

<p><b><u>CORESO Engineers</u></b></p> <p><b><u>North :</u></b> KROMLIDIS Stylianos</p> <p><b><u>South :</u></b> SCHÜLKE Arnaud</p>	<p><b>Day Ahead report for</b></p> <p><b>10 February 2018</b></p>
<p><b>Security Levels:</b></p> <p><b>CWE: Some constraints detected manageable with classical remedial actions.</b></p> <p><b>CEE: No critical constraint detected.</b></p> <p><b>CSE: Critical constraints detected on the CH-IT border. To avoid a pentilateral procedure, coordinated remedial actions are required in Swissgrid (2 nodes in Sils 380 kV) and Eles (increase SI-IT flow to 1300 MW).</b></p>	

#### **Key overall conditions**

#### **Outages table**

#### **Exchange program forecasts**

#### **ELIA expected flows & PSTs tap position**

#### **CEE Renewable Power Generation & Forecast**

#### **CWE, CSE & SWE Renewable Power Forecast (D-1 and D-2)**

#### **RTE flows on cross-border lines**

#### **N state flows at 10:30 and 19:30**

#### **Special topologies at 10:30 and 19:30**

#### **North analyses results**

Constraints on Elia, RTE (North) and 50HzT 400kV grids and tie-lines

Constraints greater than 100% on NL + Amprion 400kV grids and greater than 120% on DE, CZ, PL and SK 400kV grids

Constraints on ELIA 220/150kV grid at 10:30

50HzT DC loopflows sensitivity

#### **South analyses results**

#### **N state flows Off-Peak & Peak**

#### **Special topologies**

Sensitivity coefficients for the Pentilateral instruction

Constraints on APG, Eles, RTE (South), Swissgrid and Terna 400kV grids and tie-lines

Final PSTs settings

#### **Conclusion**

## Key overall conditions

Load & Generation margin forecast			Main generating units connected to the grid in DACF					
ELIA			Elia	Doel	Pmax (MW)	1000	3	3900
						450	2	
Peak load [MW]	9500	18:00		Tihange		1000	2	2900
						450	2	
Generation Margin	Sufficient			Coo		230	3	1170
						160	3	
			50HzT	Rostock	Pmax (MW)	530	1	530
				Janschwalde		500	6	3000
				Boxberg		500	2	2800
						900	2	
				Schw. Pumpe		800	2	1600
				Lippendorf		920	2	1840
RTE			RTE	Gravelines	Pmax (MW)	900	6	5400
Peak load [MW]	78000	13:00		Chooz		1500	2	3000
Generation Margin	Sufficient			Cattenom		1300	4	5200
				Fessenheim		900	1	900
NATIONAL GRID (UK time)				Penly		1300	2	2600
Peak load [MW]	42200	18:00		Paluel		1300	3	3900
Generation Margin	Sufficient			Nogent s/ Seine		1300	2	2600
				Bugey		900	4	3600
TERNA				St Alban		1300	2	2600
Peak load [MW]	47124	18:30		Cruas		900	4	3600
Generation Margin	Sufficient			Tricastin		900	3	2700

### Generation margin legend:

**Green:** Sufficient margin available. No risk for need of inter-TSO solicitation due to margin issues.

**Orange:** Tight margin available. Low risk for need of inter-TSO solicitation due to margin issues.

**Red:** Insufficient margin available. High risk for need of inter-TSO solicitation due to margin issues.

### Comments:

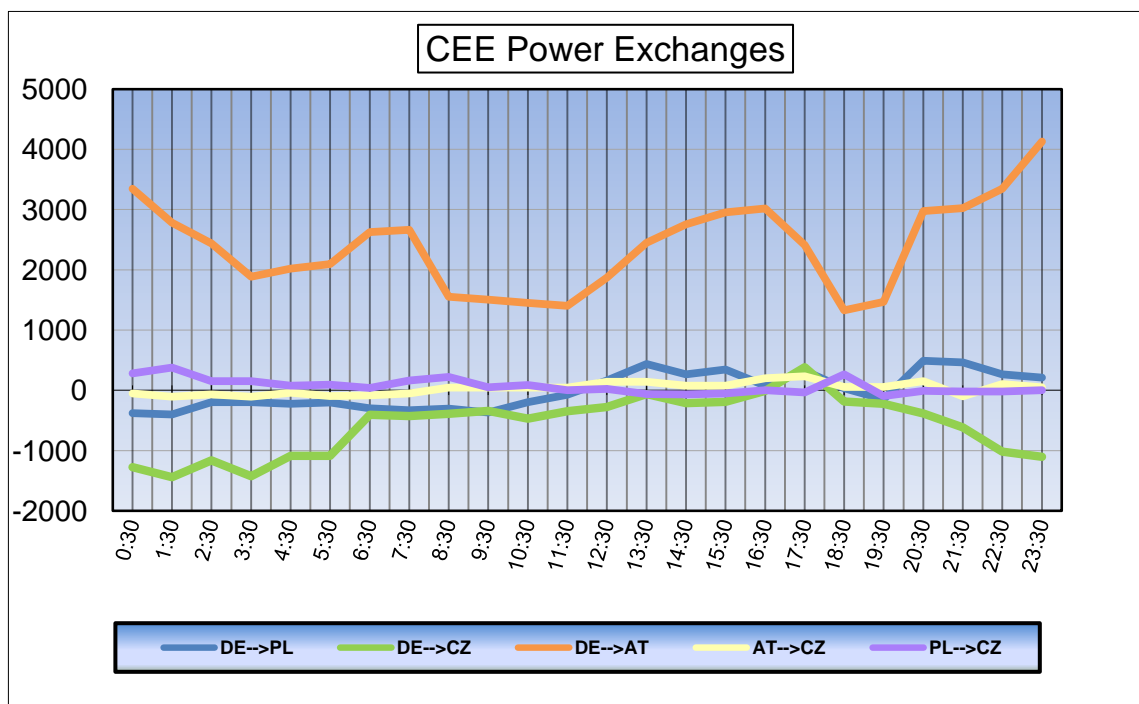
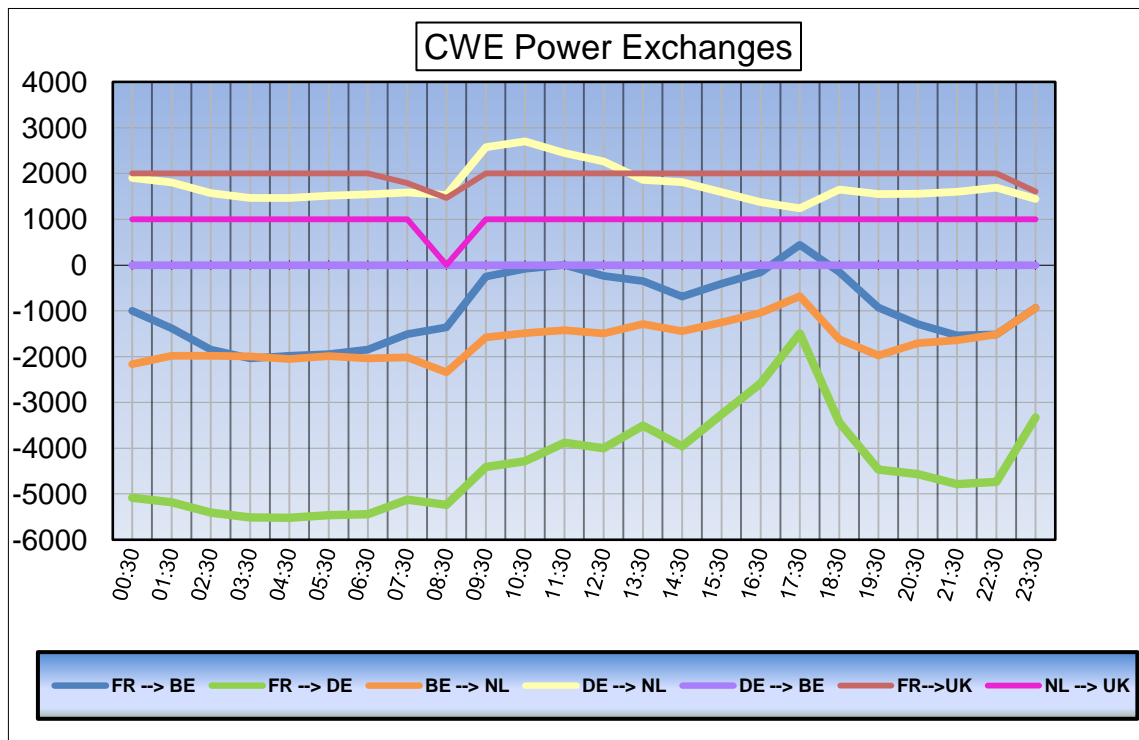
**CWE / CEE** Model improvement from 20:00 to 24:00 at Meeden PSTs using tap -1, instead of tap 0.

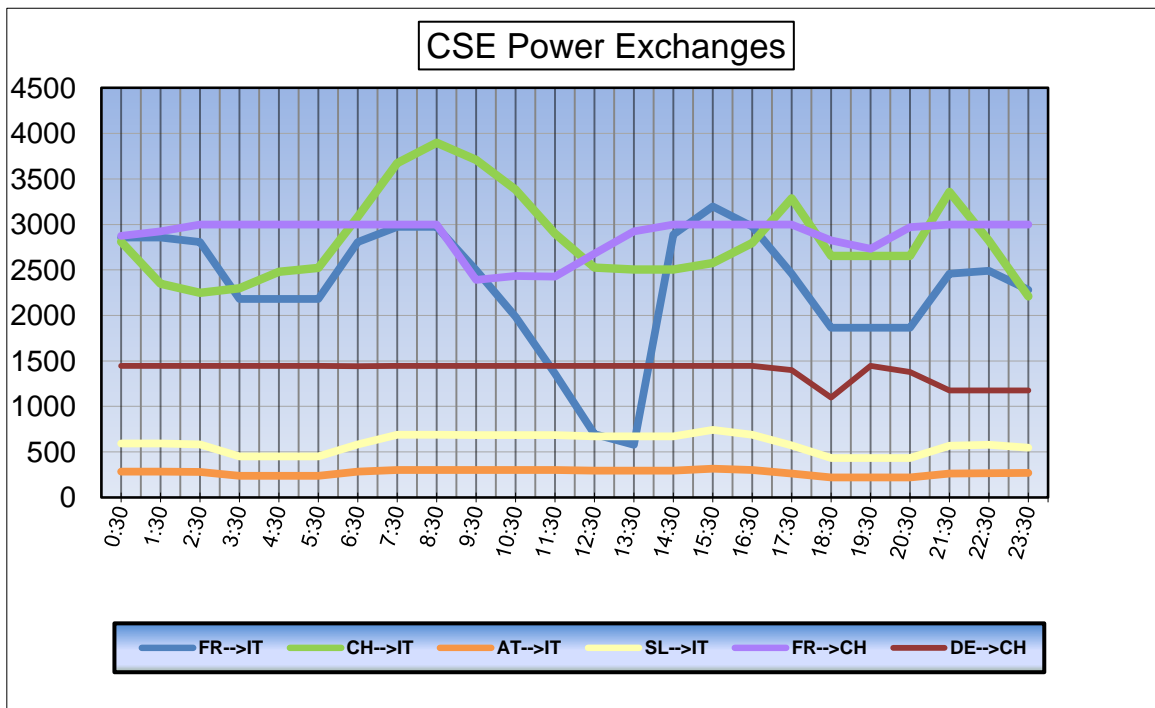
**CSE** **Swissgrid:** Mendrisio PST is not modelled correctly: flow regulation is not possible (but was simulated manually for the critical constraints)

## Outages table

OUTAGES						
Owner	Type of element	Line name	start	end	Comments	
50HzT	Hydro.Gen	MARKERSBACH _ Unit D 400 kV	28/09/2017	27/04/2018	160 MW	
50HzT	Line	EULA _ Wolkramhausen 357 220 kV	04/02/2018	11/02/2018		
50HzT	Line	HAMBURG Nord _ BRUNSBUTTEL 951 400 kV	04/02/2018	11/02/2018		
50HzT	Line	RAGOW _ THYROW 522 400 kV	05/02/2018	11/02/2018		
50HzT	Line	REMPTEENDORF _ VIESELBACH 416 400 kV	05/02/2018	11/02/2018	permanently	
50HzT / PSE	Line	KRAJNIK _ VIERRADEN 508 225 kV	22/06/2017	31/05/2018	long term outage	
CEPS	Line	KOCIN _ REPORYJE 1 400 kV	29/01/2018	14/02/2018	permanently	
CEPS / PSE	Line	BUJAKOW _ LISKOVEC 220 kV	10/02/2018	10/02/2018		
CEPS / SEPS	Line	NOSOVICE _ VARIN 404 400 kV	15/01/2018	02/03/2018	permanently	
CREOS	Line	BERTRANGE _ SCHIFFLANGE West 220 kV	08/01/2018	02/03/2018		
ELES / HOPS	Line	KRSKO _ TUMBRI 1 400 kV	22/01/2018	02/03/2018	permanently	
ELES / HOPS	Line	KRSKO _ TUMBRI 2 400 kV	08/02/2018	11/02/2018	daily	
ELIA	Line	GEZELLE _ STEVIN 112 400 kV	19/09/2017	02/03/2018	permanently	
ELIA	Nuc.Gen	DOEL _ Unit 3 (1000MW) 400 kV	23/09/2017	16/04/2018	forced outage	
PSE	Line	LESNIOW _ MIKULOWA 220 kV	09/02/2018	11/02/2018	Permanently	
PSE	Line	POLANIEC _ TARNOW 400 kV	05/02/2018	10/02/2018	daily	
RTE	Line	CHEVALET _ ARGOEUVES 1 380 kV	24/01/2018	23/02/2018		
RTE	Line	GENISSIAT _ VIELMOULIN 1 400 kV	29/01/2018	23/02/2018		
RTE	Nuc.Gen	CRUAS _ Unit 2 (900MW) 400 kV	02/12/2017	30/03/2018		
RTE	Nuc.Gen	FESSENHEIM _ Unit 2 (900MW) 400 kV	01/01/2017	15/03/2018		
RTE	Nuc.Gen	PALUEL _ Unit 2 (1300MW) 400 kV	01/08/2015	15/04/2018		
S.GRID	Line	CHAMOSON _ MUHLEBERG "Sanetsch 2" 220 kV	24/10/2017	30/03/2018		
S.GRID	Line	CHATELARD _ NANT DE DRANCE 400 kV	16/01/2018	27/04/2018		
S.GRID	Line	LIMMERN _ TIERFEHD 1 400 kV	28/01/2018	08/06/2018		
S.GRID	Nuc.Gen	BEZNAU _ BEZNAU G11 220 kV	13/03/2015	28/02/2018	182 MW	
S.GRID	Nuc.Gen	BEZNAU _ BEZNAU G12 220 kV	13/03/2015	28/02/2018	182 MW	
S.GRID	Transformer	BASSECOURT _ Transformer 400 kV	13/12/2017	31/03/2018	Trfo 32	
TENNET DE	Generation	KUHTAI _ Unit 1 220 kV	02/10/2017	31/01/2019	142 MW	
TENNET DE	Generation	KUHTAI _ Unit 2 220 kV	01/01/2017	01/10/2019	142 MW	
TENNET DE	Generation	SILZ _ 2 220 kV	01/10/2017	01/10/2019	250 MW	
TENNET DE	Generation	SILZ _ Unit M1 TIWAG 220 kV	01/10/2017	31/12/2018	250 MW	
TENNET DE	Hydro.Gen	WALDECK _ UNIT 5 400 kV	15/01/2018	30/11/2018	240 MW	
TENNET DE	Hydro.Gen	WALDECK _ UNIT 6 400 kV	15/01/2018	14/02/2018	240 MW	
TENNET DE	Line	TWISTETAL _ BORKEN 3 400 kV	16/05/2017	11/10/2018		
TENNET NL	Line	ENS _ ZWOLLE WT 400 kV	10/02/2018	16/02/2018		
TransnetBW	Line	BUNZWANGEN _ LAICHINGEN Grün 380 kV	01/01/2018	24/02/2018		
TransnetBW	Line	BUNZWANGEN _ LAICHINGEN Grün 380 kV	05/02/2018	24/02/2018		

## Exchange program forecasts





## ELIA expected flows & PSTs tap position

		Node 1	Node 2	Order	00:30	02:30	03:30	07:30	09:30	10:30	11:30	12:30	17:30	19:30	20:30	23:30
BE	FR	ACHENE	LONNY	380.19	628	740	769	676	397	377	381	450	183	552	628	488
BE	FR	AUBANGE	MONT ST MARTIN	220.51	100	169	169	184	76	58	48	71	11	133	172	123
BE	FR	AUBANGE	MOULAIN	220.51	78	146	149	160	55	34	29	49	-4	111	144	105
BE	FR	AVELGEM	AVELIN	380.80	731	872	864	792	447	426	412	523	11	698	727	444
BE	FR	AVELGEM	MASTAING	380.79	90	215	248	141	-98	-116	-112	-37	-204	81	127	31
BE	FR	MONCEAU	CHOOZ	220.48	-42	13	33	-16	-101	-107	-102	-83	-121	-48	-18	-28
BE	NL	VAN EYCK 1	MAASBRACHT	380.27	-750	-633	-602	-608	-626	-650	-640	-654	-397	-653	-609	-459
BE	NL	VAN EYCK 2	MAASBRACHT	380.28	-607	-510	-499	-435	-277	-297	-310	-375	-13	-497	-445	-208
BE	NL	ZANDVLIET	BORSSELE	380.29	-849	-758	-742	-892	-769	-741	-746	-757	-592	-875	-661	-449
BE	NL	ZANDVLIET	GEERTRUIDENBERG	380.30	-428	-320	-292	-331	-224	-214	-223	-270	13	-411	-346	-83
BE	LU	BELVAL	SCHIFFLANGE	220.511	-130	-77	-59	-177	-211	-187	-169	-178	-10	-139	-145	27

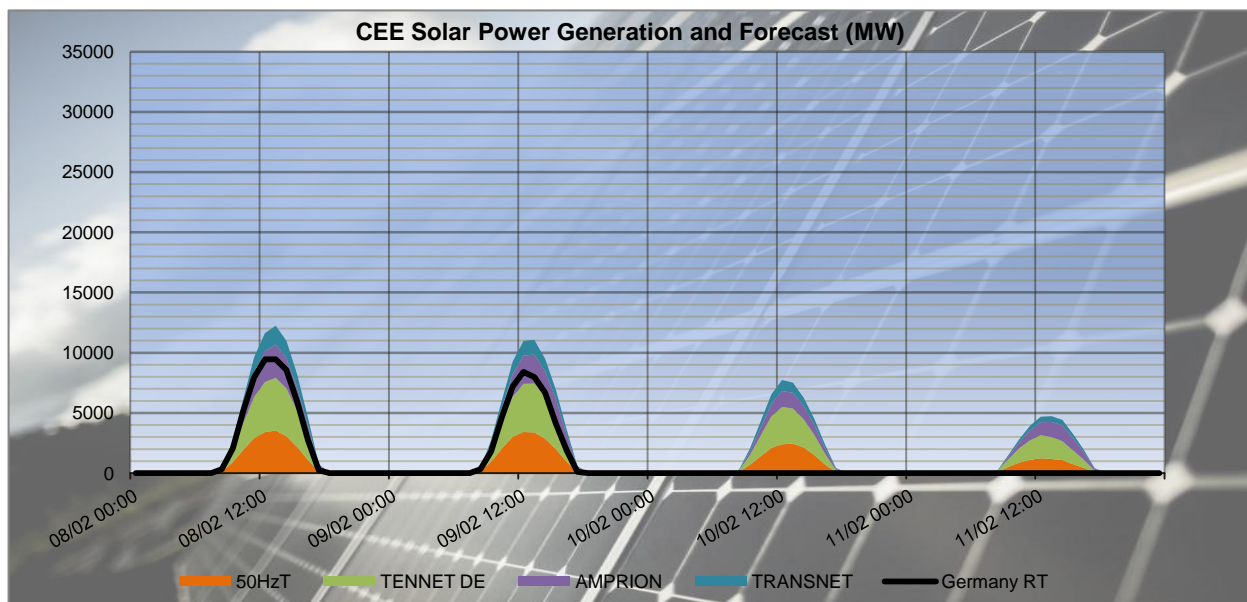
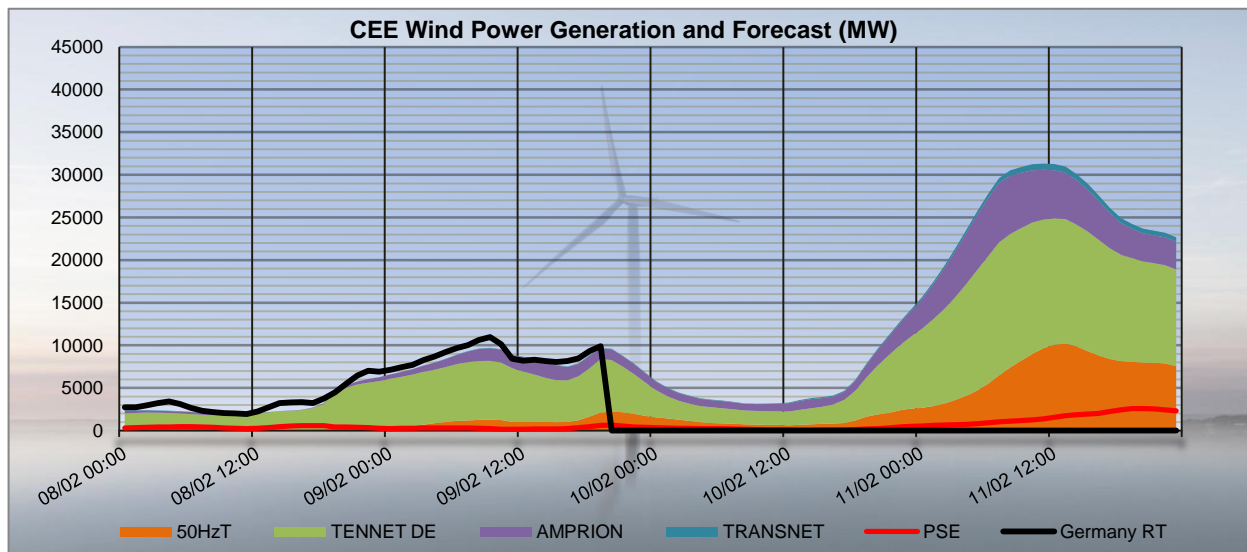
BE	FR	TOTAL		1585	2155	2232	1937	776	672	656	973	-124	1527	1780	1163
BE	NL	TOTAL		-2634	-2221	-2135	-2266	-1896	-1902	-1919	-2056	-989	-2436	-2061	-1199
BE	LU	TOTAL		-130	-77	-59	-177	-211	-187	-169	-178	-10	-139	-145	27
TOTAL BELGIAN IMPORT/EXPORT				-1179	-143	38	-506	-1331	-1417	-1432	-1261	-1123	-1048	-426	-9

PST taps in DACF	Zandvliet 1	12	12	12	12	12	12	12	12	12	12	12	12	12	12
	Zandvliet 2	12	12	12	12	12	12	12	12	12	12	12	12	12	12
	Van Eyck 1	15	15	15	15	15	15	15	15	15	15	15	15	15	15
	Van Eyck 2	15	15	15	15	15	15	15	15	15	15	15	15	15	15
	Average	14	14	14	14	14	14	14	14	14	14	14	14	14	14

CREOS PST in DACF	Schiffange	17	17	17	17	17	17	17	17	17	17	17	17	17	17
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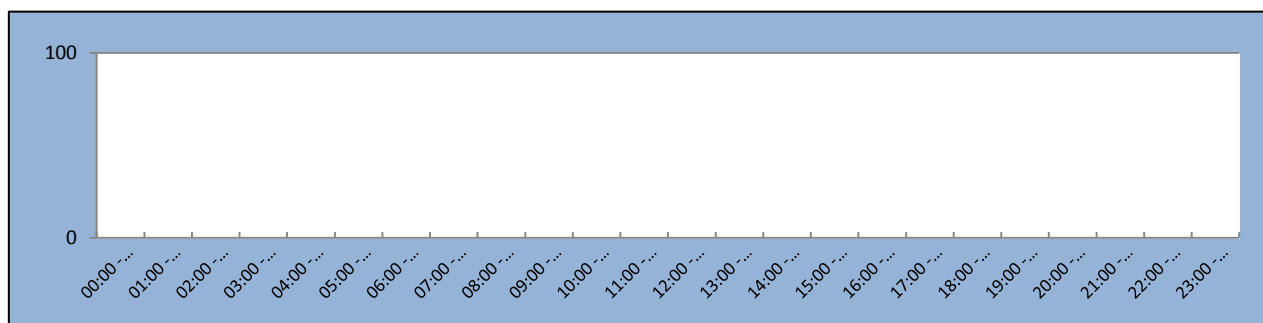
Proposal for real time after D-1 studies																								
Timestamps	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
PSTs																								
Zandvliet PST 1	[1;35]	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Zandvliet PST 2	[1;35]	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Van Eyck PST 1	[1;35]	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Van Eyck PST 2	[1;35]	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Schiffange PST 1	[1;35]	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17

## CEE Renewable Power Generation & Forecast

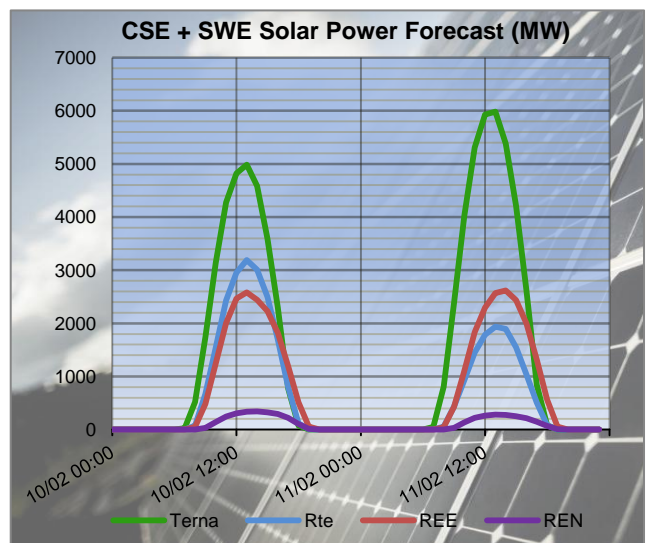
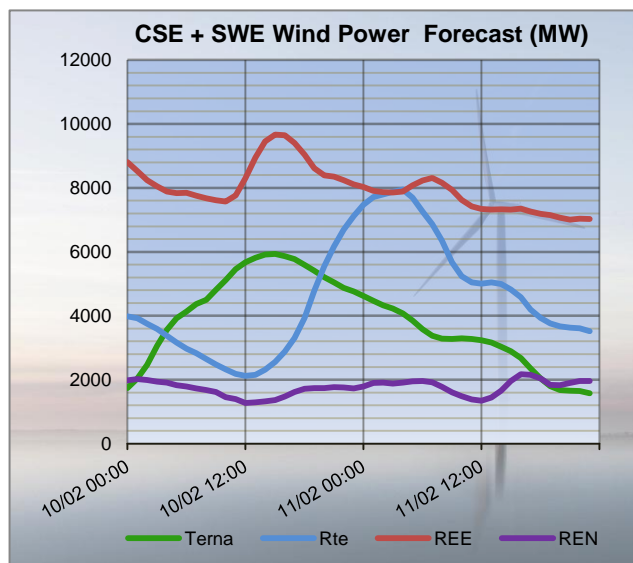
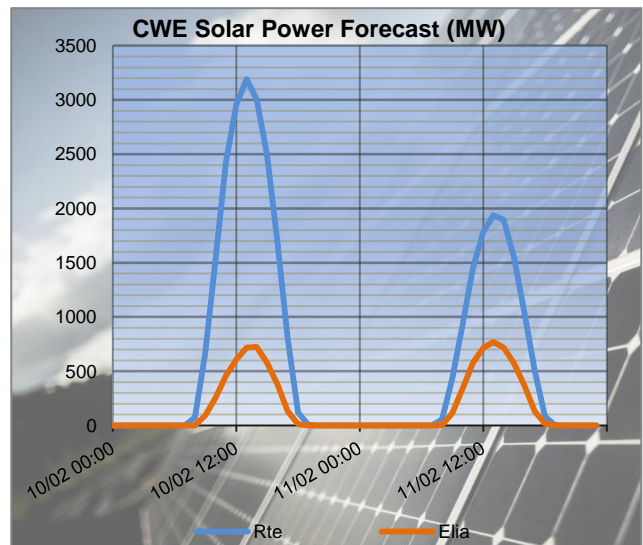
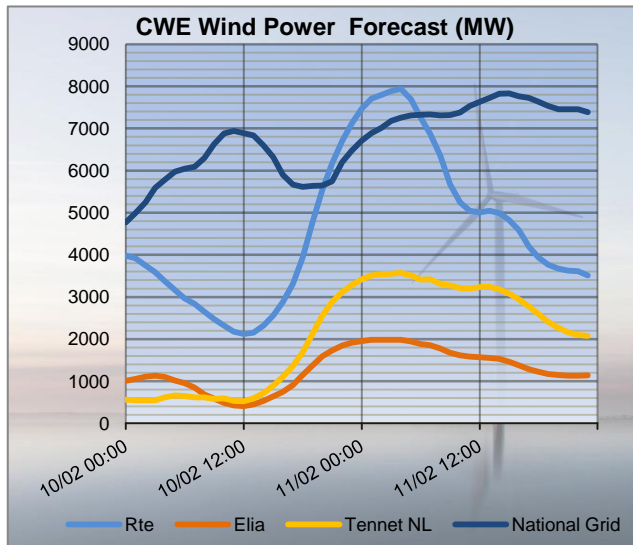


The charts above show the wind and solar generation forecasts for the TSOs in CEE (most significant) from D+1 until D-2 and the realised generation in Germany in real time. Source: Meteologica and 50HzT (RT)

## 50HzT Preventive Redispatch



## CWE, CSE & SWE Renewable Power Forecast (D-1 and D-2)



The charts above show the latest wind and solar generation forecasts for D-1 and D-2 for all the European TSOs in CWE, CSE and SWE with a significant installed capacity. Source: Meteologica



## RTE flows on cross-border lines

With last provided tap position on Belgian PSTs:

				03:30			07:30			10:30			12:30		
		Node 1	Node 2	DACF	Merge	Delta	DACF	Merge	Delta	DACF	Merge	Delta	DACF	Merge	Delta
FR	BE	LONNY	ACHENE	-742	-769	-27	-639	-676	-37	-276	-377	-101	-380	-450	-70
FR	BE	MONT ST MARTIN	AUBANGE	-160	-169	-9	-165	-184	-19	-22	-58	-36	-38	-71	-33
FR	BE	MOULAIN	AUBANGE	-141	-149	-8	-142	-160	-18	0	-34	-34	-18	-49	-31
FR	BE	AVELIN	AVELGEM	-884	-864	20	-818	-792	26	-494	-426	68	-579	-523	56
FR	BE	MASTAING	AVELGEM	-240	-248	-8	-145	-141	4	89	116	27	15	37	22
FR	BE	CHOOZ	MONCEAU	-19	-33	-14	31	16	-15	122	107	-15	100	83	-17
FR	DE	MUHLBACH	EICHSTETTEN	-294	-104	190	-192	-138	54	-430	-283	147	-404	-293	111
FR	DE	VOGELGRUN	EICHSTETTEN	-224	-129	95	-171	-122	49	-146	-87	59	-131	-90	41
FR	DE	ST AVOLD	ENSDORF	0	0	0	0	0	0	0	0	0	0	0	0
FR	DE	VIGY	ENSDORF 1	-453	-219	234	-387	-243	144	-272	-139	133	-269	-177	92
FR	DE	VIGY	ENSDORF 2	-584	-308	276	-410	-237	173	-336	-171	165	-327	-208	119

				17:30			19:30			23:30		
		Node 1	Node 2	DACF	Merge	Delta	DACF	Merge	Delta	DACF	Merge	Delta
FR	BE	LONNY	ACHENE	-178	-183	-5	-548	-552	-4	-384	-488	-104
FR	BE	MONT ST MARTIN	AUBANGE	6	-11	-17	-120	-133	-13	-94	-123	-29
FR	BE	MOULAIN	AUBANGE	20	4	-16	-98	-111	-13	-78	-105	-27
FR	BE	AVELIN	AVELGEM	-36	-11	25	-667	-698	-31	-415	-444	-29
FR	BE	MASTAING	AVELGEM	203	204	1	-47	-81	-34	-3	-31	-28
FR	BE	CHOOZ	MONCEAU	109	121	12	64	48	-16	52	28	-24
FR	DE	MUHLBACH	EICHSTETTEN	239	251	12	-230	-121	109	66	283	217
FR	DE	VOGELGRUN	EICHSTETTEN	-22	-15	7	-151	-95	56	-131	-45	86
FR	DE	ST AVOLD	ENSDORF	0	0	0	0	0	0	0	0	0
FR	DE	VIGY	ENSDORF 1	241	264	23	-289	-165	124	-71	68	139
FR	DE	VIGY	ENSDORF 2	282	327	45	-326	-170	156	-125	47	172

				03:30			07:30			10:30			12:30		
		Node 1	Node 2	DACF	Merge	Delta	DACF	Merge	Delta	DACF	Merge	Delta	DACF	Merge	Delta
FR	CH	SIERENTZ	ASPHARD	19	113	94	15	81	66	-157	-52	105	-168	-50	118
FR	CH	MAMBELIN	BASSECOURT	-397	-291	106	-404	-318	86	-387	-301	86	-373	-301	72
FR	CH	SIERENTZ	BASSECOURT	778	710	-68	651	647	-4	497	466	-31	493	466	-27
FR	CH	BOIS TOLLOT	ROMANEL	-14	-203	-189	-2	-205	-203	-29	-204	-175	-22	-191	-169
FR	CH	SIERENTZ	LAUFENBURG	57	93	36	54	92	38	-139	-82	57	-159	-92	67
FR	CH	CORNIER	RIDDES	-149	-86	63	-112	-64	48	-109	-54	55	-104	-46	58
FR	CH	CORNIER	ST TRIPHON	-177	-141	36	-151	-113	38	-128	-76	52	-114	-64	50
FR	CH	PRESSY	VALLORCINES	-316	-264	52	-261	-219	42	-256	-179	77	-260	-182	78
FR	CH	BOIS TOLLOT	VERBOIS	138	184	46	116	170	54	135	186	51	154	202	48
FR	CH	GENISSIAT	VERBOIS	31	13	-18	48	35	-13	50	42	-8	58	50	-8
FR	CH	GENISSIAT	VERBOIS	31	13	-18	48	35	-13	50	42	-8	58	50	-8
FR	IT	ALBERTVILLE	RONDISSONE	471	181	-290	703	557	-146	639	500	-139	434	328	-106
FR	IT	ALBERTVILLE	RONDISSONE	472	-52	-524	766	585	-181	677	480	-197	464	317	-147
FR	IT	MENTON	CAMPOROSSO	252	116	-136	145	141	-4	151	69	-82	147	21	-126
FR	IT	VILLARODIN	VENAUS	-27	155	182	530	512	-18	465	492	27	167	285	118

				17:30			19:30			23:30		
		Node 1	Node 2	DACF	Merge	Delta	DACF	Merge	Delta	DACF	Merge	Delta
FR	CH	SIERENTZ	ASPHARD	166	268	102	-69	-17	52	113	117	4
FR	CH	MAMBELIN	BASSECOURT	-130	-90	40	-355	-323	32	-292	-239	53
FR	CH	SIERENTZ	BASSECOURT	513	503	-10	601	551	-50	716	658	-58
FR	CH	BOIS TOLLOT	ROMANEL	12	-46	-58	-228	-218	10	26	-178	-204
FR	CH	SIERENTZ	LAUFENBURG	118	194	76	-58	3	61	148	213	65
FR	CH	CORNIER	RIDDES	-76	14	90	-159	-61	98	-132	-84	48
FR	CH	CORNIER	ST TRIPHON	-69	-15	54	-149	-83	66	-151	-131	20
FR	CH	PRESSY	VALLORCINES	-247	-154	93	-300	-194	106	-275	-244	31
FR	CH	BOIS TOLLOT	VERBOIS	197	199	2	185	183	-2	143	189	46
FR	CH	GENISSIAT	VERBOIS	124	113	-11	65	59	-6	69	51	-18
FR	CH	GENISSIAT	VERBOIS	124	113	-11	65	59	-6	69	51	-18
FR	IT	ALBERTVILLE	RONDISSONE	777	709	-68	513	397	-116	540	448	-92
FR	IT	ALBERTVILLE	RONDISSONE	825	729	-96	560	382	-178	558	395	-163
FR	IT	MENTON	CAMPOROSSO	144	142	-2	145	31	-114	152	152	0
FR	IT	VILLARODIN	VENAUS	613	692	79	332	427	95	279	344	65

## N state flows at 10:30 and 19:30

The I<sub>max</sub> and load values in the table below are extracted from the merged TSOs' DACF.

TSO	Line (380 kV)	10:30		19:30	
		I <sub>max</sub> (A)	% of I <sub>max</sub>	I <sub>max</sub> (A)	% of I <sub>max</sub>
ELIA	Champion - Gramme (32)	2448	43	2448	35
	Doel - Mercator (51)	2239	39	2239	44
	Doel - Mercator (52)	2239	39	2239	44
	Doel - Mercator (54)	2448	39	2448	44
	Doel - Zandvliet (25)	2349	23	2349	32
	Mercator - Horta (73)	2569	45	2569	47
	Courcelles - Gramme (31)	2349	50	2349	42
	Mercator - Rodenhuize/Horta (74)	2342	52	2349	53
RTE	Attaques - Warande 2	3780	61	3780	60
	Avelin - Gavrelle	2622	58	2622	63
	Avelin - Warande	3458	4	3458	3
	Lonny - Seuil	4149	28	4149	30
	Mandarins - Warande 1	3540	61	3540	60
	Muhlbach - Scheer	2598	12	2598	21
	Revigny - Vigy	2596	49	2596	48
	Warande - Weppes	3458	10	3458	9

X < 50 % of I<sub>max</sub>
 50 ≤ X < 75 % of I<sub>max</sub>
 X ≥ 75 % of I<sub>max</sub>

TSO	Voltage	Line (380 kV)	10:30		19:30	
			I <sub>max</sub> (A)	% of I <sub>max</sub>	I <sub>max</sub> (A)	% of I <sub>max</sub>
50 HzT	380 kV	Eisenach - Mecklar (450-2)	2520	28	2520	15
		Hagenwerder - Mikulowa (567)	2520	17	2520	23
		Hagenwerder - Mikulowa (568)	2520	17	2520	23
		Remptendorf - Redwitz (413)	3572	35	3551	40
		Remptendorf - Redwitz (414)	3572	35	3551	40
		Röhrsdorf - Hradec (445)	2520	16	2520	21
		Röhrsdorf - Hradec (446)	2520	16	2520	21
		Vieselbach - Mecklar (449-1)	2520	30	2520	18
		Wolmirstedt - Helmstedt (491-1)	2400	6	2400	9
		Wolmirstedt - Helmstedt (492-2)	2400	6	2400	9
	220 kV	Vierraden - Krajnik (507)	1370	0	1370	0
		Vierraden - Krajnik (508)	1370	0	1370	0

X < 50 % of I<sub>max</sub>
 50 ≤ X < 75 % of I<sub>max</sub>
 X ≥ 75 % of I<sub>max</sub>

## Special topologies at 10:30 and 19:30

Nodes in North area				
			10:30	19:30
380 kV	Elia	Doel	1	1
		Avelgem	1	1
	Rte	Warande	1	1
		Cergy	2	2
		Terrier	1	1
		Plessis Gassot	1	1
		Mery/Seine	2	2
		Muhlbach	1	1
		Vigy	2	2
	Transnet bw	Eichstetten	1	1
	Amprion	Uchtelfangen	1	1
	Tennet DE	Redwitz	1	1
	50 HzT	Remptendorf	1	1
		Wolmirstedt	1	1
	CEPS	Hradec Vychod	1	1
220 kV	50 HzT	Pasewalk	1	1

## North analyses results

Security analyses have been performed for 24 timestamps.

All remedial actions have been agreed with concerned TSO during the day ahead process.

### Constraints on Elia, RTE (North) and 50HzT 400kV grids and tie-lines

TSO	Validity	Contingency				Constraint					Timestamps of max
		U (kV)	Substation 1	Substation 2	Code	Overload	U (kV)	Substation 1	Substation 2	Code	
Rte	00:30-14:30 & 18:30-22:30	380	Attaques	Warande	2	112%	380	Mandarins	Warande	1	06:30
		<b>Curative action</b> : 2-nodes topology in Warande 380 kV => 77 % remaining.									

### Constraints greater than 100% on NL + Amprion 400kV grids and greater than 120% on DE, CZ, PL and SK 400kV grids

TSO	Validity	Contingency				Constraint					Timestamps of max
		U (kV)	Substation 1	Substation 2	Code	Overload	U (kV)	Substation 1	Substation 2	Code	
No constraint detected											

### Constraints on ELIA 220/150kV grid at 10:30

Contingency				Constraint					Comments
U (kV)	Substation 1	Substation 2	Code	Overload	U (kV)	Substation 1	Substation 2	Code	
380	Mercator	Busbar	1	116%	150	Lillo	Zandvliet	117	validity: all day max (124%) at 18:30

## 50HzT DC loopflows sensitivity

Vierraden-Krajnik 220kV axis in long term outage till end of May 2018.

## South analyses results

Security analyses have been performed for these 2 timestamps:

- Off-peak period (23:00 – 07:00): **03:30**
- Peak period (07:00 – 23:00): **08:30**

Adaptations made on merged DACFs:

### Off-peak:

- SI → IT physical flow adapted to target flow **950 MW** (target flow of 800 MW cannot be reached)
- Mendrisio-Cagno flow adapted to the schedule **170 MW**
- PST of Lienz adapted to **120 MW**
- PST of Camporosso adapted to **200 MW**
- PST of La Praz on **tap 1**

### Peak:

- SI → IT physical flow adapted to target flow **1000 MW** (target flow of 800 MW cannot be reached)
- Mendrisio-Cagno flow adapted to the schedule : **80 MW**
- PST of Lienz adapted to **150 MW**
- PST of Camporosso adapted to **200 MW**
- PST of La Praz on **tap 1**

## Special topologies

Nodes in South area				
			Off Peak	Peak
380 kV	Swissgrid	Sils	1	1
		Robbia	2	2
	Rte	Génissiat	1	1
		Albertville	2	2
		Grande Ile	1	1
	Terna	Turbigo	1	1
		Baggio	1	1
		Bovisio	2	2
		Ostiglia	1	1

## N state flows Off-Peak & Peak

The I<sub>max</sub> and load values in the table below are extracted from the **adapted** merged TSOs' DACF.

TSO	Voltage	Line (380 kV)	Off Peak		Peak	
			I <sub>max</sub> (A)	% of I <sub>max</sub>	I <sub>max</sub> (A)	% of I <sub>max</sub>
Terna	380 kV	Albertville - Rondissone 1	2370	13	2370	35
		Albertville - Rondissone 2	2370	1	2370	37
		Bulciago - Soazza	2300	37	2300	54
		Cagno - Mendrisio	855	30	855	36
		Musignano - Lavorgo	2270	54	2270	71
		Redipuglia - Divaca	2450	38	2450	37
		Robbia - San Fiorano	2530	38	2530	60
		Robbia - Gorlago	2530	53	2530	72
		Venaus - Villarodin	2715	10	2715	28
	220 kV	Airolo - Ponte	900	20	900	20
		Lienz - Soverzene	704	41	704	39
		Menton - Campo Rosso	1165	44	1165	43
		Padriciano - Divaca	960	77	960	94
		Riddes - Avise	1010	13	1010	19
		Riddes - Valpelline	1010	13	1010	20
		Serra - Pallanzeno	900	18	900	41

For Terna:

	X < 50 % of I <sub>max</sub>		50 ≤ X < 75 % of I <sub>max</sub>		X ≥ 75 % of I <sub>max</sub>
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### Sensitivity coefficients for the Pentalateral instruction

The amount of the control program curtailment on peak and off-peak can be calculated thanks to the sensitivities in the table below:

		FR → IT	CH → IT	AT → IT	SI → IT
Off Peak	Initial physical flows on adapted base case	581	3477	118	952
	Compensation ratio (calculated from NTC)	32%	58%	3%	7%
	Pentalateral impact on physical flows	-26%	-57%	-4%	-14%
Peak	Initial physical flows on adapted base case	1844	4618	62	1313
	Compensation ratio (calculated from NTC)	44%	41%	4%	10%
	Pentalateral impact on physical flows	-30%	-54%	-4%	-12%

## OFF PEAK

### Off Peak constraints on APG, Eles, RTE (South), Swissgrid and Terna 400kV grids and tie-lines

	TSO	Contingency				Constraint				
		U (kV)	Substation 1	Substation 2	Code	Overload	U (kV)	Substation 1	Substation 2	Code
Off - Peak	Swissgrid	380	Bonaduz	Sils	N-2	98%	380	Pradella	La Punt	
		For info (no overload)								

## PEAK

### Peak constraints on APG, Eles, RTE (South), Swissgrid and Terna 400kV grids and tie-lines

	TSO	Contingency				Constraint				
		U (kV)	Substation 1	Substation 2	Code	Overload	U (kV)	Substation 1	Substation 2	Code
Peak	APG / Eles / Terna	380/220	Robbia - Filisur / Pradella Sils	N-2	119%	220	Padriciano	Divaca		
					105%	380	Sils	Soazza		
					102%	380	Lavorgo	Musignano		
		<p><b><u>Preventive action:</u></b></p> <p>Increase SI-IT physical flow to 1300 MW (Divaca PST on tap 17, Padriciano PST on tap 28 (in uct)), accepted by APG and Eles Increase taps on both Rondissone PSTs (resp. +2 and +3 taps) to reach the maximum tap 2 node topology in Sils 380 kV substation, agreed by Swissgrid =&gt; respectively 111%, 99% and 99% remaining</p> <p><b><u>Curative action:</u></b> increase 2 taps (28 to 30) on Padriciano PST =&gt; respectively 97%, 99% and 99% remaining</p> <p><b>Warning:</b> no further remedial actions are available (except taps on Lavorgo and Soazza PSTs) =&gt; <b>situation is very close to the need for pentilateral reduction.</b></p>								
	Swissgrid	380	Bonaduz	Sils	N-2	119%	380	Pradella	La Punt	
		With the <b><u>preventive action</u></b> mentioned above: 95% remaining								
	Swissgrid / Terna	380	Redipuglia	Padriciano / Divaca	N-2	102%	380	Lienz	Soverzene	
		<b><u>Curative action:</u></b> -1 tap on Lienz PST => 96% remaining								

## Final PSTs settings

The tables below present the tap positions and the physical flows on different PSTs with the adaptations described at the top of the page (IT-SI target flow...) and preventive actions (before Pentilateral reduction).

PST	Off Peak	
	Tap position	Physical flow to Italy (MW)
La Praz (1/33)	1	184
Rondissone 1 (1/33)	0	-20
Rondissone 2 (1/33)	9	208
Camporosso (-32/32)	-17	208
Lienz (-32/32)	-15	120
Padriciano (1/33)	33	299
Divaca (-32/32 each)	-27	654

PST	Peak	
	Tap position	Physical flow to Italy (MW)
La Praz (1/33)	1	389
Rondissone 1 (1/33)	30	576
Rondissone 2 (1/33)	31	553
Camporosso (-32/32)	-12	193
Lienz (-32/32)	-27	56
Padriciano (1/33)	28	325
Divaca (-32/32 each)	-16	980

## Conclusion

**CWE:** Some constraints detected manageable with classical remedial actions.

**CEE:** No critical constraint detected.

**CSE:** Critical constraints detected on the CH-IT border. To avoid a pentilateral procedure, coordinated remedial actions are required in Swissgrid (2 nodes in Sils 380 kV) and Eles (increase SI-IT flow to 1300 MW).