

2018-05-09

PROMEMORIA

# Swedish Interconnectors

COMP CASE NO 39351

Requested additional information



## 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 continuing to monitor the development of the European Network Codes and how they will relate to our Commitment.

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



## Details on restrictions to interconnector capacity between 2016 and 2017

Affärsverket Svenska kraftnät has been requested by the Commission to provide further details on Svenska kraftnät's 14<sup>th</sup> monitoring report due to an increase in capacity reduction on certain interconnectors between 2016 and 2017. The Commission asks specific answers for five questions no later than 11 May 2018. Each question is answered under respective heading.

### 1 Limitation on trading capacity as enforced by Svenska kraftnät 2016 and 2017

*Q1. The Commission asks why limitation of the trading capacity as enforced by Svenska kraftnät has increased in 2017 compared with the previous year for specific interconnectors<sup>1</sup>.*

Svenska kraftnät derive the available trading capacity based on stability calculations and the (n-1) criterion in order to assure secure network operation. The calculations and resulting available trading capacities depends on the given network configuration (e.g. planned outages) and occurrence of disturbances (e.g. unplanned outages). The annual available trading capacity for each concerned interconnector will thus vary between years depending on the duration of outages for maintenance and reinforcement measures.

Furthermore, the trading capacity on concerned interconnectors (apart from import capacity on SE3-NO1) is also affected by limitations caused by congestion in the West Coast Corridor (WCC) which depends on variable factors such as wind power generation in southern Sweden, power generation in the nuclear-station Ringhals, temperatures and weather conditions together with consumption patterns in the Malmö and Gothenburg area.

Table 1 shows how the annual available trading capacity as percentage of maximum net transfer capacity (NTC) for each interconnector has varied throughout the last five years. The reason why available trading capacity has been reduced between 2016 and 2017 is explained by mainly two factors. First, the export and import capacity on SE3-NO1 was affected by a planned maintenance work between Skogssäter-Loviseholm and Halden-Loviseholm during approximately 2 months in 2017. See UMM for more de-

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<sup>1</sup> Certain interconnectors refers to: SE3-NO1 (import/export), SE4-DE (import), SE4-DK2 (import), SE4- PL (import), SE4-LT (import)

tails: <https://umm.nordpoolgroup.com/#/messages/2b8f4e4f-4499-41c1-94ec-007d4397e3f0/3>

Moreover, the capacity reduction for the remaining interconnectors is mainly due to a significant change in the availability of nuclear power in Ringhals during 2016, increased wind power generation in 2017 and updated routine for congestion management for the West Coast Corridor from the middle of December, 2016. More details on the latter are explained in the answer to question 2 (Q2.2).

Table 1: Total available trading capacity as percentage of maximum NTC enforced by Svenska kraftnät between 2013 and 2017

	2013	2014	2015	2016	2017
SE3-NO1 (export)	83 %	87 %	91 %	93 %	66 %
SE3-DK1 (import)	68 %	73 %	73 %	87 %	73 %
SE4-DK2 (import)	83 %	84 %	92 %	91 %	78 %
SE4-DE (import)	85 %	89 %	89 %	93 %	73 %
SE4-PL (import)	85 %	87 %	91 %	91 %	77 %
SE3-LT (import)	-	-	-	68 %	64 %
SE3-NO1 (import)	95 %	96 %	97 %	98 %	84 %

## 2 Capacity reduction on certain interconnectors caused by congestion on the West Coast Corridor 2016 and 2017

*Q2.1 The Commission asks for the capacity reduction percentage caused by congestion of the West Coast Corridor for certain interconnectors<sup>2</sup> for each quarter between 2016 and 2017*

Svenska kraftnät hereby provides the average capacity reduction in percentage of maximum NTC for each quarter (Q1-Q4) in 2016 and 2017 related with the reason code "1624" (limitation caused by congestion on the West Coast Corridor). Table 2 shows the average capacity reduction caused by congestion on the WCC enforced by Svenska kraftnät. The average capacity reduction is more or less similar between each intercon-

<sup>2</sup> Certain interconnectors refers to:  
SE4-DE (import), SE4-DK2 (import), SE4- PL (import), SE4-LT (import), SE3-NO1 (export)

nector. The variations in table 2 depend on the operating status for each interconnector and whether or not any other capacity reductions have limited the final trading capacity. For instance, if the import capacity between SE3-DK1 is reduced further by other reasons the available trading capacity due to congestion on the WCC can be increased among the remaining interconnectors.

Table 2: Average capacity reduction in percentage of maximum NTC caused by reason code "1624" enforced by Svenska kraftnät

	2016				2017			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
SE3-NO1 (export)	22 %	25 %	22 %	35 %	40 %	43 %	-	39 %
SE3-DK1 (import)	30 %	32 %	30 %	41 %	47 %	47 %	39 %	45 %
SE4-DK2 (import)	23 %	24 %	22 %	38 %	44 %	45 %	35 %	42 %
SE4-DE (import)	29 %	30 %	29 %	42 %	47 %	47 %	40 %	46 %
SE4-PL (import)	28 %	29 %	29 %	44 %	48 %	48 %	40 %	46 %
SE4-LT (import)	-	-	-	54 %	48 %	48 %	41 %	46 %

The import capacity between SE4-LT was included in the congestion management for the West Coast Corridor in 15<sup>th</sup> December in 2016 and thus not affected previous quarters. Note that the export capacity between SE3 – NO1 was not affected by limitations caused by congestion on the WCC in Q3 for 2017. The reason is that the same interconnector was limited further due to the applied maintenance work between Skogssäter – Loviseholm and Halden – Loviseholm stated previously. Table 3 show the total number of hours per quarter in which limitation due to congestion on the WCC has been enforced by Svenska kraftnät. Note that no hours are registered for SE4-LT in Q1-Q3, 2016 and SE3-NO1 in Q3, 2017.

Table 3: The total number of hours with limitation due to congestion on the WCC enforced by Svenska kraftnät per quarter

	2016					2017				
	Q1	Q2	Q3	Q4	Tot	Q1	Q2	Q3	Q4	Total
SE3-NO1 (export)	409	217	141	665	<b>1432</b>	1349	1105	0	888	<b>3342</b>
SE3-DK1 (import)	396	211	132	652	<b>1391</b>	1342	1171	299	822	<b>3634</b>
SE4-DK2 (import)	340	196	117	575	<b>1228</b>	1430	1211	341	921	<b>3903</b>
SE4-DE (import)	230	137	76	514	<b>957</b>	1267	1125	274	785	<b>3451</b>
SE4-PL (import)	188	116	60	466	<b>830</b>	1305	1147	287	794	<b>3533</b>
SE4-LT (import)	0	0	0	221	<b>221</b>	1123	1026	242	707	<b>3098</b>

Svenska kraftnät wants to emphasize that that congestion on the West Coast Corridor not always limits the final trading capacity. The final average reduction also depends on the capacity reduction made by the opposite TSO. Table 4 shows the average capacity reduction caused by congestion on the WCC which also has limited the final trading capacity. It is possible that the average capacity reduction increases for certain interconnectors since the reduction is applied only if the reduction is larger than the capacity reduction presented by the opposite TSO.

Table 4: Average capacity reduction in percentage of maximum NTC caused by reason code "1624" enforced by Svenska kraftnät which also limited the final trading capacity

	2016				2017			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
SE3-NO1 (export)	22 %	25 %	24 %	35 %	40 %	46 %	-	39 %
SE3-DK1 (import)	30 %	32 %	30 %	41 %	47 %	47 %	39 %	45 %
SE4-DK2 (import)	23 %	24 %	22 %	38 %	44 %	46 %	35 %	49 %
SE4-DE (import)	27 %	30 %	28 %	41 %	51 %	48 %	42 %	45 %
SE4-PL (import)	56 %	55 %	-	59 %	59 %	60 %	49 %	53 %
SE4-LT (import)	-	-	-	54 %	48 %	48 %	39 %	46 %

The number of hours where capacity reduction caused by congestion on the West Coast Corridor also has limited the final trading can be seen in table 5. Note that no reduction was applied due to congestion on the WCC for SE4-PL in Q3, 2016 and almost halved for SE4-DE and SE4-LT in 2017 compared with the results in table 3.

Table 5: The total number of hours with limitation due to congestion on the WC enforced by Svenska kraftnät that also limited the final trading capacity per quarter

	2016					2017				
	Q1	Q2	Q3	Q4	Total	Q1	Q2	Q3	Q4	Total
SE3-NO1 (export)	409	217	114	658	<b>1398</b>	1349	959	0	871	<b>3179</b>
SE3-DK1 (import)	396	211	120	651	<b>1378</b>	1342	1145	299	822	<b>3608</b>
SE4-DK2 (import)	340	196	117	575	<b>1228</b>	1405	1097	341	648	<b>3491</b>
SE4-DE (import)	76	37	58	170	<b>341</b>	640	646	208	208	<b>1702</b>
SE4-PL (import)	7	1	0	209	<b>217</b>	624	432	115	542	<b>1713</b>
SE4-LT (import)	0	0	0	221	<b>221</b>	1123	1026	234	707	<b>3090</b>

*Q2.2 The Commission asks for an explanation to why the number of hours with limitation of trading capacity due to congestion on the West Coast Corridor has increased between 2016 and 2017.*

Svenska kraftnät has explained to the Commission the principles behind the congestion management for the West Coast Corridor. Svenska kraftnät updated this routine in 15<sup>th</sup> of December, 2016 in which NordBalt (SE4-LT) was added to the list of concerned interconnectors contributing to the northbound flow over the West Coast Corridor. The contribution had been proven after preceding assessment during the same year and was informed to all market participants at Nord Pool website two days earlier:

<https://www.nordpoolgroup.com/message-center-container/newsroom/tso-news/2016/q4/no.-332016---updated-routine-for-congestion-management-for-the-west-coast-corridor-in-sweden/>

Import capacity between SE4-LT provides a possible increase in the northbound power flow and hence a larger possibility for congestion on the West Coast Corridor. In order to account for this fact the capacity must be further reduced on the remaining interconnectors in order to provide capacity between SE4-LT in accordance with the pro-rata principle.

The other main factor to the increased number of hours is that the nuclear power generation in Ringhals returned to full operation in November 2016. One nuclear station had been out of operation during repair work from a prior turbine failure since august 2014. Figure 1 shows the unavailability in Ringhals four power stations with the long unavailability for all quarters marked in 2016.



Figure 1: Reported unavailability from nuclear power stations in Ringhals 2016 to 2017. For more information, see UMM:

- a): <https://umm.nordpoolgroup.com/#/messages/9f05c786-0b96-4568-9d75-60d4a5fd32d5/3>  
 b): <https://umm.nordpoolgroup.com/#/messages/76bdb123-4bb3-4f91-8b05-cbbf2b65eb77/12>

The high correlation between generation in Ringhals and the need for limitations can be seen in figure 2. The need for limitation is defined as the ratio of hours with reduction caused by congestion on the WCC per quarter among concerned interconnectors. A similar correlation can be seen between the need for limitations and wind power generation in SE4 as depicted in figure 3. The average wind power generation increased during the first two quarters in 2017 compared with the same period in 2016.

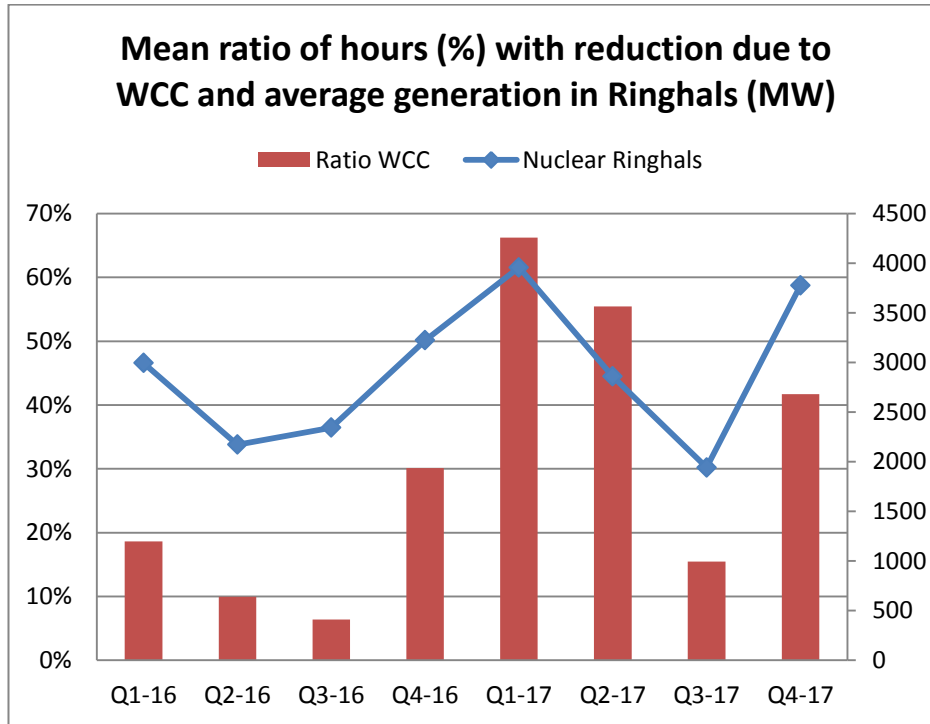


Figure 1: The correlation between the average generation in Ringhals per quarter and the maximum ratio of hours with reduction caused by congestion on the WCC per quarter among concerned interconnectors.



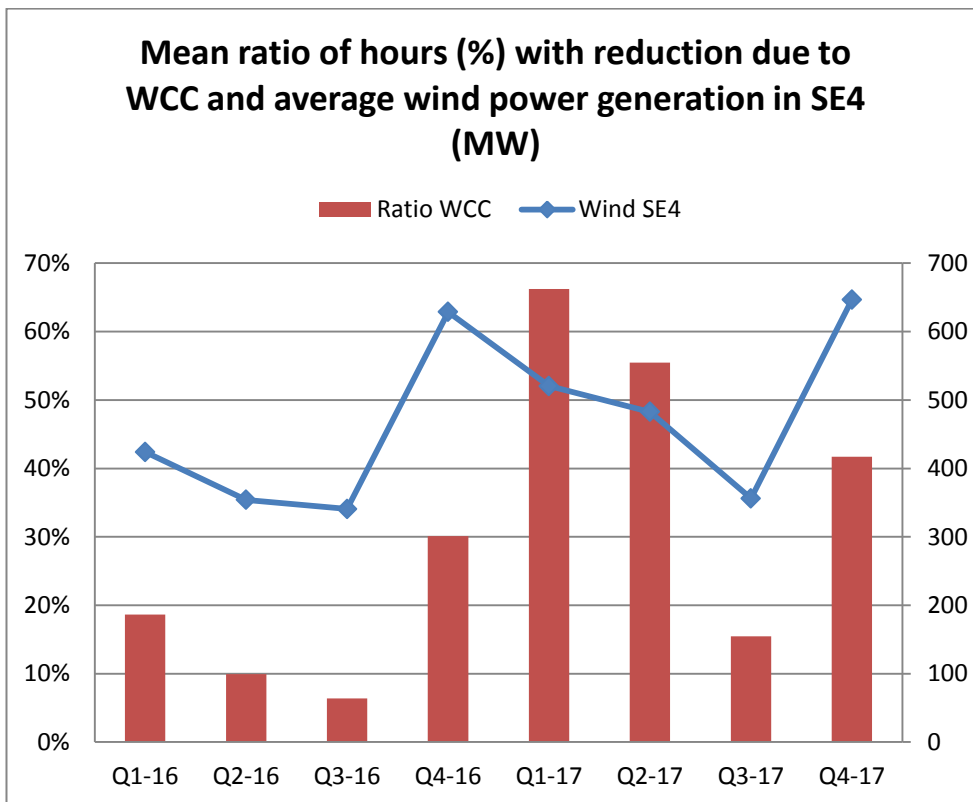


Figure 2: The correlation between average wind power generation in SE4 per quarter and maximum ratio of hours with reduction caused by congestion on the WCC per quarter.

### 3 Capacity reduction on certain interconnectors caused by reason code “9999”

*Q3.1 The Commission asks for the capacity reduction percentage caused by the reason code “9999” for certain interconnectors<sup>3</sup> for each quarter between 2016 and 2017.*

Capacity reduction caused by reason code “9999” is given whenever neighbouring TSO outside the reason code framework has a capacity reduction that limits the final trading capacity. Hence, Svenska kraftnät has therefore no enforced reductions caused by this reason code. Table 6 show the average capacity reduction given from corresponding TSO.

<sup>3</sup> Certain interconnectors refers to:  
SE4-DE (import/export), SE4- PL (import/export), SE4-LT (import/export)

Table 6: The average capacity reduction in relation to maximum NTC caused by reason code “9999” given from corresponding TSO

	2016				2017			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
SE4-DE (export)	78 %	54 %	55 %	67 %	66 %	62 %	67 %	45 %
SE4-PL (export)	75 %	84 %	90 %	87 %	85 %	79 %	84 %	53 %
SE4-LT (export)	100 %	85 %	100 %	100 %	100 %	100 %	100 %	35 %
SE4-DE (import)	67 %	56 %	60 %	67 %	69 %	73 %	75 %	76 %
SE4-PL (import)	86 %	87 %	83 %	80 %	83 %	87 %	66 %	73 %
SE4-LT (import)	100 %	85 %	100 %	100 %	100 %	100 %	100 %	

Table 7 shows the total number of hours per quarter in which corresponding TSO has limited the trading capacity reported with reason code “9999”. Note that the total number of hours from 2016 and 2017 has reduced for the interconnectors SE4-PL and SE4-LT.

Table 7: The total number of hours in per quarter in which corresponding TSO has limited the trading capacity reported by the reason code 9999

	2016					2017				
	Q1	Q2	Q3	Q4	Total	Q1	Q2	Q3	Q4	Total
SE4-DE (export)	892	892	869	820	<b>3473</b>	785	570	1483	1331	<b>4169</b>
SE4-PL (export)	1183	842	854	818	<b>3697</b>	782	841	181	359	<b>2163</b>
SE4-LT (export)	263	412	464	344	<b>1483</b>	447	24	72	12	<b>555</b>
SE4-DE (import)	1422	1173	1207	1396	<b>5198</b>	1297	1141	1638	1626	<b>5702</b>
SE4-PL (import)	2150	2162	2053	1938	<b>8303</b>	1435	1700	1932	1374	<b>6441</b>
SE4-LT (import)	263	412	464	344	<b>1483</b>	447	24	72	0	<b>543</b>

*Q3.2 The Commission asks for more details about the reasons classified as “9999” which have caused limitation of trading capacities on certain interconnectors<sup>4</sup> between 2016 and 2017.*

Reason code “9999” stand for “other connection” and “other reason” and is stated whenever neighbouring TSO not included in the reason code framework has a capacity reduction that limits the final trading capacity. Svenska kraftnät has no more information on this regard and directs the Commission to the corresponding TSO for further details.

<sup>4</sup> Certain interconnectors refers to:  
SE4-DE (import/export), SE4- PL (import/export), SE4-LT (import/export)