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Swedish Interconnectors

COMP Case No 39351

Monitoring Report No 17

Introduction

This report is submitted to comply with section 5 (Monitoring provisions) of Svenska kraftnät's Commitments (26 January 2010) under Article 9 of Council Regulation No. 1/2003 in connection with the European Commission investigation in Case COMP/39351 – Swedish Interconnectors. The Commitments were adopted and made binding by decision of the Commission on 14 April 2010. Regarding this, Svenska kraftnät would like to emphasize that that we are monitoring the development of the European legislation on the internal electricity market continuously and how it will relate to our Commitment.

The development of the European legislation on the internal electricity market will have an impact on the management of the Swedish interconnectors, but the major impact is expected after the commitments expires. More specifically, the implementation of the 70 % minimum capacity criterion and the Nordic capacity calculation methodology according to CACM changes how the capacity will be allocated on the Swedish interconnectors.

The report is prepared in good faith and aims at providing any information the Commission may need in order to judge whether Svenska kraftnät is proceeding in accordance with the Commitments. Additional information can be provided to the Commission upon request.

In accordance with what was stated in last (sixteenth) monitoring report this seventeenth monitoring report has been submitted by 14 June 2020 at the latest.

Svenska kraftnät confirms that the report does not contain any confidential information and may be freely distributed to third parties.

Sundbyberg, June 3, 2020

otta Medelius-Bredhe

Table of Contents

1	Svens	ka kraftr	ät's commitment 7
2	Period	l Januar	y 1 - April 19, 20207
	2.1	Allocat	ion of trading capacity
	2.2	Comme	ents on each interconnector12
		2.2.1	SE1-FI, North Finland12
		2.2.2	SE1-NO4, North Norway13
		2.2.3	SE2-NO3, Central Norway13
		2.2.4	SE2-NO4, North Norway13
		2.2.5	SE3-DK1, Western Denmark13
		2.2.6	SE3-FI, Southern Finland13
		2.2.7	SE3-NO1, Southern Norway13
		2.2.8	SE4-DE, Germany14
		2.2.9	SE4-DK2, Eastern Denmark14
		2.2.10	SE4-PL, Poland14
		2.2.11	SE4-LT, Lithuania14

Appendix A – Explanation of Attachments15

1 Svenska kraftnät's commitment

As committed, Svenska kraftnät has subdivided the Swedish part of the Nordic electricity market into several bidding zones and the Swedish Transmission System is operated on this basis since November 1, 2011. Congestion in the Swedish Transmission System, with exception of Congestion in the West Coast Corridor, is generally managed without limiting Trading Capacity on Interconnectors. This particularly evident in Table 3.

2 Period January 1 - April 19, 2020

This section describes operational experience and measures regarding allocation of trading capacity in the period January 1 to April 19, 2020.

In the period, totally 2 639 hours, the main direction of the power flow was southbound.

Table 1 below shows the average prices in Sweden and all neighbouring areas for the above mentioned period (excluding Germany and Poland). Table 2 summarises the number of hours where price differences occurred between the respective zones.

Area	Average Price Level (EUR)	Maximum Price (EUR)	Minimum Price (EUR)
SE1	13.60	70.76	-0.20
SE2	13.60	70.76	-0.20
SE3	16.67	70.76	-0.20
SE4	18.73	70.76	-0.20
DK1	19.05	64.70	-55.77
DK2	21.19	70.76	-42.66
FI	22.87	121.03	-0.20
NO1	13.27	32.04	1.24
NO3	13.50	31.76	1.04
NO4	13.50	31.76	1.04
LT	26.20	121.03	0.07

Table 1. Average, maximum, and minimum prices for areas within Nord Pool.

No of hours where price for row area greater than for column area	SE1	SE2	SE3	SE4	DK1	DK2	FI	NO1	NO3	NO4	LT
SE1	-	0	0	0	312	117	0	660	44	74	1
SE2	0	-	0	0	312	117	0	660	44	74	1
SE3	847	847	-	0	326	117	0	897	888	909	1
SE4	1 006	1 006	414	-	470	117	236	1 106	1 043	1 064	3
DK1	1 339	1 339	854	680	-	38	641	1 255	1 374	1 388	480
DK2	1 452	1 452	1 092	859	659	-	774	1 493	1 486	1 493	557
FI	1 574	1 574	1 260	1 096	1 260	1 012	Ŧ	1 609	1 611	1 633	57
NO1	840	840	343	336	401	289	342	-	821	846	306
NO3	133	133	124	124	328	207	111	702	-	48	93
NO4	183	183	129	129	336	212	108	710	59	-	91
LT	1 845	1 845	1 659	1 391	1 572	1 307	817	1 873	1 873	1 883	=

Table 2. Number of hours where the price for the area in the row was higher than for the area in the column.

Summary of table 1 and 2:

- LT had the highest average price, followed by FI, DK2, DK1, SE4, SE3, SE1, SE2, NO3, NO4, and NO1.
- SE1 and SE2 had a common price during all hours.

2.1 Allocation of trading capacity

Table 3 below summarises how often Svenska kraftnät have allocated less trading capacity than maximum NTC for interconnectors and corridors between internal areas in the period.

Interconnectors/ corridors between internal areas	No of limit	ed hours	No of days tation	with limi-	Average reduction				
	Export/ South- bound	Import/ North- bound	Export/ South- bound	Import/ North- bound	Export/ South- bound	Import/ North- bound			
SE1-SE2	290	0	14	0	2 %	о %			
SE2-SE3	2 639	0	110	0	10 %	0 %			
SE3-SE4	2 639	0	110	о	10 %	о %			
SE1-FI	422	2 165	20	97	2 %	5 %			
SE1-NO4	247	248	11	11	6 %	8 %			
SE2-NO3	138	138	6	6	2 %	2 %			
SE2-NO4	200	440	9	19	5 %	7 %			
SE3-DK1	257	2 054	17	95	4 %	7 %			
SE3-FI	10	10	1	1	0 %	0 %			
SE3-NO1	367	2 615	38	109	4 %	27 %			
SE4-DE	24	288	1	33	1 %	4 %			
SE4-DK2	762	994	33	60	20 %	25 %			
SE4-PL	0	290	О	33	0 %	4 %			
SE4-LT	0	290	0	33	0 %	4 %			

Table 3. Limitations in trading capacity on interconnectors and corridors between internal areas as enforced by Svenska kraftnät. The columns with average reductions shows the average NTC divided by maximum NTC.

The majority of the limitations of export capacity on the interconnector SE1-FI, enforced by Svenska kraftnät during the period, are because of that the NTC depends on forecasted transfer between Ivalo - Varangerbotn. The forecasted transfer can both increase and decrease the NTC.

Table 4 below summarises the time during which neighbouring TSOs have allocated less trading capacity than maximum NTC to interconnectors in the period.

Interconnectors/ corridors between internal areas	No of limit	ted hours	No of days tation	with limi-	Average reduction			
	Export/ South- bound	Import/ North- bound	Export/ South- bound	Import/ North- bound	Export/ South- bound	Import/ North- bound		
SE1-SE2	-	-	-	-	-	-		
SE2-SE3	-	-	-	-	-	-		
SE3-SE4	-	-	-	-	-	-		
SE1-FI	312	2 037	14	92	-1 %	2 %		
SE1-NO4	266	2 639	12	110	8 %	14 %		
SE2-NO3	1 593	0	67	о	17 %	о %		
SE2-NO4	2 639	2 639	110	110	21 %	42 %		
SE3-DK1	50	1 921	4	81	1 %	4 %		
SE3-FI	8	8	1	1	о%	о %		
SE3-NO1	2 639	2 639	110	110	24 %	39 %		
SE4-DE	58	2 168	8	107	1 %	62 %		
SE4-DK2	734	734	32	32	21 %	22 %		
SE4-PL	837	754	48	46	26 %	23 %		
SE4-LT	0	0	0	0	о %	о %		

Table 4. Limitations in trading capacity on interconnectors as enforced by neighbouring TSOs. The columns with average reductions shows the average NTC divided by maximum NTC.

Table 5 below summarises the time during which capacities on interconnectors and corridors between internal areas have been reduced, taking into account reductions by both Svenska kraftnät and neighbouring TSOs.

Interconnectors/ corridors between internal areas	No of limit	ed hours	No of days tation	with limi-	Average reduction				
	Export/ South- bound	Import/ North- bound	Export/ South- bound	Import/ North- bound	Export/ South- bound	Import/ North- bound			
SE1-SE2	290	0	14	0	2 %	0 %			
SE2-SE3	2 639	0	110	0	10 %	о %			
SE3-SE4	2 639	0	110	0	10 %	о %			
SE1-FI	422	2 165	20	97	2 %	5 %			
SE1-NO4	375	2 639	17	110	8 %	16 %			
SE2-NO3	1 593	138	67	6	17 %	2 %			
SE2-NO4	2 639	2 639	110	110	22 %	42 %			
SE3-DK1	297	2 080	20	97	5 %	8 %			
SE3-FI	10	10	1	1	о %	0 %			
SE3-NO1	2 639	2 639	110	110	26 %	43 %			
SE4-DE	82	2 194	9	107	2 %	62 %			
SE4-DK2	762	994	33	60	22 %	25 %			
SE4-PL	837	928	48	59	26 %	26 %			
SE4-LT	0	290	0	33	0 %	4 %			

Table 5. Final limitations in trading capacity on interconnectors and corridors between internal areas as enforced by both Svenska kraftnät and neighbouring TSOs. The columns with average reductions shows the average NTC divided by maximum NTC.

Detailed information for each limitation is provided in the tables B1 to B4 in appendix B and in the attachment. This information includes the reason for each limitation.

2.2 Comments on each interconnector

2.2.1 SE1-FI, North Finland

Svenska kraftnät has reduced the export and import capacity for 422 and 2 165 hours, respectively, on the interconnector between SE1 and FI, because the NTC depends on forecasted transfer between Ivalo – Varangerbotn, and because of

planned outage of the interconnector. In total, the export and import on the interconnector have been reduced for 422 and 2 165 hours, respectively.

2.2.2 SE1-NO4, North Norway

Svenska kraftnät has reduced the export and import capacity for 247 and 248 hours, respectively, on the interconnector between SE1 and NO4. The reasons for reductions set by Svenska kraftnät were planned outage on the interconnector and planned outage near the interconnector. In total, the export and import on the interconnector have been reduced for 375 and 2 639 hours, respectively.

2.2.3 SE2-NO3, Central Norway

Svenska kraftnät has reduced the export and import capacity for 138 and 138 hours, respectively, on the interconnector between SE2 and NO3. The reasons for reductions set by Svenska kraftnät were planned outage on the interconnector and planned outage near the interconnector. In total, the export and import on the interconnector have been reduced for 1 593 and 138 hours, respectively.

2.2.4 SE2-NO4, North Norway

Svenska kraftnät has reduced the export and import capacity for 200 and 440 hours, respectively, on the interconnector between SE2 and NO4. The reasons for reductions set by Svenska kraftnät were planned outage of the interconnector and planned outage near the interconnector. In total, the export and import on the interconnector have been reduced for all hours, respectively.

2.2.5 SE3-DK1, Western Denmark

Svenska kraftnät has reduced the export and import capacity for 257 and 2 054 hours, respectively, on the interconnector between SE3 and DK1. The reasons for reductions set by Svenska kraftnät were congestion in the West Coast Corridor, planned outage on the interconnector, planned outage near the interconnector, and failure on and near the interconnector. In total, the export and import on the interconnector have been reduced for 297 and 2 080 hours, respectively.

2.2.6 SE3-FI, Southern Finland

Svenska kraftnät has reduced the export and import capacity for 10 and 10 hours, respectively, on the interconnector between SE3 and FI. The reason for reductions set by Svenska kraftnät was maintenance. In total, the export and import on the interconnector have been reduced for 10 and 10 hours, respectively.

2.2.7 SE3-NO1, Southern Norway

Svenska kraftnät has reduced the export and import capacity for 367 and 2 615 hours, respectively, on the interconnector between SE3 and NO1. The reasons for reductions set by Svenska kraftnät were congestion in the West Coast Corridor, planned outage on the interconnector, planed outage near the interconnector, and unavailable system protection. In total, the export and import on the interconnector have been reduced for all hours, respectively.

2.2.8 SE4-DE, Germany

Svenska kraftnät has reduced the export and import capacity for 24 and 288 hours, respectively, on the interconnector between SE4 and DE. The reasons for reductions set by Svenska kraftnät were congestion in the West Coast Corridor and failure near the interconnector. In total, the export and import on the interconnector have been reduced for 82 and 2 194 hours, respectively.

2.2.9 SE4-DK2, Eastern Denmark

Svenska kraftnät has reduced the export and import capacity for 762 and 994 hours, respectively, on the interconnector between SE4 and DK2. The reasons for reductions set by Svenska kraftnät were congestion in the West Coast Corridor, failure near the interconnector, and planned outage on the interconnector. In total, the export and import on the interconnector have been reduced for 762 and 994 hours, respectively.

2.2.10 SE4-PL, Poland

Svenska kraftnät has reduced the export and import capacity for 0 and 290 hours, respectively, on the interconnector between SE4 and PL. The reason for reductions set by Svenska kraftnät was congestion in the West Coast Corridor. In total, the export and import on the interconnector have been reduced for 837 and 928 hours, respectively.

2.2.11 SE4-LT, Lithuania

Svenska kraftnät has reduced the export and import capacity for 0 and 290 hours, respectively, on the interconnector between SE4 and LT. The reason for reductions set by Svenska kraftnät was congestion in the West Coast Corridor. In total, the export and import on the interconnector have been reduced for 0 and 290 hours, respectively.

Appendix A – Explanation of Attachments

The attached spreadsheets contain data for each hour during the period. Each value in the spreadsheets is explained in the table below.

Value	Explanation
Maximum NTC export/southbound (MW) Maximum NTC import/northbound (MW)	Maximum NTC for export/import, as agreed by TSOs on both sides, and maximum NTC for corridors between in- ternal areas in south/north direction. These values normally only change after the network has been rein- forced.
Svk NTC export (MW) Svk NTC import (MW)	Svenska kraftnät's view of NTC for export/im- port.
Svk Reduction export (Y/N) Svk Reduction import (Y/N)	Yes (Y), if Svenska kraftnät's view of NTC for export/import is lower than maximum NTC, otherwise No (N).
Svk Reduction export (MW) Svk Reduction import (MW)	Difference between maximum NTC and Svenska kraftnät's view of NTC.

Table A1. Explanation of data in the attached spreadsheets.

Svk Reason for export reduction Svk Reason for import reduction	Reason codes for Sven- ska kraftnät's reduction of capacities. Reduction codes are according Nord Pool's instruc- tions only reported when the reduction is greater than 100 MW. Because of this princi- ple, there might be mis- matches between the figures shown in table 3 and 5 and tables A2 to A5. See separate sheet in spreadsheet file for explanation of the codes.
Neighbouring TSO NTC export (MW) Neighbouring TSO NTC import (MW)	Neighbouring TSO's view of NTC for ex- port/import.
Final NTC export/southbound (MW) Final NTC import/northbound (MW)	Final NTC for corridors between internal areas in south/north direc- tion, and the minimum of Svenska kraftnät's view and the neigh- bouring TSO's view of the export/import NTC on interconnectors.
Final Reduction export/southbound (Y/N) Final Reduction import/northbound (Y/N)	Yes (Y), if the final NTC is lower than the maxi- mum NTC, otherwise No (N).
Final Reduction export/southbound (MW) Final Reduction import/northbound (MW)	Difference between maximum NTC and fi- nal NTC.

Final Reason for export/southbound reduction Final Reason for import/northbound reduction	Reason codes for reduc- tion of the final capaci- ties. Reduction codes are according Nord Pool's instructions only reported when the re- duction is greater than 100 MW. Because of this principle, there might be mismatches between the figures shown in table 3 and 5 and tables A2 to A5. See separate sheet in spreadsheet file for ex- planation of the codes.
Registered physical flow (positive for imports and negative for exports/positive for southbound and negative for northbound)	Measured flow on inter- connectors and corri- dors between internal areas.
Electricity price level SE1/SE2/SE3/SE4/DK1/DK2/NO1/NO3/NO4/FI/LT (EUR)	Price level in SE1, SE2, SE3, SE4, DK1, DK2, NO1, NO3, NO4, FI, and LT. Prices for DE and PL are not availa- ble, since they are not part of Nord Pool. Red figures indicate a higher price than neighbouring SE-area, and blue indicates a lower price.
Price difference (Y/N)	Yes (Y), if there is a price difference be- tween neighbouring SE-area and current area, otherwise No (N). Blank for DE and PL.

Appendix B – January 1 - April 19, 2020

Tables B1 to B4 shows how of many hours the capacities have been reduced per type of reduction for each interconnector and corridor between internal areas for January 1 - April 19, 2020. The reason codes are explained in the attached spreadsheet.

	1010	1115	1126	1155	1156	1157	1421	1422	1425	1426	1431	1432	1433	1457	1458	1523	1533	1622	1623	1624	1625	1823
SE1-SE2	2 380						122	13			124											
SE2-SE3	18							176				15	227					1 116				
SE3-SE4	894												227			24	120		704			22
SE1-FI	2 494					26								115								
SE1-NO4	2 501			138																		
SE2-NO3	2 501	42		96																		
SE2-NO4	2 4 3 9			138	62																	
SE3-DK1	2 392								4				45			24					132	
SE3-FI	2 6 2 9														8							
SE3-NO1	2 355							12												268		
SE4-DE	2 615															24						
SE4-DK2	1 877		716							18						24						
SE4-PL	2 639																					
SE4-LT	2 639																					

Table B1. Number of hours per type of export reduction (for interconnectors) and per type of southbound reduction (for corridors between internal areas) enforced by Svenska kraftnät.

	1833	1923	1933	1934	2033	2034	2214	2222	2226	2257	2258	2326	2357	2522	2523	2533
SE1-SE2																
SE2-SE3			24		264									720		79
SE3-SE4	8	24	72	16	4	66									386	72
SE1-FI						,	1			1			2			
SE1-NO4																
SE2-NO3																
SE2-NO4																
SE3-DK1																42
SE3-FI											2					
SE3-NO1								4								
SE4-DE																
SE4-DK2									2			2				
SE4-PL																
SE4-LT																

	1010	1115	1126	1155	1156	1157	1426	1431	1433	1457	1458	1523	1614	1624	1933	2214	2226	2258	2326	2333	2357	2433
SE1-SE2	2 639																					
SE2-SE3	2 639																					
SE3-SE4	2 639																					
SE1-FI	2 4 9 6					26				115											2	
SE1-NO4	2 392			138				109														
SE2-NO3	2 501	42		96																		
SE2-NO4	2 577				62																	
SE3-DK1	2 362											24		253								
SE3-FI	2 629										8							2				
SE3-NO1	24								45				144		1 548	2				12		864
SE4-DE	2 4 0 2													237								
SE4-DK2	1 653		715				18							249			2		2			
SE4-PL	2 396													243								
SE4-LT	2 388													251								

Table B2. Number of hours per type of import reduction (for interconnectors) and per type of northbound reduction (for corridors between internal areas) enforced by Svenska kraftnät.

	1010	1125	1126	1151	1155	1156	1157	1226	1247	1251	1421	1422	1425	1431	1432	1433	1445	1456	1457	1458	1523	1533	1545
SE1-SE2	2 380										122	13		124									
SE2-SE3	18											176			15	227							
SE3-SE4	894															227					24	120	
SE1-FI	2 4 9 4						26												115				
SE1-NO4	2 397				194																		
SE2-NO3	1 790				139				24									62					384
SE2-NO4	2 414				139	44												18					
SE3-DK1	2 342	26											4			45					24		
SE3-FI	2 6 2 9																			8			
SE3-NO1				10						456		12					14						1 928
SE4-DE	2 557																				24		
SE4-DK2	1 873		692					42													24		
SE4-PL	1 862																						
SE4-LT	2 6 3 9																						

Table B3. Number of hours per type of export reduction as enforced by Svenska kraftnät and neighbouring TSOs (for interconnectors) and per type of southbound reduction (for corridors between internal areas) enforced by Svenska kraftnät.

	1546	1549	1555	1556	1622	1623	1624	1625	1823	1833	1923	1933	1934	1947	1950	2033	2034	2214	2222	2226	2257	2258	2326	2357	2522
SE1-SE2																									
SE2-SE3					1 116							24				264									720
SE3-SE4						704			22	8	24	72	16			4	66								
SE1-FI																		1			1			2	
SE1-NO4			24												24										
SE2-NO3		216												24											
SE2-NO4				24																					
SE3-DK1								132																	
SE3-FI																						2			
SE3-NO1	4						211												4						
SE4-DE																									
SE4-DK2							4													2			2		
SE4-PL																									
SE4-LT																					-				

	2523	2533	9942	9999
SE1-SE2				
SE2-SE3		79		
SE3-SE4	386	72		
SE1-FI	-			
SE1-NO4				-
SE2-NO3				
SE2-NO4				
SE3-DK1		42	24	
SE ₃ -FI				
SE3-NO1				
SE4-DE				58
SE4-DK2				
SE4-PL				777
SE4-LT				

Table B4. Number of hours per type of import reduction as enforced by Svenska kraftnät and neighbouring TSOs (for interconnectors) and per type of northbound reduction (for corridors between internal areas) enforced by Svenska kraftnät.

	1010	1115	1125	1126	1151	1155	1156	1157	1226	1251	1426	1431	1433	1445	1456	1457	1458	1523	1545	1555	1556	1624
SE1-SE2	2 639																					
SE2-SE3	2 6 3 9																					
SE3-SE4	2 639																					
SE1-FI	2 4 9 6							26								115						
SE1-NO4	2 281					139			_			109			62					24		
SE2-NO3	2 501	42				96																
SE2-NO4	2 553						44								18						24	1
SE3-DK1	2 312		26															24				253
SE3-FI	2 629																8					
SE3-NO1					10					411			39	14					1 416			
SE4-DE	564																					26
SE4-DK2	1 657			691					24		18											245
SE4-PL	1 776																					159
SE4-LT	2 388																					251

	1933	1950	2226	2245	2258	2326	2333	2357	9942	9999
SE1-SE2										
SE2-SE3										
SE3-SE4										
SE1-FI								2		
SE1-NO4		24								
SE2-NO3										
SE2-NO4										
SE3-DK1									24	
SE3-FI					2					
SE3-NO1	742			1			6			
SE4-DE						-				2 0 4 9
SE4-DK2			2			2				
SE4-PL										704
SE4-LT										

