece	Blagoevgrad	Thessaloniki	AC	400	1300
	Bulgaria –Macedonia	Skakavica	Kriva Palanka	AC	110	123
	Bulgaria –Macedonia	Petric	Sušica	AC	110	123

CROATIA

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MVA]
Croatia	Hungary-Croatia	Lenti	Nedeljanec	AC	110	82
	Hungary-Croatia	Siklos	Donji Miholjac	AC	110	114
	Hungary-Croatia	Héviz	Zerjavinec	AC	400	1246
	Hungary-Croatia	Héviz	Tumbri	AC	400	1246
	Croatia-Slovenia	Melina	Divaèa	AC	380	1264
	Croatia-Slovenia	Pehlin	Divaèa	AC	220	366
	Croatia-Slovenia	Buje	Koper	AC	110	89
	Croatia-Slovenia	Matulji	Ilirska Bistrica	AC	110	53
	Croatia-Slovenia	Tumbri	Krško	AC	400	1316
	Croatia-Slovenia	Tumbri	Krško	AC	400	1316
	Croatia-Slovenia	Mraclin	Cirkovce	AC	220	297
	Croatia-Slovenia	Nedeljanec	Formin	AC	110	115
	Bosnia - H.-Croatia	Mostar	Konjsko	AC	400	1316
	Bosnia - H.-Croatia	Mostar	Zakuèac	AC	220	311
	Bosnia - H.-Croatia	Grahovo	Knin	AC	110	90
	Bosnia - H.-Croatia	Buško Blato	Kraljevac	AC	110	115
	Bosnia - H.-Croatia	Buško Blato	Peruca	AC	110	90
	Bosnia - H.-Croatia	Grude	Imotski	AC	110	72
	Bosnia - H.-Croatia	Kulen Vakuf	Gracac	AC	110	120
	Bosnia - H.-Croatia	Jajce	Mraclin	AC	220	297
	Bosnia - H.-Croatia	Prijedor	Međuriæ	AC	220	297
	Bosnia - H.-Croatia	Trebinje	Dubrovnik	AC	220	460
	Bosnia - H.-Croatia	Trebinje	Dubrovnik	AC	220	460
	Bosnia - H.-Croatia	Capljina	Opuzen	AC	110	84
	Bosnia - H.-Croatia	Neum	Opuzen	AC	110	84
	Bosnia - H.-Croatia	Neum	Ston	AC	110	76
	Bosnia - H.-Croatia	Trebinje	Komolac	AC	110	84
	Bosnia - H.-Croatia	Ugljevik	Ernestinovo	AC	400	831
	Bosnia - H.-Croatia	Gradaèac	Đakovo	AC	220	229
	Bosnia - H.-Croatia	Tuzla	Đakovo	AC	220	229
	Bosnia - H.-Croatia	Bosanski Brod	Slavonski Brod 2	AC	110	115
	Bosnia - H.-Croatia	Orasje	Županja	AC	110	76
	Croatia - Serbia – M.	Ernestinovo	Mladost	AC	380	831
	Croatia- Serbia – M.	Nijemci	Šid	AC	110	76
	Croatia- Serbia – M.	Beli Manastir	Apatin	AC	110	78

CZECH REPUBLIC

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MVA]
Czech R.	Austria-Czech R.	Bisamberg	Sokolnice	AC	220	269
	Austria-Czech R.	Bisamberg	Sokolnice	AC	220	269
	Austria-Czech R.	Dürnrohr	Slavetice	AC	380	1711
	Czech R.-Poland	Liskovec	Kopanina	AC	220	400
	Czech R.-Poland	Liskovec	Bujaków	AC	220	400
	Czech R.-Slovakia R.	Liskovec	Pov. Bystrica	AC	220	269
	Czech R.-Slovakia R.	Sokolnice	Senica	AC	220	318
	Czech R.-Germany	Hradec	Etzenricht	AC	380	1639
	Czech R.-Germany	Prestice	Etzenricht	AC	380	1645
	Czech R.-Germany	Hradec	Röhrsdorf	AC	380	1476
	Czech R.-Germany	Hradec	Röhrsdorf	AC	380	1476
	Czech R.-Slovakia R.	Nosovice	Varin	AC	400	1465
	Czech R.-Slovakia R.	Sokolnice	Krizovany	AC	400	1503
	Czech R.-Poland	Albrechtice	Dobrzen	AC	400	1088
	Czech R.-Poland	Nošovice	Wielopole	AC	400	1088
	Czech R.-Slovakia R.	Sokolnice	Stupava	AC	400	1711

FRANCE

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MVA]
France	Belgium-France	Jamiolle	Chooz	AC	220	356
	Belgium-France	Avelgem	Avelin	AC	380	1109
	Belgium-France	Achène	Lonny	AC	380	1229
	Belgium-France	Aubange	Moulaine	AC	220	286
	Germany-France	Uchtelfangen	Vigy	AC	380	1167
	Germany-France	Uchtelfangen	Vigy	AC	380	1167
	Germany-France	Ensdorf	St-Avold	AC	220	261
	Germany-France	Eichstetten	Vogelgrün	AC	220	338
	Germany-France	Eichstetten	Muhlbach	AC	380	1751
	Switzerland-France	Bassecourt	Sierentz	AC	380	1186
	Switzerland-France	Laufenburg	Sierentz	AC	380	1167
	Switzerland-France	Bassecourt	Mambelin	AC	380	789
	Switzerland-France	Verbois	Bois-Tollot	AC	380	1211
	Switzerland-France	Chamoson	Bois-Tollot	AC	380	1409
	Switzerland-France	Verbois	Génissiat	AC	220	280
	Switzerland-France	Verbois	Génissiat	AC	220	280
	Switzerland-France	Verbois	Chancy-Pougny	AC	130	52
	Switzerland-France	La Bâtiaz	Vallorcine	AC	220	266
	Switzerland-France	Riddes	Cornier	AC	220	275
	Switzerland-France	St.-Triphon	Cornier	AC	220	275
	Switzerland-France	Asphard	Sierentz	AC	380	1167
	France-Italy	Albertville	Rondissone	AC	380	1150
	France-Italy	Albertville	Rondissone	AC	380	1150
	France-Italy	Le Broc Carros	Camporosso	AC	220	320
	France-Italy	Villarodin	Venaus	AC	380	879
	France-Italy	Lucciana	Suvereto	DC	220	300
	Spain-France	Hernani	Argia	AC	380	1136
	Spain-France	Irún	Errondenia	AC	132	56

	Spain-France	Arkale	Argia	AC	220	340
	Spain-France	Biescas	Pragnères	AC	220	257
	Spain-France	Benós	Lac d'Oo	AC	110	63
	Spain-France	Vic	Baixas	AC	380	1105

GERMANY

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MVA]
Germany	Germany-Netherlands	Diele	Meeden	AC	380	1382
	Germany-Netherlands	Diele	Meeden	AC	380	1382
	Germany-Netherlands	Siersdorf	Maasbracht	AC	380	1645
	Germany-Netherlands	Rommerskirchen	Maasbracht	AC	380	1698
	Germany-Netherlands	Gronau W	Hengelo	AC	380	1790
	Germany-Netherlands	Gronau Z	Hengelo	AC	380	1790
	Germany-France	Uchtelfangen	Vigy	AC	380	1167
	Germany-France	Uchtelfangen	Vigy	AC	380	1167
	Germany-France	Ensdorf	St-Avold	AC	220	261
	Germany-France	Eichstetten	Vogelgrün	AC	220	338
	Germany-France	Eichstetten	Muhlbach	AC	380	1751
	Switzerland-Germany	Laufenburg	Gurtweil	AC	220	485
	Switzerland-Germany	Laufenburg	Gurtweil	AC	220	485
	Switzerland-Germany	Laufenburg	Kühmoos	AC	220	295
	Switzerland-Germany	Laufenburg	Kühmoos	AC	220	485
	Switzerland-Germany	Laufenburg	Kühmoos	AC	380	1620
	Switzerland-Germany	Laufenburg	Kühmoos	AC	380	1620
	Switzerland-Germany	Laufenburg	Kühmoos	AC	380	1580
	Switzerland-Germany	Laufenburg	Tiengen	AC	380	1158
	Switzerland-Germany	Beznau	Tiengen	AC	380	1158
	Switzerland-Germany	Beznau	Tiengen	AC	220	335
	Switzerland-Germany	Klingnau	Tiengen	AC	110	57
	Switzerland-Germany	Asphard	Kühmoos	AC	380	1340
	Switzerland-Germany	Laufenburg	Engstlatt	AC	380	1675
	Austria-Germany	Bürs	Obermooweiler	AC	380	1369
	Austria-Germany	Bürs	Obermooweiler	AC	380	1369
	Austria-Germany	Bürs	Herbertingen	AC	220	389
	Austria-Germany	Bürs	Dellmensingen	AC	220	492
	Austria-Germany	Rieden	Lindau	AC	110	84
	Austria-Germany	Hörbranz	Lindau	AC	110	84
	Austria-Germany	Vorderwald	Weiler	AC	110	141
	Austria-Germany	Braunau	Neuötting	AC	110	102
	Austria-Germany	Braunau	Stammham	AC	110	102
	Austria-Germany	Ranshofen	Neuötting	AC	110	90
	Austria-Germany	Ranshofen	Neuötting	AC	110	90
	Austria-Germany	Antiesenhofen	Egglfing	AC	110	102
	Austria-Germany	St. Peter	Altheim	AC	220	301
	Austria-Germany	St. Peter	Simbach	AC	220	301
	Austria-Germany	St. Peter	Ering	AC	110	152
	Austria-Germany	St. Peter	Ering	AC	110	152
	Austria-Germany	St. Peter	Egglfing	AC	110	105
	Austria-Germany	St. Peter	Pirach	AC	220	518
	Austria-Germany	St. Peter	Pleinting	AC	220	518
	Austria-Germany	Ranna	Passau	AC	110	90

	Austria-Germany	Ranna	Passau	AC	110	90
	Austria-Germany	Oberaudorf	Rosenheim	AC	110	93
	Austria-Germany	Oberaudorf	Kiefersfelden	AC	110	102
	Austria-Germany	Antiesenhofen	Weidach	AC	110	130
	Austria-Germany	Antiesenhofen	Weidach	AC	110	130
	Austria-Germany	Aigerding	Passau	AC	110	102
	Austria-Germany	St. Peter	Schärding	AC	220	301
	Austria-Germany	St. Peter	Schärding	AC	220	301
	Austria-Germany	Kufstein	Oberaudorf	AC	110	90
	Austria-Germany	Ebbs	Oberaudorf	AC	110	127
	Austria-Germany	Westtirol	Leupolz	AC	380	1316
	Austria-Germany	Westtirol	Memmingen	AC	220	762
	Austria-Germany	Silz	Oberbrunn	AC	220	793
	Austria-Germany	Silz	Oberbrunn	AC	220	793
	Austria-Germany	Reutte	Füssen	AC	110	127
	Austria-Germany	Reutte	Füssen	AC	110	127
	Germany-Luxembourg	Niederstedem	Vianden	AC	220	730
	Germany-Luxembourg	Niederstedem	Vianden	AC	220	365
	Germany-Luxembourg	Niederstedem	Vianden	AC	220	365
	Germany-Luxembourg	Bauler	Vianden	AC	220	730
	Germany-Luxembourg	Bauler	Flebour	AC	220	490
	Germany-Luxembourg	Bauler	Roost	AC	220	490
	Germany-Luxembourg	Trier	Heisdorf	AC	220	490
	Germany-Luxembourg	Quint	Heisdorf	AC	220	490
	Czech R.-Germany	Hradec	Etzenricht	AC	380	1639
	Czech R.-Germany	Prestice	Etzenricht	AC	380	1645
	Czech R.-Germany	Hradec	Röhrsdorf	AC	380	1476
	Czech R.-Germany	Hradec	Röhrsdorf	AC	380	1476
	Germany-Poland	Vierraden	Krajnik	AC	220	173
	Germany-Poland	Vierraden	Krajnik	AC	220	173
	Germany-Poland	Hagenwerder	Mikulowa	AC	380	1302
	Germany-Poland	Hagenwerder	Mikulowa	AC	380	1302

GREECE

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MVA]
Greece	Italy-Greece	Galatina	Arachthos	DC	380	500
	Macedonia-Greece	Dubrovo	Thessaloniki	AC	400	1300
	Macedonia-Greece	Bitola	Amynteo	AC	150	120
	Albania-Greece	Elbasan	Kardia	AC	400	1300
	Albania-Greece	Bistrica	Mourtos	AC	150	120
	Bulgaria-Greece	Blagoevgrad	Thessaloniki	AC	400	1300

HUNGARY

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MVA]
Hungary	Austria-Hungary	Wien Süd-Ost	Györ	AC	220	305
	Austria-Hungary	Neusiedl	Györ	AC	220	305
	Austria-Hungary	Wien Süd-Ost	Györ	AC	380	1514
	Hungary-Croatia	Lenti	Nedeljanec	AC	110	82
	Hungary-Croatia	Siklos	Donji Miholjac	AC	110	114
	Hungary-Croatia	Héviz	Zerjavinec	AC	400	1246
	Hungary-Croatia	Héviz	Tumbri	AC	400	1246
	Hungary-Serbi/M.	Sándorfalva	Subotica 3	AC	380	1246
	Hungary-Serbi/M.	Szeged	Subotica	AC	120	86
	Hungary-Slovakia R.	Györ	Gabcikovo	AC	400	1246
	Hungary-Slovakia R.	Göd	Levice	AC	400	1246
	Hungary-Romania	Sándorfalva	Arad	AC	400	1246

ITALY

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MVA]
Italy	France-Italy	Albertville	Rondissone	AC	380	1150
	France-Italy	Albertville	Rondissone	AC	380	1150
	France-Italy	Le Broc Carros	Camporosso	AC	220	320
	France-Italy	Villarodin	Venaus	AC	380	879
	France-Italy	Lucciana	Suvereto	DC	220	300
	Switzerland-Italy	Airolo	Ponte	AC	220	257
	Switzerland-Italy	Gorduno	Mese	AC	220	257
	Switzerland-Italy	Soazza	Bulciago	AC	380	1142
	Switzerland-Italy	Lavorgo	Musignano	AC	380	1118
	Switzerland-Italy	Campocologno	Poschiavino	AC	150	103
	Switzerland-Italy	Robbia	Sondrio	AC	220	257
	Switzerland-Italy	Riddes	Avise	AC	220	290
	Switzerland-Italy	Riddes	Valpelline	AC	220	290
	Switzerland-Italy	Mörel	Pallanzeno	AC	220	257
	Switzerland-Italy	Robbia	San Fiorano	AC	380	1000
	Switzerland-Italy	Robbia	San Fiorano	AC	380	1000
	Austria-Italy	Lienz	Soverzene	AC	220	257
	Italy-Slovenia	Redipuglia	Divaca	AC	380	1712
	Italy-Slovenia	Padriciano	Divaca	AC	220	305
	Italy-Greece	Galatina	Arachthos	DC	380	500

LUXEMBOURG

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MVA]
Luxembourg	Belgium-Luxembourg	Aubange	Belval	AC	220	358
	Belgium-Luxembourg	Aubange	Belval	AC	220	358
	Belgium-Luxembourg	Aubange	Belval	AC	150	157
	Belgium-Luxembourg	Aubange	Belval	AC	150	157
	Germany-Luxembourg	Niederstedem	Vianden	AC	220	730
	Germany-Luxembourg	Niederstedem	Vianden	AC	220	365
	Germany-Luxembourg	Niederstedem	Vianden	AC	220	365
	Germany-Luxembourg	Bauler	Vianden	AC	220	730
	Germany-Luxembourg	Bauler	Flebour	AC	220	490
	Germany-Luxembourg	Bauler	Roost	AC	220	490
	Germany-Luxembourg	Trier	Heisdorf	AC	220	490
	Germany-Luxembourg	Quint	Heisdorf	AC	220	490

MACEDONIA

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MVA]
Macedonia	Macedonia-Greece	Dubrovo	Thessaloniki	AC	400	1300
	Macedonia- Greece	Bitola	Amynteo	AC	150	120
	Bulgaria-Macedonia	Skakavica	Kriva Palanka	AC	110	123
	Bulgaria -Macedonia	Petric	Sušica	AC	110	123
	Macedonia- Serbia /M.	Skopje 1	Kosovo A	AC	220	311
	Macedonia- Serbia /M.	Skopje 1	Kosovo A	AC	220	311
	Macedonia- Serbia /M.	Skopje 4	Kosovo B	AC	380	1264

NETHERLANDS

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MVA]
Netherlands	Germany-Netherlands	Diele	Meeden	AC	380	1382
	Germany-Netherlands	Diele	Meeden	AC	380	1382
	Germany-Netherlands	Siersdorf	Maasbracht	AC	380	1645
	Germany-Netherlands	Rommerskirchen	Maasbracht	AC	380	1698
	Germany-Netherlands	Gronau W	Hengelo	AC	380	1790
	Germany-Netherlands	Gronau Z	Hengelo	AC	380	1790
	Belgium-Netherlands	Gramme	Maasbracht	AC	380	1207
	Belgium-Netherlands	Meerhout	Maasbracht	AC	380	1270
	Belgium-Netherlands	Zandvliet	Geertruidenberg	AC	380	1476
	Belgium-Netherlands	Zandvliet	Borssele	AC	380	1476
	Belgium-Netherlands	Maldegem	Oostburg	AC	150	139

POLAND

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MVA]
Poland	Czech R.-Poland	Liskovec	Kopanina	AC	220	400
	Czech R.-Poland	Liskovec	Bujaków	AC	220	400
	Czech R.-Poland	Albrechtice	Dobrzen	AC	400	1088
	Czech R.-Poland	Nošovice	Wielopole	AC	400	1088
	Germany-Poland	Vierraden	Krajnik	AC	220	173
	Germany-Poland	Vierraden	Krajnik	AC	220	173
	Germany-Poland	Hagenwerder	Mikulowa	AC	380	1302
	Germany-Poland	Hagenwerder	Mikulowa	AC	380	1302
	Poland-Slovakia R.	Krosno Iskrzynia	Lemešany	AC	400	1252
	Poland-Slovakia R.	Krosno Iskrzynia	Lemešany	AC	400	1252

PORTUGAL

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MVA]
Portugal	Spain- Portugal	Las Conchas	Lindoso	AC	132	90
	Spain- Portugal	Aldeadávila	Bemposta	AC	220	321
	Spain- Portugal	Aldeadávila	Pocinho	AC	220	321
	Spain- Portugal	Saucelle	Pocinho	AC	220	321
	Spain- Portugal	Cedillo	Falagueira	AC	380	948
	Spain- Portugal	Cartelle	Alto Lindoso	AC	380	1036

ROMANIA

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MVA]
Romania	Serbia/M.-Romania	Djerdap	Portile de Fier	AC	380	1264
	Serbia/M.-Romania	Sip	Gura Vãii	AC	110	90
	Serbia/M.-Romania	Kikinda 1	Jimbolia	AC	110	90
	Serbia/M.-Romania	Kusijak	Ostrovu Mare	AC	110	257
	Romania-Bulgaria	Isaccea	Dobr. Varna	AC	400	1715
	Romania-Bulgaria	Isalnita	Kozlodui	AC	220	360
	Romania-Bulgaria	Tântãreni	Kozlodui	AC	400	1309
	Romania-Bulgaria	Tântãreni	Kozlodui	AC	400	1309
	Hungary-Romania	Sándorfalva	Arad	AC	400	1246

SERBIA-MONTENEGRO

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MVA]
Serbia Montenergo.	Serbia /M.-Romania	Djerdap	Portile de Fier	AC	380	1264
	Serbia /M.-Romania	Sip	Gura Vãii	AC	110	90
	Serbia /M.-Romania	Kikinda 1	Jimbolia	AC	110	90
	Serbia /M.-Romania	Kusijak	Ostrovu Mare	AC	110	257
	Bulgaria-Serbia /M.	Sofija Zapad	Niš	AC	380	1264
	Bulgaria-Serbia /M.	Breznik	HE Vrla 1	AC	110	90
	Bulgaria-Serbia /M.	Kula	Zajecar	AC	110	90
	Albania-Serbia /M.	Vau i Dejës	Podgorica	AC	220	311
	Albania-Serbia /M.	Fierza	Prizren	AC	220	311
	Hungary-Serbia /M.	Sándorfalva	Subotica 3	AC	380	1246
	Hungary-Serbia /M.	Szeged	Subotica	AC	120	86
	Croat-Serbia /M.	Ernestinovo	Mladost	AC	380	831
	Croat-Serbia /M.	Nijemci	Šid	AC	110	76
	Croat-Serbia /M.	Beli Manastir	Apatin	AC	110	78
	Bosnia - H.-Serbia /M.	Trebinje	Podgorica	AC	380	1264
	Bosnia - H.-Serbia /M.	Trebinje	Perucica	AC	220	311
	Bosnia - H.-Serbia /M.	Trebinje	Herceg Novi	AC	110	90
	Bosnia - H.-Serbia /M.	Bileca	Vilusi	AC	110	84
	Bosnia - H.-Serbia /M.	Sarajevo 20	Piva	AC	220	366
	Bosnia - H.-Serbia /M.	Goražde	Pljevlja	AC	110	90
	Bosnia - H.-Serbia /M.	Višegrad	Požega	AC	220	311
	Bosnia - H.-Serbia /M.	Bijeljina	Lešnica	AC	110	123
	Bosnia - H.-Serbia /M.	Zvornik	HE Zvornik	AC	110	123
	Bosnia - H.-Serbia /M.	Višegrad	Potpec	AC	110	123
	Macedonia-Serbia /M.	Skopje 1	Kosovo A	AC	220	311
	Macedonia-Serbia /M.	Skopje 1	Kosovo A	AC	220	311
	Macedonia-Serbia /M.	Skopje 4	Kosovo B	AC	380	1264

SLOVAKIA

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MVA]
Slovakia R.	Czech R.-Slovakia R.	Liskovec	Pov. Bystrica	AC	220	269
	Czech R.-Slovakia R.	Sokolnice	Senica	AC	220	318
	Czech R.-Slovakia R.	Nosovice	Varin	AC	400	1465
	Czech R.-Slovakia R.	Sokolnice	Krizovany	AC	400	1503
	Czech R.-Slovakia R.	Sokolnice	Stupava	AC	400	1711
	Poland-Slovakia R.	Krosno Iskrzynia	Lemešany	AC	400	1252
	Poland-Slovakia R.	Krosno Iskrzynia	Lemešany	AC	400	1252
	Hungary-Slovakia R.	Györ	Gabcikovo	AC	400	1246
	Hungary-Slovakia R.	Göd	Levice	AC	400	1246

SLOVENIA

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MVA]
Slovenia	Austria-Slovenia	Obersielach	Podlog	AC	220	351
	Austria-Slovenia	Kainachtal	Maribor	AC	380	1514
	Austria-Slovenia	Kainachtal	Maribor	AC	380	1514
	Italy-Slovenia	Redipuglia	Divaca	AC	380	1712
	Italy-Slovenia	Padriciano	Divaca	AC	220	305
	Croatia-Slovenia	Melina	Divaèa	AC	380	1264
	Croatia-Slovenia	Pehlin	Divaèa	AC	220	366
	Croatia-Slovenia	Buje	Koper	AC	110	89
	Croatia-Slovenia	Matulji	Ilirska Bistrica	AC	110	53
	Croatia-Slovenia	Tumbri	Krško	AC	400	1316
	Croatia-Slovenia	Tumbri	Krško	AC	400	1316
	Croatia-Slovenia	Mraclin	Cirkovce	AC	220	297
	Croatia-Slovenia	Nedeljanec	Formin	AC	110	115

SPAIN

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MVA]
Spain	Spain-France	Hernani	Argia	AC	380	1136
	Spain-France	Irún	Errondenia	AC	132	56
	Spain-France	Arkale	Argia	AC	220	340
	Spain-France	Biescas	Pragnères	AC	220	257
	Spain-France	Benós	Lac d'Oo	AC	110	63
	Spain-France	Vic	Baixas	AC	380	1105
	Spain-Portugal	Las Conchas	Lindoso	AC	132	90
	Spain-Portugal	Aldeadávila	Bemposta	AC	220	321
	Spain-Portugal	Aldeadávila	Pocinho	AC	220	321
	Spain-Portugal	Saucelle	Pocinho	AC	220	321
	Spain-Portugal	Cedillo	Falagueira	AC	380	948
	Spain-Portugal	Cartelle	Alto Lindoso	AC	380	1036

SWITZERLAND

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MVA]
Switzerland	Switzerland-France	Bassecourt	Sierentz	AC	380	1186
	Switzerland-France	Laufenburg	Sierentz	AC	380	1167
	Switzerland-France	Bassecourt	Mambelin	AC	380	789
	Switzerland-France	Verbois	Bois-Tollot	AC	380	1211
	Switzerland-France	Chamoson	Bois-Tollot	AC	380	1409
	Switzerland-France	Verbois	Génissiat	AC	220	280
	Switzerland-France	Verbois	Génissiat	AC	220	280
	Switzerland-France	Verbois	Chancy-Pougny	AC	130	52
	Switzerland-France	La Bâtiaz	Vallorcine	AC	220	266
	Switzerland-France	Riddes	Cornier	AC	220	275
	Switzerland-France	St.-Triphon	Cornier	AC	220	275
	Switzerland-France	Asphard	Sierentz	AC	380	1167
	Switzerland-Germany	Laufenburg	Gurtweil	AC	220	485
	Switzerland-Germany	Laufenburg	Gurtweil	AC	220	485
	Switzerland-Germany	Laufenburg	Kühmoos	AC	220	295
	Switzerland-Germany	Laufenburg	Kühmoos	AC	220	485
	Switzerland-Germany	Laufenburg	Kühmoos	AC	380	1620
	Switzerland-Germany	Laufenburg	Kühmoos	AC	380	1620
	Switzerland-Germany	Laufenburg	Kühmoos	AC	380	1580
	Switzerland-Germany	Laufenburg	Tiengen	AC	380	1158
	Switzerland-Germany	Beznau	Tiengen	AC	380	1158
	Switzerland-Germany	Beznau	Tiengen	AC	220	335
	Switzerland-Germany	Klingnau	Tiengen	AC	110	57
	Switzerland-Germany	Asphard	Kühmoos	AC	380	1340
	Switzerland-Germany	Laufenburg	Engstlatt	AC	380	1675
	Switzerland-Italy	Airolo	Ponte	AC	220	257
	Switzerland-Italy	Gorduno	Mese	AC	220	257
	Switzerland-Italy	Soazza	Bulciago	AC	380	1142
	Switzerland-Italy	Lavorgo	Musignano	AC	380	1118
	Switzerland-Italy	Campocologno	Poschiavino	AC	150	103
	Switzerland-Italy	Robbia	Sondrio	AC	220	257
	Switzerland-Italy	Riddes	Avise	AC	220	290
	Switzerland-Italy	Riddes	Valpelline	AC	220	290
	Switzerland-Italy	Mörel	Pallanzeno	AC	220	257
	Switzerland-Italy	Robbia	San Fiorano	AC	380	2000
	Austria-Switzerland	Meiningen	Y-Rehag	AC	220	501
	Austria-Switzerland	Meiningen	Winkeln	AC	220	776
	Austria-Switzerland	Westtirol	Pradella	AC	380	1340
	Austria-Switzerland	Westtirol	Pradella	AC	380	1340

Other European Countries synchronously interconnected with UCTE, but without being members of UCTE:

ALBANIA

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MVA]
Albania	Albania-Serbia/M.	Vau i Dejës	Podgorica	AC	220	311
	Albania-Serbia/M.	Fierza	Prizren	AC	220	311
	Albania-Greece	Elbasan	Kardia	AC	400	1300
	Albania-Greece	Bistrica	Mourtos	AC	150	120

2. INTERCONNECTIONS IN THE NORDEL POOL

Note 1: in the following tables all circuits of the cross-border lines are listed.
Note 2: the list includes also the interconnections with neighboring pools

DENMARK

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MW]
Denmark	Denmark-Norway	Tjele	Kristiansand	DC	250	1040
	Denmark-Norway	Tjele	Kristiansand	DC	350	
	Denmark-Sweden	Vester Hassing	Göteborg	DC	250	290
	Denmark-Sweden	Vester Hassing	Lindome	DC	280	360
	Germany-Denmark	Audorf	Kassø	AC	400	1200
	Germany-Denmark	Flensburg	Kassø	AC	220	
	Germany-Denmark	Flensburg	Ensted	AC	220	
	Germany-Denmark	Flensburg	Ensted	AC	150	150
	Denmark-Sweden	Teglstrupgård	Mörarp 1 – 2	AC	132	350
	Denmark-Sweden	Gørløsegård	Söderåsen	AC	400	800
	Denmark-Sweden	Hovegård	Söderåsen	AC	400	800
	Denmark-Sweden	Hasle (Bornholm)	Borrby	AC	60	60
	Germany-Denmark	Bentswich (Rostock)	Bjæverskov	DC	400	600

FINLAND

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MW]
Finland	Norway-Finland	Varangerboth	Ivalo	AC	220	120
	Sweden-Finland	Kalix	Ossauskoski	AC	220	1600
	Sweden-Finland	Letsi	Petäjäskoski	AC	400	
	Sweden-Finland	Svartbyn	Keminmaa	AC	400	
	Sweden-Finland	Forsmark	Raumo	DC	400	550
	Sweden-Finland	Tingsbacka (Åland)	Senneby	AC	110	80
	Finland-Russia	Imatra	Charlottenberg	AC	110	100
	Finland-Russia	Yllikkälä	Vyborg	AC	400	1400
	Finland-Russia	Kymi	Vyborg 13	AC	400	
	Finland-Russia	Nellimö	Kaitakoski	AC	110	60

NORWAY

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MW]
Norway	Denmark-Norway	Tjele	Kristiansand	DC	250	1040
	Denmark-Norway	Tjele	Kristiansand	DC	350	
	Norway-Russia	Kirkenes	Boris Gleb	AC	154	50
	Norway-Finland	Varangerboth	Ivalo	AC	220	120
	Norway-Sweden	Sildvik	Tornehamn	AC	132	120
	Norway-Sweden	Ofoten	Ritsem	AC	400	1350
	Norway-Sweden	Rössåga	Ajaure	AC	220	415
	Norway-Sweden	Nea	Järpströmmen	AC	275	600
	Norway-Sweden	Eidskog	Charlottenberg	AC	132	100
	Norway-Sweden	Lutufallet	Höljes	AC	132	40
	Norway-Sweden	Hasle	Borgvik	AC	400	2200
	Norway-Sweden	Halden	Skogssäter	AC	400	

SWEDEN

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MW]
Sweden	Denmark-Sweden	Vester Hassing	Göteborg	DC	250	290
	Denmark-Sweden	Vester Hassing	Lindome	DC	280	360
	Denmark-Sweden	Teglstrupgård	Mörarp 1 and 2	AC	132	350
	Denmark-Sweden	Gørløsegård	Söderåsen	AC	400	800
	Denmark-Sweden	Hovegård	Söderåsen	AC	400	800
	Denmark-Sweden	Hasle (Bornholm)	Borrby	AC	60	60
	Norway-Sweden	Sildvik	Tornehamn	AC	132	120
	Norway-Sweden	Ofoten	Ritsem	AC	400	1350
	Norway-Sweden	Rössåga	Ajaure	AC	220	415
	Norway-Sweden	Nea	Järpströmmen	AC	275	600
	Norway-Sweden	Eidskog	Charlottenberg	AC	132	100
	Norway-Sweden	Lutufallet	Höljes	AC	132	40
	Norway-Sweden	Hasle	Borgvik	AC	400	2200
	Norway-Sweden	Halden	Skogssäter	AC	400	
	Sweden-Finland	Kalix	Ossauskoski	AC	220	1600
	Sweden-Finland	Letsi	Petäjäskoski	AC	400	
	Sweden-Finland	Svartbyn	Keminmaa	AC	400	
	Sweden-Finland	Forsmark	Raumo	DC	400	550
	Sweden-Finland	Tingsbacka (Åland)	Senneby	AC	110	80
	Germany-Sweden	Herrenwyk	Kruseberg	DC	450	600
	Poland-Sweden	Slupsk	Stärnö	DC	450	600

3. INTERCONNECTIONS IN THE BALTIC IPS (DC BALTIJA) POOL

Note 1: in the following tables all circuits of the cross-border lines are listed.
Note 2: the list includes also the interconnections with neighboring pools

ESTONIA

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MW]
Estonia	Estonia -Russia	Balti	Leningradskaja	AC	330	1400 *
	Estonia -Russia	Eesti	Kingisepp	AC	330	800
	Estonia -Russia	Tartu	Pskov	AC	330	600
	Estonia -Latvia	Tsirguliina	Valmiera	AC	330	700
	Estonia - Latvia	Tartu	Valmiera	AC	330	500

(*) in MVA

LATVIA

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MW]
Latvia	Estonia-Latvia	Tsirguliina	Valmiera	AC	330	700
	Estonia-Latvia	Tartu	Valmiera	AC	330	500
	Latvia-Lithuania	Liksna	Ignalina	AC	330	789
	Latvia-Lithuania	Plavinas	Panevezis	AC	330	789
	Latvia-Lithuania	Jelgava	Šiauliai	AC	330	789
	Latvia-Lithuania	Grobina	Klaipeda	AC	330	943
	Latvia-Russia	Rezekne	Pskov	AC	330	300

LITHUANIA

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MW]
Lithuania	Latvia-Lithuania	Liksna	Ignalina	AC	330	789
	Latvia-Lithuania	Plavinas	Panevezis	AC	330	789
	Latvia-Lithuania	Jelgava	Šiauliai	AC	330	789
	Latvia-Lithuania	Grobina	Klaipeda	AC	330	943
	Lithuania-Kaliningrad	Kruonis	Sovietsk	AC	330	1143
	Lithuania-Kaliningrad	Jurbarkas	Sovietsk	AC	330	572
	Lithuania-Kaliningrad	Klaipeda	Sovietsk	AC	330	572
	Lithuania-Belarus	Ignalina NPP	Polock	AC	330	1097
	Lithuania-Belarus	Ignalina NPP	Belarusskaja	AC	330	1143
	Lithuania-Belarus	Ignalina NPP	Smorgon/Molodechno	AC	330	943
	Lithuania-Belarus	Vilnius	Molodechno	AC	330	943
	Lithuania-Belarus	Alytus	Grodno	AC	330	789

APPENDIX 2

INTERFACE BETWEEN THE EUROPEAN POOLS AND IPS/UPS INTERCONNECTIONS

1. INTERCONECTION LINES BETWEEN UCTE AND NEIGHBOURING SYSTEMS

System	Border System	Substation From	Substation To	Type	Voltage [kV]	Capacity [MW]
UCTE	UCTE-NORDEL	Audorf	Kassø	AC	400	1200
	UCTE-NORDEL	Flensburg	Kassø	AC	220	
	UCTE-NORDEL	Flensburg	Ensted	AC	220	
	UCTE-NORDEL	Flensburg	Ensted	AC	150	150
	UCTE-NORDEL	Bentswich (Rostock)	Bjæverskov	DC	400	600
	UCTE-NORDEL	Herrenwyk	Kruseberg	DC	450	600
	UCTE-NORDEL	Slupsk	Stärnö	DC	450	600
	UCTE-Belarus	Bialystok s/s	Ross s/s	AC	220	215 *
	UCTE-Belarus	Vulka	Brest2	AC	110	120
	UCTE-Moldova	Dobrudja s/s	Vulkaneshti	AC	400	900 *
	UCTE-Ukraine	Zamoœæ	Dobrotwór	AC	220	309 *
	UCTE-Ukraine	Rzeszów Widelka	Chmielnicka	AC	750	2676 *
	UCTE-Ukraine	V. Kapusany	Mukacevo	AC	400	1183 *
	UCTE-Ukraine	Tiszalök	Mukacevo	AC	220	312 *
	UCTE-Ukraine	Kisvárda	Mukacevo	AC	220	312 *
	UCTE-Ukraine	Sajószöged	Mukacevo	AC	400	1685 *
	UCTE-Ukraine	Albertirsa	Zahidnoukrainskaja	AC	750	4000 *
	UCTE-Ukraine	Isaccea	Pivdenno Ukrainska	AC	750	4000 *
	UCTE-Ukraine	Rosiori	Mukacevo	AC	400	1700 **
	UCTE-Moldova	Isaccea	Vulkaneshti	AC	400	1700 **
	UCTE-Moldova	Stânca	Costesti	AC	110	90 *
	UCTE-Moldova	Husj	Cioara	AC	110	90 *
	UCTE-Moldova	Tujora	Ungheni	AC	110	90 *
	UCTE-Turkey	Maritsa East	Babaeski	AC	400	1000 *
	UCTE-Turkey	Maritsa East	Hamitabat	AC	400	1500 *
	UCTE-UK	Mandarins	England Sellindge (Kent)	DC	270	2000
	UCTE-Marocco	Pinar del Rey (Puerto de la Cruz)	Melloussa	AC	400	730 *

(*) in [MVA]
(**) in [A]

2. INTERCONECTION LINES BETWEEN NORDEL AND NEIGHBOURING SYSTEMS

System	Border System	Substation From	Substation To	Type	Voltage [kV]	Capacity [MW]
NORDEL	UCTE-NORDEL	Audorf	Kassø	AC	400	1200
	UCTE-NORDEL	Flensburg	Kassø	AC	220	
	UCTE-NORDEL	Flensburg	Ensted	AC	220	
	UCTE-NORDEL	Flensburg	Ensted	AC	150	150
	UCTE-NORDEL	Bentswich (Rostock)	Bjæverskov	DC	400	600
	NORDEL-Russia	Kirkenes	Boris Gleb	AC	154	50
	UCTE-NORDEL	Herrenwyk	Kruseberg	DC	450	600
	UCTE-NORDEL	Slupsk	Stärnö	DC	450	600
	NORDEL-Russia	Imatra	Charlottenberg	AC	110	100
	NORDEL-Russia	Yllikkälä	Vyborg	AC	400	1400
	NORDEL-Russia	Kymi	Vyborg 1_3	AC	400	
	NORDEL-Russia	Nellimö	Kaitakoski	AC	110	60

3. INTERCONECTION LINES BETWEEN BALTIC IPS (DC BALTIJA) AND NEIGHBOURING SYSTEMS

System	Border System	Substation From	Substation To	Type	Voltage [kV]	Capacity [MW]
DC Baltija	DC Baltija-Russia	Balti	Leningradskaja	AC	330	1400 *
	DC Baltija-Russia	Eesti	Kingisepp	AC	330	800
	DC Baltija-Russia	Tartu	Pskov	AC	330	600
	DC Baltija-Russia	Rezekne	Pskov	AC	330	300
	DC Baltija-Kaliningrad (Russia)	Kruonis	Sovietsk	AC	330	1143
	DC Baltija-Kaliningrad (Russia)	Jurbarkas	Sovietsk	AC	330	572
	DC Baltija-Kaliningrad (Russia)	Klaipeda	Sovietsk	AC	330	572
	DC Baltija-Belarus	Ignalina NPP	Polock	AC	330	1097
	DC Baltija-Belarus	Ignalina NPP	Belarusskaja	AC	330	1143
	DC Baltija-Belarus	Ignalina NPP	Smorgon/Molodechno	AC	330	943
	DC Baltija-Belarus	Vilnius	Molodechno	AC	330	943
	DC Baltija-Belarus	Alytus	Grodno	AC	330	789

(*) in [MVA]

4. IPS/UPS INTERCONNECTIONS

In the following tables the interconnecting lines of the European part of IPS/UPS pool are shown. The region covers the following countries: Belarus, Ukraine, Moldova and the European part of the Russian Federation

BELARUS

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MW]
Belarus	DC BALTIJA-Belarus	Ignalina NPP	Polock	AC	330	1097
	DC BALTIJA-Belarus	Ignalina NPP	Belarusskaja	AC	330	1143
	DC BALTIJA-Belarus	Ignalina NPP	Smorgon/Molodechno	AC	330	943
	DC BALTIJA-Belarus	Vilnius	Molodechno	AC	330	943
	DC BALTIJA-Belarus	Alytus	Grodno	AC	330	789
	Belarus-Russia	Belorusskaya s/s	Smolenskaya NPP	AC	750	4600
	Belarus-Russia	Vitebsk s/s	Talashkino s/s	AC	330	780
	Belarus-Russia	Kritchev s/s	Roslavl s/s	AC	330	940
	Belarus-Russia	Polotsk s/s	Novosokolniki	AC	330	780
	Belarus-Ukraine	Mozyr s/s	Chernobyl NPP	AC	330	940
	Belarus- Ukraine	Gomel s/s	Chernigov s/s	AC	330	780
	UCTE-Belarus	Bialystok s/s	Ross s/s	AC	220	215 *
	UCTE-Belarus	Vulka	Brest2	AC	110	120

(*) in [MVA]

MOLDOVA

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MVA]
Moldova	Moldova-Ukraine	Moldavian	Usatovo	AC	330	400
	Moldova-Ukraine	Moldavian	Novo Odesskaya	AC	330	400
	Moldova-Ukraine	Moldavian	Kotovskaya	AC	330	400
	Moldova-Ukraine	Moldavian	Artsiz	AC	330	850
	Moldova-Ukraine	Beltsy	Dnestrovskie	AC	330	400
	Moldova-Ukraine	Rybnitsa no. 1	Kotovskaya	AC	330	850
	Moldova-Ukraine	Rybnitsa no.2	Kotovskaya	AC	330	850
	UCTE-Moldova	Dobrudja s/s	Vulkaneshti	AC	400	900
	UCTE-Moldova	Isaccea	Vulkaneshti	AC	400	1700 **
	UCTE-Moldova	Stânca	Costesti	AC	110	90
	UCTE-Moldova	Husj	Cioara	AC	110	90
	UCTE-Moldova	Tujora	Ungheni	AC	110	90

(**) in [A]

RUSSIA

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MW]
Russia	NORDEL-Russia	Kirkenes	Boris Gleb	AC	154	50
	NORDEL-Russia	Imatra	Charlottenberg	AC	110	100
	NORDEL-Russia	Yllikkälä	Vyborg	AC	400	1400
	NORDEL-Russia	Kymi	Vyborg 13	AC	400	
	NORDEL-Russia	Nellimö	Kaitakoski	AC	110	60
	DC Baltija-Russia	Balti	Leningradskaja	AC	330	1400 *
	DC Baltija-Russia	Eesti	Kingisepp	AC	330	800
	DC Baltija-Russia	Tartu	Pskov	AC	330	600
	DC Baltija-Russia	Rezekne	Pskov (Pskov Region)	AC	330	300
	Belarus-Russia	Belorusskaya s/s	Smolenskaya NPP	AC	750	4600
	Belarus-Russia	Vitebsk s/s	Talashkino s/s	AC	330	780
	Belarus-Russia	Kritchev s/s	Roslavl s/s	AC	330	940
	Belarus-Russia	Polotsk s/s	Novosokolniki	AC	330	780
	Ukraine-Russia	Donbass	Volgograd	DC	400	2000 **
	Ukraine-Russia	Severoukrainskaya	Kurskaya NPP	AC	750	2000 **
	Ukraine-Russia	Donbass	Novovoronezh skaya	AC	500	2000 **
	Ukraine-Russia	Sumy	Kurskaya NPP	AC	330	1420 **
	Ukraine-Russia	Shostka	Kurskaya NPP	AC	330	1650 **
	Ukraine-Russia	Zmiev TPP	Valuiki	AC	330	1420 **
	Ukraine-Russia	Zmiev TPP	Belgorod	AC	330	1650 **
	Ukraine-Russia	Losevo	Shebekino	AC	330	1650 **
	Ukraine-Russia	Velikotsk	Pryidonsk	AC	220	710 **
	Ukraine-Russia	Pobeda	Shakhty	AC	500	2000 **
	Ukraine-Russia	Uzhnaya	Novocherkassk TPP	AC	330	1650 **
	Ukraine-Russia	Pobeda	Nesvetai TPP	AC	220	710 **
	Ukraine-Russia	Lugansk TPP	Syisoevo	AC	220	825 **
	Ukraine-Russia	Amvrosievka	Taganrog 15	AC	220	710 **
	Ukraine-Russia	Velikotsk	Syisoevo	AC	220	710 **

(*) in [MVA]
(**) in [A]

UKRAINE

Country	Border	Substation From	Substation To	Type	Voltage [kV]	Capacity [MVA]
Ukraine	Belarus-Ukraine	Mozyr s/s	Chernobyl NPP	AC	330	940
	Belarus-Ukraine	Gomel s/s	Chernigov s/s	AC	330	780
	Moldova-Ukraine	Moldavian	Usatovo	AC	330	400
	Moldova-Ukraine	Moldavian	Novo-Odesskaya	AC	330	400
	Moldova-Ukraine	Moldavian	Kotovskaya	AC	330	400
	Moldova -Ukraine	Moldavian	Artsiz	AC	330	850
	Moldova -Ukraine	Beltsy	Dnestrovskie	AC	330	400
	Moldova -Ukraine	Rybnitsa no. 1	Kotovskaya	AC	330	850
	Moldova -Ukraine	Rybnitsa no.2	Kotovskaya	AC	330	850
	UCTE-Ukraine	Zamoœæ	Dobrotwór	AC	220	309
	UCTE-Ukraine	Rzeszów Widelka	Chmielnicka	AC	750	2676
	UCTE-Ukraine	V. Kapusany	Mukacevo	AC	400	1183
	UCTE-Ukraine	Tiszalök	Mukacevo	AC	220	312
	UCTE-Ukraine	Kisvárda	Mukacevo	AC	220	312
	UCTE-Ukraine	Sajószöged	Mukacevo	AC	400	1685
	UCTE-Ukraine	Albertirsa	Zahidnoukrainskaja	AC	750	4000
	UCTE-Ukraine	Isaccea	PivdennoUkrainska	AC	750	4000
	UCTE-Ukraine	Rosiori	Mukacevo	AC	400	1700 **
	Ukraine-Russia	Donbass	Volgograd	DC	400	2000 **
	Ukraine- Russia	Severoukrainskaya	Kurskaya NPP	AC	750	2000 **
	Ukraine- Russia	Donbass	Novovoronezhskaya	AC	500	2000 **
	Ukraine- Russia	Sumy	Kurskaya NPP	AC	330	1420 **
	Ukraine-Russia	Shostka	Kurskaya NPP	AC	330	1650 **
	Ukraine- Russia	Zmiev TPP	Valuiki	AC	330	1420 **
	Ukraine- Russia	Zmiev TPP	Belgorod	AC	330	1650 **
	Ukraine- Russia	Losevo	Shebekino	AC	330	1650 **
	Ukraine- Russia	Velikotsk	Pryidonsk	AC	220	710 **
	Ukraine- Russia	Pobeda	Shakhty	AC	500	2000 **
	Ukraine- Russia	Uzhnaya	Novocherkassk TPP	AC	330	1650 **
	Ukraine- Russia	Pobeda	Nesvetai TPP	AC	220	710 **
	Ukraine- Russia	Lugansk TPP	Syisoevo	AC	220	825 **
	Ukraine- Russia	Amvrosievka	Taganrog	AC	220	710 **
	Ukraine- Russia	Velikotsk	Syisoevo	AC	220	710 **

(**) in [A]

APPENDIX 3

NTC AMONG THE EU COUNTRIES

The following tables show the GTC (Gross Total Capacity), NTC (Net Transfer Capacity) and the ratio NTC/GTC referred to the European cross-border sections in the winter period 2003/2004.

Data have been retrieved from the following sources:

- for GTC: UCTE, NORDEL; DC-BALTIJA and national TSO
- for NTC: ETSO (for countries belonging to ETSO association) and national ISO/TSO. In case of inconsitency between data published by ETSO and those supplied by national ISO/TSO, priority has been given to these latter (see in the tables the data in red characters).

In some cases NTC values are zero, which means that power flows in this direction is not realistic. We remind that NTC values are directional, then two values exist across each cut-sets: NTC from country A to country B and NTC from country B to country A.

Moreover, in other cases, NTC can be computed taking into account an “electrical border” that differs from the “political borders”. Consequently, in some situations NTC are expressed with reference to cut-sets that involves more political borders. This happens normally in central and South-Eastern Europe where the grids are strongly meshed.

Area From	Area To	GTC 2004** [MVA or MW]	NTC 2004*** [MW]	NTC/GTC**** 2004 [%]
Albania	JIEL/EKC block*	622	300	48,2
Albania	Greece	1420	300	21,1
Albania+Bulgaria+JIEL/EKC	Greece	4140	0	
Austria	Germany	11935	1400	11,7
Austria	Italy	257	220	85,6
Austria	Czech Rep. + Hungary	4373	600	13,7
Austria	Czech Rep.	2249	0	
Austria	Italy + Slovenia	3636	0	
Austria	Germany + Switzerland	15892	1200	7,6
Austria	Slovenia	3379	400	11,8
Austria	Hungary	2124	500	23,5
Belgium	France	2980	2750	92,3
Belgium	Netherlands	5568	2350	42,2
Belgium + Germany	Netherlands	15255	4700	30,8
Bosnia	Croatia	5436	350	6,4
Bosnia	JIEL/EKC*	2885	600	20,8
Bulgaria	JIEL/EKC block*	1444	935	64,8
Bulgaria	Greece	1300	654	50,3
Bulgaria	Romania	4693	1135	24,2
Bulgaria+JIEL/ECK*	Romania	1690	700	41,4
Croatia	Bosnia and Herzegovina	5436	500	9,2
Croatia	JIEL/EKC block*	985	300	30,5
Croatia	Hungary	2688	100	3,7
Croatia	Slovenia	4816	1000	20,8
Czech Rep.+Poland	Germany	9186	0	
Czech Rep.	Germany	6236	1625	26,1
Czech Rep.	Austria	2249	600	26,7
Czech Rep.	Poland	2976	0	
Czech Rep.	Slovakia	5266	1300	24,7
Czech+Germany+Slovakia	Poland	8430	200	2,4
Czech Rep.+Hungary	Austria	4373	0	
Denmark (West)	Germany	1350	1200	88,9
Denmark (East)	Germany	600	550	91,7
Denmark (West)	Sweden	650	490	75,4
Denmark (East)	Sweden	2010	1700	84,6
Denmark (West)	Norway	1040	950	91,3
Finland	Sweden	2230	1600	71,7
Finland	Norway	120	100	83,3

Area From	Area To	GTC 2004** [MVA or MW]	NTC 2004*** [MW]	NTC/GTC**** 2004 [%]
France	United Kingdom	2000	2000	100,0
France	Belgium	2980	2250	75,5
France	Germany	4584	2550	55,6
France	Italy	4099	2650	64,6
France	Switzerland + Italy	12456	3200	25,7
France	Spain	2957	1400	47,3
France+Switzerland	Italy	10070	0	
Germany	Austria	11935	1600	13,4
Germany	Netherlands	9687	3800	39,2
Germany	Czech Rep. + Poland	9186	0	
Germany	Czech Rep.	6236	700	11,2
Germany	Denmark (East)	600	550	91,7
Germany	Denmark (west)	1350	800	59,3
Germany	France	4684	2500	53,4
Germany	Poland	2950	2000	67,8
Germany	Sweden	600	370	61,7
Germany	Switzerland	12293	3000	24,4
Germany+Switzerland	Austria	11935	1600	13,4
Greece	Albania	1420	130	9,2
Greece	JIEL/EKC block*	2840	600	21,1
Greece	Italy	500	500	100,0
Greece	Albania+Bulgaria+JIEL/EKC block*	2720	600	22,1
Hungary	Austria	2124	200	9,4
Hungary	Croatia	2688	1000	37,2
Hungary	JIEL/EKC block*	1332	800	60,1
Hungary	Romania	1246	1100	88,3
Hungary	Slovakia	2492	200	8,0
Hungary	Ukraine	6309	400	6,3
Italy	Austria + Slovenia	2274	0	
Italy	France + Switzerland	10070	0	
Italy	France	4099	0	
Italy	Switzerland	5971	0	
Italy	Austria	257	0	
Italy	Slovenia	2017	480	23,8
Italy	Greece	500	500	100,0
Italy+Slovenia	Austria	3285	0	

Area From	Area To	GTC 2004** [MVA or MW]	NTC 2004*** [MW]	NTC/GTC**** 2004 [%]
JIEL/EKC block*	Albania	622	250	40,2
JIEL/EKC block*	Bosnia and Herzegovina	2885	450	15,6
JIEL/EKC block*	Bulgaria	1444	965	66,8
JIEL/EKC block*	Croatia	985	300	30,5
JIEL/EKC block*	Greece	2840	600	21,1
JIEL/EKC block*	Hungary	1332	650	48,8
JIEL/EKC block*	Romania	1701	1050	61,7
Morocco	Spain	730	400	54,8
Netherlands	Belgium	5568	1900	34,1
Netherlands	Belgium + Germany	15255	3500	22,9
Netherlands	Germany	9687	3900	40,3
Norway	Denmark (West)	1040	1000	96,2
Norway	Sweden	4825	3350	69,4
Norway	Finland	120	70	58,3
Poland	Czech Rep. + Germany + Slovakia	8430	2100	24,9
Poland	Czech Rep.	2976	1650	55,4
Poland	Germany	2950	1100	37,3
Poland	Slovakia	2504	750	30,0
Poland	Sweden	600	550	91,7
Portugal	Spain	3037	1300	42,8
Rep. Of Ireland	United Kingdom	500	120	24,0
Romania	JIEL/EKC block*	1701	1700	99,9
Romania	Bulgaria	4693	765	16,3
Romania	Bulgaria + JIEL/EKC block*	6394	0	
Romania	Hungary	1246	800	64,2
Romania	Ukraine	5178	750	14,5
Russia	Finland	1560	1400	89,7
Slovakia	Czech Rep.	5266	600	11,4
Slovakia	Hungary	2492	1100	44,1
Slovakia	Poland	2504	750	30,0
Slovakia	Ukraine	1183	500	42,3
Slovenia	Austria	3379	0	
Slovenia	Croatia	4816	1000	20,8
Slovenia	Italy	2017	380	18,8

Area From	Area To	GTC 2004** [MVA or MW]	NTC 2004*** [MW]	NTC/GTC**** 2004 [%]
Spain	Portugal	3037	900	30,0
Spain	France	2957	1000	33,8
Spain	Morocco	730	400	54,8
Sweden	Germany	600	460	76,7
Sweden	Denmark (West)	650	460	70,8
Sweden	Denmark (East)	2010	1300	64,7
Sweden	Finland	2230	1800	80,7
Sweden	Norway	4825	3050	63,2
Sweden	Poland	600	550	91,7
Switzerland	Austria	3957	1500	37,9
Switzerland	Germany	12293	4000	32,5
Switzerland	France	8357	0	
Switzerland	Italy	5971	2800	46,9
Ukraine	Hungary	6309	455	7,2
Ukraine	Romania	5178	600	11,6
Ukraine	Slovakia	1183	500	42,3
UK (Great Britain)	France	2000	0	
UK (North Ireland)	Republic of Ireland	500	330	66,0
UK (Great Britain)	UK (North Ireland)	500	450	90,0
UK (North Ireland)	UK (Great Britain)	500	450	90,0
Estonia	Russia (Leningrad Region)	2800	1000	35,7
Estonia	South cross-section (Latvia+Pskov Region)	1500	1200	80,0
Latvia	North cross section (Estonia+Pskov Region)	1500	1200	80,0
Latvia	Lituania	3310	2000	60,4
Lituania	Latvia	3310	2500	75,5
Lituania	Belarus	4915	2200	44,8
Lituania	Kaliningrad	2287	700	30,6

Notes:
*JIEL block: Serbia, Montenegro and FYROM.
*ECK block: Bosnia and Herzegovina.
** Values relevant to Baltic States, Nordel states and DC links are expressed in MW.
*** Data from local ISO in red. Data from ETSO source in black.

**** Legend

Ratio NTC/GTC < 25%
25% < NTC/GTC < 70%
Ratio NTC/GTC > 70%

APPENDIX 4

RECENTLY ACHIEVED AND SCHEDULED PROJECTS

Major Projects/Investments			
Project name	**Year built or expected**	**Location**	**Real or expected costs (MEUR)**
BELGIUM (BE)			
1 Avelgem(B) – Avelin (F)	2005	Avelgem 380 kV	12,5
2 Chooz (F) – Monceau (B)	2006	Monceau 220/150 kV	12,9
3 Phase shifters 380 kV	2007	Zandvliet (1), Van Eyck (2)	44
BULGARIA (BG)			
1 Interconnection OHTL 400 kV Bulgaria-Turkey and reconstruction of 400 kV line bay	2003 commissioned	SS Maritsa East 3, Bulgaria-SS Alibeikyoi, Turkey	30
2 Improvement of the joint operation of the Bulgarian and Greek power system	2004 commissioned		2
3 Improvement of the joint operation of the Bulgarian and Romanian power system	2005 commissioned		3
4 SS Proslav 110/20 kV	2005 commissioned		3,5
5 OHTL 110 kV Ardino-Severni Rodopi	2005 commissioned	Ardino-Severni Rodopi	1
6 Interconnection OHTL 400 kV Bulgaria-Macedonia	2007	SS Chervena mogila, Bulgaria-SS Shtip, Macedonia	15
7 Interconnection OHTL 400 kV Bulgaria-Greece		SS Maritza East-Galabovo, Bulgaria-Philipi, Greece	25
8 MIS	2005		8
9 Reconstruction of 400 kV line bay at SS Plovdiv 400/220/110kV and OHTL 400 kV Plovdiv - Karlovo	2007		20,7
10 Modernisation of SCADA/EMS	2005		7
11 Distant electric meter reading	2005		2
12 Rehabilitation of power system substations 220 kV and 400 kV	2007		45
13 Development of the telecommunication system	2007		15
CYPRUS (CY)			
1 New S/S Ay. Athanasios	2008		4
2 New S/S “Tseri”132/11kV	2008		3,5
3 New S/S “Aluminium Tower” 132/11kV	2012		3,5
4 New S/S “Trimiklini” 66/11kV	2008		1,8
5 Interconnecting cable	2009	Tseri - Lakatamia	3,1
6 Interconnecting Trans. line	2010	Vasilikos - Alambra	1,4
7 Interconnecting Trans. line	2010	Vasilikos -Moni	1,1

Major Projects/Investments

Project name	Year built or expected	Location	Real or expected costs (MEUR)
CZECH REPUBLIC (CZ)			
1 2ndLine 400 kV SLA-DUR	2006	Slavětice-Dürenrohr	3,7
2 Line 400 kV CST-BEZ	2008	Čechy Střed - Bezděčín	33,2
3 Line 400 kV KRA-HZI	2009	Krasíkov – Horní Životice	39,3
4 Line 400 kV NOS-PRO	2011	Nošovice - Prosenice	44,3
ESTONIA (EE)			
1 Balti-Kiisa 330 kV OHL	2005-2007	From Balti powerplant to Kiisa substation	24,67
2 Reconstruction of Balti 330 kV substation	2004-2005	Powerplant's switchgear in Narva region	14,89
3 Construction of Tõnismäe and Elektrijaama110 kV GIS substations, reconstruction of Endla 110 kV substation and Endla-Tõnismäe-Elektrijaama 110 kV cable	2003-2005	City of Tallinn	10,29
4 Extension of Ülejõe 110 kV SS, construction of Emajõe 110 kV GIS substation and Tartu-Emajõe-Ülejõe110 kV power line	2006	City of Tartu	6,69
5 Reconstruction of Eesti powerplant's 330 kV switchgear	2009-2010	Powerplant's switchgear in Narva region	5,5
6 Reconstruction of Aruküla 220 (330)/110 kV substation	2009-2010	Main substation near Tallinn	7,4
7 Tartu-Viljandi-Sindi 330 kV OHL	2010-2013	From Tartu substation to Sindi substation	42,76
FINLAND (FI)			
1 Series compensation of P1	2001	North Finland - South Finland	15
2 Russia-interconnector	2003	State Border - Kymi	20
3 Internal OH-line project	2001	Kymi - Tammisto	20
4 Capas. increase to Sweden	2004	Reconfig. of substations	15
5 Internal OH-line project	2005	Toivila - Vihtavuori	23
6 Internal OH-line projects	2007-2008	Western Finland	75
7 Fenno-Skan 2 HVDC link	2010	South Finland - Central Sweden	110

Major Projects/Investments

Project name	Year built or expected	Location	Real or expected costs (MEUR)
FRANCE (FR)			
1 Vigy - Uchtelfangen	2002		28,1
2 Morbras - Villevaudé	2003		47,9
3 Tavel - Tricastin	2003		76
4 Argoeuves – Chevalet - Gavrelle	2003-2004		81
5 Boutre – Broc Carros	2007		141,1
6 Chaffard – Grande Ile	2007		109,2
7 Vigy - Marlenheim	2008		83,2
GREAT BRITAIN (UK)			
Licensed Transmission Business (1)			
1 London Infrastructure Project (1)	2005 Commissioning	Elstree (North London) to St. Johns Wood (Central London) (3)	
2 North Yorkshire Line/ Teesside Power Connection	2003 Commissioning	Teesside (Northeast England) to Shipton North Yorkshire, England) (3)	
3 Transmission Investment for Renewable Generation (2)	2008 through to 2012	Various locations/routes in Northeast and Northwest England (2) (3)	
National Grid Other Projects			
4 Britned Interconnector	2008 Commissioning	Great Britain - Grain Substation, Southeast England / Netherlands - Maasvlakte, Rotterdam	300/400 (4)
5 North See Interconnector	2010 Commissioning (5)	Great Britain - Hawthorn Pit Substation, Northeast England / Norway - Kvilldal, Southwest Norway	854 (4)

(1) Licensed Transmission Business investment in the transmission system in England and Wales includes over 1500 projects to invest in overhead lines routes, substations etc. The projects detailed in this table represent three of the largest projects from the period April 2000

(2)This project covers several system reinforcements to provide additional transmission capacity to facilitate the increased power transfers that would result from the development of renewable generation in Scotland and off the Scottish coastline. The work detailed here covers transmission works in England and Wales. Additional investment for renewables would be required in Scotland.

(3) Specific financial information on these projects is not published in this form.

(4) Capital costs, excluding financing costs, 2003 prices

(5) In September 2003 the Norwegian ministry unexpectedly turned down an application for the required concession. National Grid and Statnett put the project on hold whilst a project structure and capacity allocation process are explored that would address the Ministry's concerns as well as satisfying the various GB, Norwegian and European licensing and regulatory requirements. The earliest that the link could now be operational is 2010.

GREECE (GR)			
1 Interc. Greece – Italy	2002	Arachthos(Gr.)-Galatina(It.)	300
2 Interc. Zakinthos – Killini	2001	Zakinthos – Killini	29,6
3 Interc. Corfu - Igoumenitsa	2006	Ag.Basilios – Igoumenitsa	20
4 Interc. Attiki – Euboea	2007	N.Makri – Polipotamos	11,8
5 Intrc. East Peloponnese	2005	Argos - Molaoi	12,3

Major Projects/Investments

Project name	Year built or expected	Location	Real or expected costs (MEUR)
HUNGARY (HU)			
1. Sándorfalva – Békéscsaba (HU)	2003	Sándorfalva – Békéscsaba (HU)	33
2. Paks - Pécs (HU)	2004	Paks - Pécs (HU)	30
3. Győr – Szombathely (HU)	2006	Győr – Szombathely (HU)	60
4. Hévíz (HU) – Cirkovce (SL)	2007	Hévíz (HU) – Cirkovce (SL)	-
5. Békéscsaba (HU) – Oradea (RO)	2008	Békéscsaba (HU) – Oradea (RO)	10
6. Sajóivánka (HU) – Rimavska Sobota (SK)	2008	Sajóivánka (HU) – Rimavska Sobota (SK)	20
7. Pécs (HU) – Ernestinovo (CR)	2009	Pécs (HU) – Ernestinovo (CR)	19,4
8. Szombathely (HU) – Hévíz (HU)	2009	Szombathely (HU) – Hévíz (HU)	40
9. Békéscsaba (HU) – Arad (RO)	2010	Békéscsaba (HU) – Arad (RO)	10
10. (Győr) – Szombathely (HU) – Pod.Biskupice (SK)	2010	(Győr) – Szombathely (HU) – Pod.Biskupice (SK)	10
IRELAND (IE)			
1 Cashla-OldStreet 400/220 kV	Sep 2003		38
2 Flagford-Srananagh 220 kV	Oct 2006		64
3 Dublin 220 kV Cables	Jul 2002		30
ITALY (IT)			
1 S.Fiorano – Robbia (CH)	2004		21
2 Piossasco – Grand Ile (FR)	Long term (>2010)		30,6
3 Italy – Austria (Lienz)	Long term (>2010)	Italian bus to be determined	50
4 Udine Ovest – Okroglo (SLO)	2009		28
LATVIA (LV)			
1 330 kV Overhead line	After 2015	Substation Sindi (Estonia) – Substation TEC-2 (Latvia)	48,0

Major Projects/Investments

Project name	Year built or expected	Location	Real or expected costs (MEUR)
LITHUANIA (LT)			
1 Modernisation and upgrading of Vilnius 330/110 kV substation	2005-2007	Vilnius, Lithuania	18,8
2 Modernisation and upgrading of Šiauliai 330/110 kV substation	2006-2007	Šiauliai, Lithuania	9
3 Cross border 400 kV transmission line Alytus – state border and "back to back " station in Alytus substation	2008-2009*	Kruonis - Alytus – Lithuania/Poland State border	143
4 330 kV transmission line Klaipėda - Telšiai	2009-2011	Klaipėda - Telšiai	21
NETHERLANDS (NL)			
1 Zwolle- Eemshaven	1995-1996	Zwolle-Eeemshaven	340
2 Randstad ring	2003-2012	Diemen-Beverwijk-Bleiswijk-Maasvlakte	400
3 Phase shifters	2000-2003	Meeden	35
NORTHERN IRELAND (UK)			
1 Moyle Interconnector	2000		200
2 Interconnector enhancements	2000		20
3 New RoI Interconnector	2000		80/2 *
NORWAY (NO)			
1 NorNed	2007	Feda (NO), Emshaven (NL)	496
2 Klæbu - Viklandet	2004	Trondheim, Sunndalsøra	55
3 Ormen Lange	2006	Sunndalsøra, Fræna	74
4 Skagerrak 4	2010	Kristiansand (NO), Tjele (DK)	142
5 Evje – Holen	2009	Evje, Holen	75
6 Sima - Samnanger	2009	Eidfjord, Kvamskogen	50
7 Ørskog - Aurland	2011	Ørskog, Aurland	120
SERBIA and M. (CS)			
1 SS Sombor 3	2006	2001./2006.	11,4
2 SS Jagodina 4	2006	2001./2006.	11,1
3 SS Beograd 20 + 18 km of 400 kV OHL	2007	2001./2007.	26,7
4 SS Sremska Mitrovica 2	2006	2001./2006.	5,5
5 OHL Nis-Skopje	2009	2004./2009.	30,8
6 OHL Mitrovica-Ugljevik	2006	2001./2006.	4,5
7 OHL Subotica-Sombor	2006	2001./2006.	8,5
8 OHL Sombor-Pecs	2011	2008./2011.	13

* 80 MEUR Project joint funding with ROI

Major Projects/Investments

Project name	Year built or expected	Location	Real or expected costs (MEUR)
SLOVAKIA (SK)			
1 Križovany substation 400 kV	2003/2008	Križovany	48
2 Medzibrod substation 400 kV	2005/2010	Medzibrod	51,3
3 Reconstruction of the 2x400 kV line Lemešany - Kapušany	2011/2013	Lemešany - Kapušany	40
4 Internal 2x400 kV line Medzibrod	2008/2010	Medzibrod	22,5
5 Internal 2x400 kV line Gabčíkovo - Veľký Ďur	2009/2011	Gabčíkovo - Veľký Ďur	30
6 Cross-border 400 kV line Varín - Byczyna	2018/2020	Varín - Byczyna	30
7 Cross-border 2x400 kV line Lemešany - Moldava	2009/2010	Lemešany - Moldava	30
8 Cross-border line 400 kV Stupava - Vienna	2012	Stupava - Vienna	16
9 Cross-border 400 kV line Moldava - Sajoivanka	2009/2010	Moldava - Sajoivanka	22,5
10 Cross-border 400 kV line Veľké Kapušany - UA border	2013	Veľké Kapušany - UA border	6,25
SLOVENIA (SI)			
1 400 kV double circuit OHL (internal backbone link)	2006 start of construction	NPP Krsko – Bericevo (2x)	36,25
2 400 kV double circuit OHL interconnection to Hungarian border	2007 start of construction	Cirkovce (SI) - Hevitz (HU)	37,1
3 400 kV circuit OHL inter-connection to Italian border	2008 start of construction	Okroglo (SI)– Udine Ovest (IT)	38,6
4 Substation Cirkovce	2006	Substation with TR	6

Major Projects/Investments

Project name	Year built or expected	Location	Real or expected costs (MEUR)
SWEDEN (SE)			
1 SwePol Link	2000	Stärnö (Sweden) – Slupsk (Poland)	295 (total cost)
2 Alvesta- Hemsjö 400kV line	2001	Alvesta – Hemsjö	26
3 Borgvik 400 kV Substation	2002	Borgvik	11
4 Hemsjö 400 kV Substation	2003	Hemsjö	11
5 Kontiskan 1	2005	Lindome	28
6 Lindome-Stenkullen 400 kV line	2006	Lindome - Stenkullen	12
7 2 400 kV Substations/year	2006-2012		20 /year
8 Järpströmmen-Nea 400 kV line	2009	Järpstr. (Sweden) – Nea (Norway	38
9 Fenno-Skan 2 HVDC	2010	Finnböle (Sweden) – Rauma (Finland	260 (total cost)
10 Hallsberg-Hurva 400 kV line	2012	Hallsberg - Hurva	150
TURKEY (TR)			
1 Etiler - Alibeyköy OHL Replacement	2006	İstanbul	8,41/11,9
2 Yusufeli HEP - Erzurum OHL	2006	Artvin	6,78/16,45
3 Reserved Transformers-2	2005	Various	7,45/8,5
4 Hisar 380 S/S	2006	Ankara	7,1/10,22
5 National Load Dispatch SCADA Project	2006	Various	6,52/
6 Şanlıurfa - Kızıltepe II OHL	2005	Şanlıurfa	6,52/10,75
7 Horasan - Ağrı OHL	2006	Ağrı	6,2/9

APPENDIX 5

SOURCE OF FINANCING OF SOME MAJOR PROJECTS

The following tables show the source of financing of some major project recently commissioned or scheduled in the near future. The list of projects is a subset of those described in Appendix 4, since in some cases the planning responsible didn't declare the source of project funding.

Note: EU funds refer to Structural and Cohesion funds.

BULGARIA							
Project name	EIB loan	EU funds	TEN-E funds	TSO equity	Bank loans	Other	Total Cost (M€)
1. Interconnection OHTL 400 kV Bulgaria-Macedonia					EBRD 15 M€		15
2. MIS					EBRD 8 M€		8
3. Reconstruction of 400 kV line bay at SS Plovdiv 400/220/110kV and OHTL 400 kV Plovdiv - Karlovo					EBRD 20,7 M€		20,7
4. Modernisation of SCADA/EMS					EBRD 7 M€		7
4. System for distant electric meter reading					EBRD 2 M€		2
5. Rehabilitation of power system substations 220 kV and 400 kV	45						45
6. Development of the telecommunication system	15						15
7. Improvement of the joint operation of the Bulgarian and Greek power system						PHARE 2 M€	2
8. Improvement of the joint operation of the Bulgarian and Romanian power system						PHARE 1,5 M€	3

CZECH REPUBLIC							
Project name	EIB loan	EU funds	TEN-E funds	TSO equity	Bank loans	Other	Total Cost (M€)
1) 2nd line 400 kV SLA-DUR				100 %			3,7
3) Line 400 kV CST-BEZ				50 %	50 %		33,2
4) Line 400 kV KRA-HZI				50 %	50 %		39,2
5) Line 400 kV NOS-PRO				50 %	50 %		44,3

ESTONIA							
Project name	EIB loan	EU funds	TEN-E funds	TSO equity	Bank loans to EE AS	Other (*)	Total Cost (M€)
1. Balti-Kiisa 330 kV OHL				55%	35%	10%	24,67
2. Reconstruction of Balti 330 kV substation				55%	35%	10%	14,89
3. Construction of Tõnismäe and Elektrijaama110 kV GIS substations, reconstruction of Endla 110 kV substation and Endla-Tõnismäe-Elektrijaama 110 kV cable	7%			55%	28%	10%	10,29
4. Extension of Ülejõe 110 kV SS, construction of Emajõe 110 kV GIS substation and Tartu-Emajõe-Ülejõe110 kV power line				55%	35%	10%	6,69
5. Reconstruction of Eesti powerplant's 330 kV switchgear				55%	35%	10%	5,50
6. Reconstruction of Aruküla 220 (330)/110 kV substation				55%	35%	10%	7,40
7. Tartu-Viljandi-Sindi 330 kV OHL				55%	35%	10%	42,76

(*) Shareholder loan from EE AS

FINLAND							
Project name	EIB loan	EU funds	TEN-E funds	TSO equity	Bank loans to EE AS	Other (*)	Total Cost (M€)
1 Series compensation P1 (**)	45%					55%	15
2 Russia-interconnector	45%					55%	20
3 Internal OH-line project	45%					55%	20
4 Capas. increase to Sweden						100%	15
5 Internal OH-line project						100%	23
6 Internal OH-line projects						100%	75
7 Fenno-Skan 2 HVDC link						100%	110

(*) Cash flow + debt
(**) Corridor North-Finland / South Finland

FRANCE							
Project name	EIB loan	EU funds	TEN-E funds	TSO equity	Bank loans	Other	Total Cost (M€)
1 Historic Investments				100%			
2 Future Investments				100%			

GREAT BRITAIN (UK)							
Project name	EIB loan	EU funds	TEN-E funds	TSO equity	Bank loans	Other	Total Cost (M€)
Licensed Transmission Business Projects (Note 1)							
1 London Infrastructure Project	Yes	No		No	No	No	143
2 North Yorkshire Line / Teesside Power Connection	Yes	No	No	No	No	No	21
3 Transmission Investment for Renewable Generation (Note 2)	-	-	-	-	-	-	
National Grid other Projects							
4 Britned Interconnector (Note 3)	Yes	No	Yes	No	Yes	Yes (Note 6)	300/400
5 North Sea Interconnector (Note 4)	22%		0.7% (Note 5)		77.3%	22% (Note 6&7)	854

Note 1 - EIB project loans have been used to help finance parts of National Grid investment programme. The total level of EIB loans is £400m (580 M€ at 1.45 € per GBP).

Note 2 - Financing for this project has yet to be agreed.

Note 3 - The BritNed project (a joint venture between National Grid International Ltd and Tennet) has not finalised its financing arrangements but anticipates it including the elements to which "Yes" was answered on the questionnaire.
The project has a total of £3.6 Million TEN-E development phase funds either paid or allocated.

Note 4 - The percentages quoted reflect the funding arrangements for the whole project including finance costs just prior to September 2003 when the project was put on hold. The project in future could well have different funding arrangements.

Note 5 – TEN-E development phase support that was planned to be capitalised into the cost of the project at the time it was due to have gone ahead.

Note 6 - The National Grid component of equity input was completely separate from the Licensed Transmission Business of National Grid, which is subject to licence conditions in relation to keeping these issues separate.

Note 7 - The shareholder funding (equity) was to be provided principally in the form of an EIB loan to the National Grid/Statnett joint venture entity. EIB funding of €240M to the sponsors was anticipated.

HUNGARY							
Project name	EIB loan	EU funds	TEN-E funds	TSO equity	Bank loans	Other	Total Cost (M€)
1 Paks – Pécs 400 kV line					66.4%		30

ITALY							
Project name	EIB loan	EU funds	TEN-E funds	TSO equity	Bank loans	Other	Total Cost (M€)
1 S.Fiorano (IT)-Robbia (CH) 400 kV line			<1%%				21

LITHUANIA							
Project name	**EIB loan**	**EU funds**	**TEN-E funds**	**TSO equity**	**Bank loans**	**Other**	**Total Cost (M€)**
1. Modernisation and upgrading of Vilnius 330/110 kV substation				50%	50%		18.8
2. Modernisation and upgrading of Šiauliai 330/110 kV substation				50%	50%		9
3. Cross border 400 kV transmission line Alytus – state border and "back to back " station in Alytus substation		60%		25%	10%	5%	143
4. 330 kV transmission line Klaipėda - Telšiai				50%	50%		21

NETHERLANDS							
Project name	**EIB loan**	**EU funds**	**TEN-E funds**	**TSO equity**	**Bank loans**	**Other**	**Total Cost (M€)**
1Zwolle-Eeemshaven					100 %		340
2 Randstad Ring	50 %				50 %		400
3Phase shifters						100 %	35

NORTHERN IRELAND (UK)							
Project name	**EIB loan**	**EU funds**	**TEN-E funds**	**TSO equity**	**Bank loans**	**Other**	**Total Cost (M€)**
1 Moyle Interconnector		30%		70%			200
2 Interconnector enhancements		30%		35%		35%	20

NORWAY							
Project name	**EIB loan**	**EU funds**	**TEN-E funds**	**TSO equity**	**Bank loans**	**Other**	**Total Cost (M€)**
1 NorNed	50 %					50 %	496
2 Klæbu - Viklandet						100 %	55
3 Ormen Lange						100 %	74
4 Skagerrak 4						100 %	142
5 Evje – Holen						100 %	75
6 Sima - Samnanger						100 %	50
7 Ørskog - Aurland						100 %	120

SERBIA-MONTENEGRO							
Project name	EIB loan	EU funds	TEN-E funds	TSO equity	Bank loans	Other	Total Cost (M€)
1 SS Sombor 3					100%		11,4
2 SS Jagodina 4					100%		11,1
3 SS Beograd 20 + OHL					100%		26,7
4 SS Sremska Mitrovica 2					100%		5,5
5 OHL Nis-Skopje		80%		20%			30,8
6 OHL Mitrovica-Ugljevik				50%	50%		4,5
7 OHL Subotica-Sombor					100%		8,5
8 OHL Sombor-Pecs							13

SLOVAKIA							
Project name	EIB loan	EU funds	TEN-E funds	TSO equity	Bank loans	Other (*)	Total Cost (M€)
1 Križovany substation 400 kV						50%	48

(*) BIDSF - Bohunice International Decommissioning Support Fund

SWEDEN							
Project name	EIB loan	EU funds	TEN-E funds	TSO equity	Bank loans	Other	Total Cost (M€)
1 Historic Investments				100%			
2 Future Investments				100%			

TURKEY							
Project name	EIB loan	EU funds	TEN-E funds	TSO equity	Bank loans	Other	Total Cost (M€)
1.Etiler - Alibeyköy OHL Replacement						100%	8,41/11,9
2. Yusufeli HEP - Erzurum OHL	7%	70%				23%	6,78/16,45
3. Reserved Transformers-2						100%	7,45/8,5
4. Hisar 380 S/S	5%	50%				45%	7,1/10,22
5.National Load Dispatch SCADA Project	5,7%	72%				22,3%	6,52/
6. Şanlıurfa - Kızıltepe II OHL	71%	7%				23%	6,52/10,75
7. Horasan - Ağrı OHL	6,2%	62%				31,8%	6,2/9