
Market consultation

Proposal for a sum allocation for SE3 to DK1 and NO1 in market coupling for day ahead trade

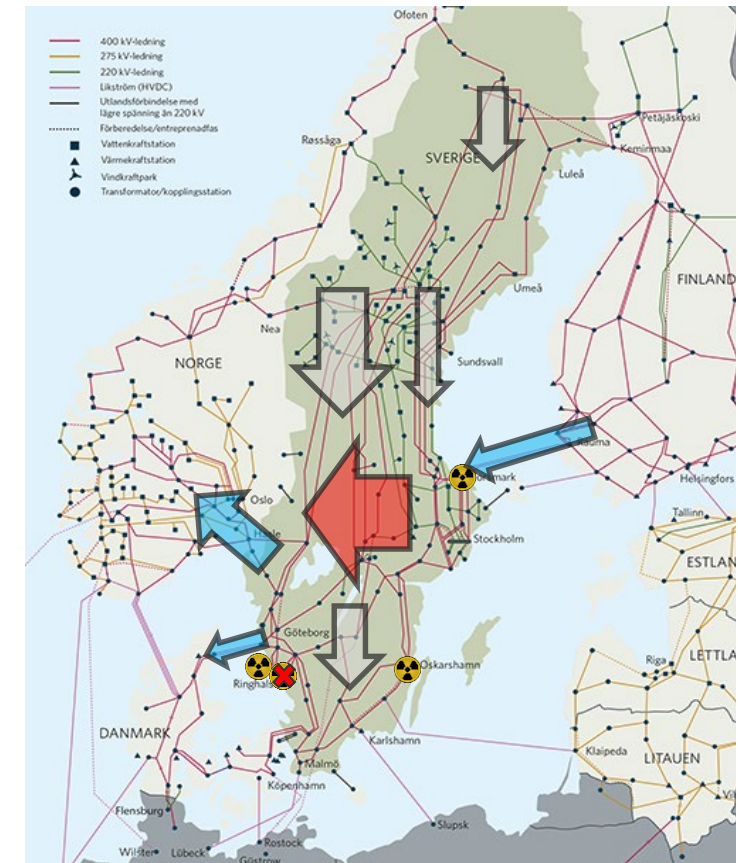
2022-01-14 (*updated 2022-01-21*)



**SVENSKA
KRAFTNÄT**

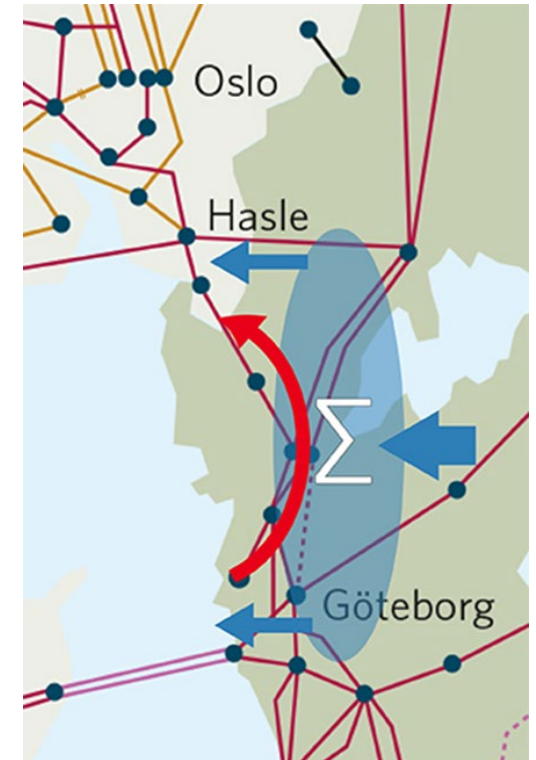
Summary: East-West flow situation

- > The power system is undergoing two major changes; reallocation on production in Sweden and new export capacities
 - > Phase-out of production (mainly on the West Coast) and more production surplus in northern Sweden and FI (+1600 MW)
 - > More export capacity from NO->DE and NO->GB (+2800 MW)
- > This induce an East-West flow that results in changes of transmission capacities to and from SE3



New East-West energy flows has significantly reduced capacities for trade to and from SE3 compared to historical values

- > Export to NO1 and DK1 from SE3 is affected by East-West energy flows
 - > Certain amount of transit through SE3 can be defined ←
 - > Today this amount has to be divided and specifically allocated to SE3-DK1 and SE3-NO1 respectively in the market coupling for day-ahead trade ⇄
 - > Svenska kraftnät see operational situations with unused capacities →
use of available capacity can be made more efficient by introducing a functionality for sum allocation in the market coupling
- more trading possibilities respecting operational security are possible between SE3, DK1 and NO1



Request for change has been sent to the market coupling for day ahead trade

- > First aim is to introduce this functionality in market coupling for day ahead trade
- > Go Live is expected during spring 2022
- > Implementation require joint prioritization of TSOs and power-exchanges in Europe

- Due to the new operational situation on the Swedish West Coast the introduction is possible
- More flexible capacity allocation than in plain NTC
- Under historical conditions the optimisation function would not have had the same relative effect

Mechanics and configuration of a sum allocation from SE3 to NO1 and DK1 – How does it work?

Example: without sum allocation

Secure capacity for import to SE3 is:

- SE3<NO1: 2120 MW
- SE3<DK1: 715 MW

Total capacity for export without the sum allocation is defined based on elements inside SE3, in this example:

1251 MW { SE3>NO1: 750 MW
SE3>DK1: 501 MW

Without the sum allocation the maximum export capacity is set for each border, non-used capacity for one of them can not be used by the other. The sum allocation allows one border to utilise the capacity not used on the other border and its import flow.

Mechanics and configuration of a sum allocation from SE3 to NO1 and DK1 – How does it work?



Maximum export on each line is dependent on the export flow on the other one

If a sum allocation is included, this can be taken into account in the optimization:

Sum allocation (i.e. total possible export from SE3):
750 MW + 501 MW = 1251 MW
Capacity SE3>NO1: 1251 + import flow from DK1 to SE3 (715) = 1966 MW (SE3+transit)
Capacity SE3>DK1: 1251 + import flow from NO1 to SE3 (750): **715 MW** (SE3+transit)

Upper limit secure capacity for border SE3>NO1: "maxNTC"

Upper limit secure capacity for border SE3<DK1: "maxNTC" (in this case boundary setting)

Svenska kraftnät has performed analyses of the introduction of the sum allocation

- > Analyses encompasses the period between April 4 to 9 (period 1) and July 26 and 27 (period 2) 2021
- > Market simulations performed by NordPool
- > Analysis of data performed by Svenska kraftnät

Increased capacities for trade if a sum allocation is introduced

| Period | Border | Upper limit secure capacity for border | Capacity Historic NTC [MW] | Sum allocation SE3 perspective [MW] (i.e. total export from SE3) | Capacity: Sum allocation + transit [MW] (potential maximal capacity for each border) | Capacity change with sum allocation (sum all+transit)/historic NTC) |
|--------|---------|--|----------------------------|--|--|---|
| 1 | SE3>DK1 | 715 (<i>maxNTC</i>) | 501 | 1251 | 715* | 143 % |
| 2 | SE3>DK1 | 715 (<i>maxNTC</i>) | 250 | 650 | 715* | 286 % |
| 1 | SE3>NO1 | 2095 (<i>maxNTC</i>) | 750 | 1251 | 1966** | 262 % |
| 2 | SE3>NO1 | 2095 (<i>maxNTC</i>) | 400 | 650 | 1365** | 341 % |

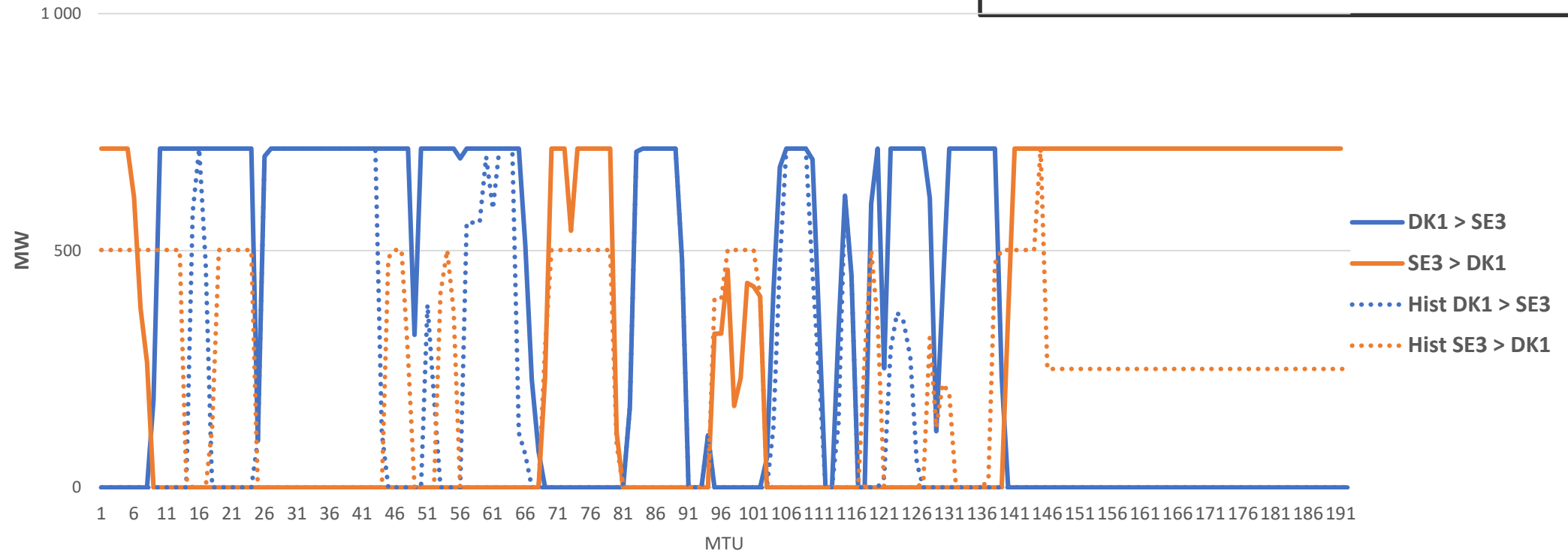
Period 1: April 4 to 9, 2021
 Period 2: July 26 and 27, 2021

* 715 MW is defined by *maxNTC* SE3 to DK1
 ** requires 715 MW import from DK1 to SE3

Flow analysis SE3-DK1

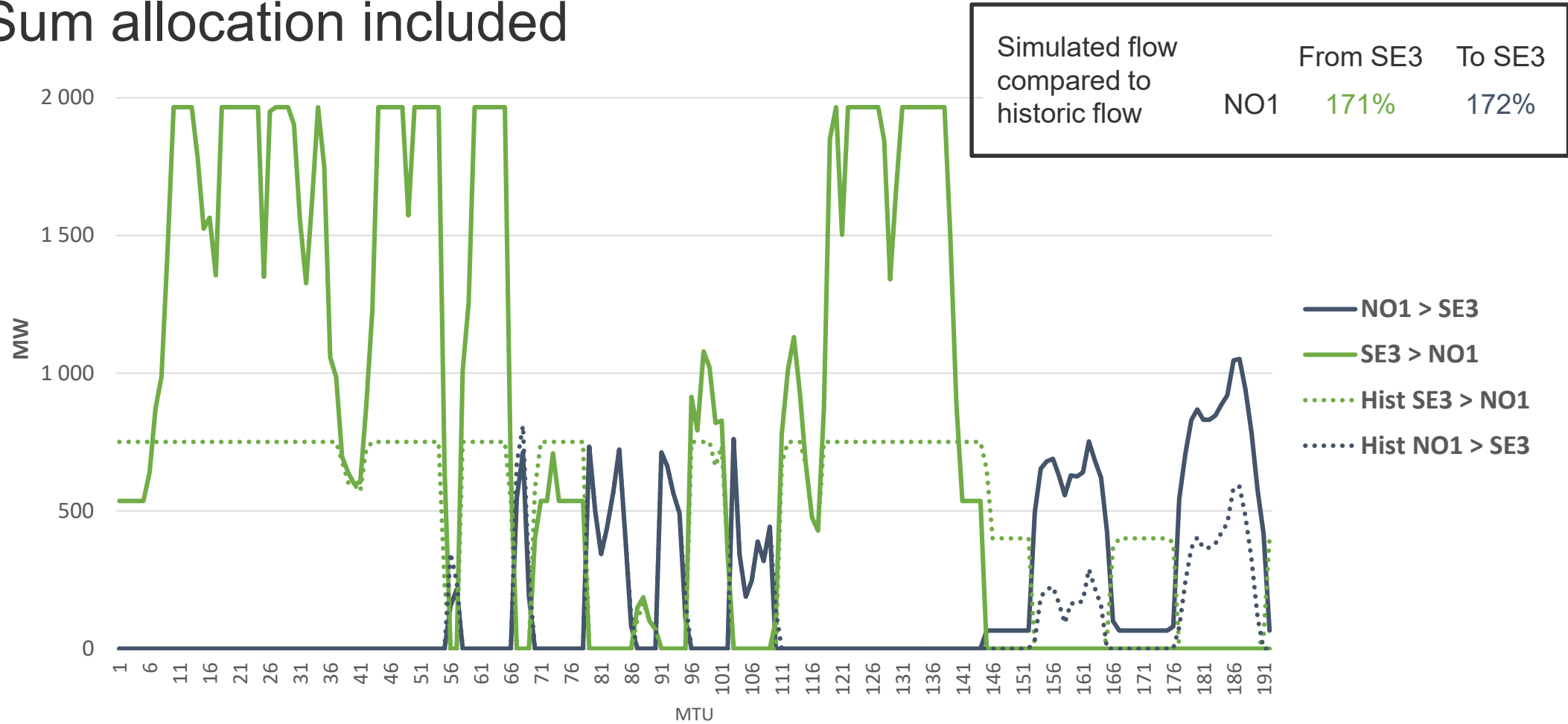
Sum allocation included

| | | | |
|--|-----|----------|--------|
| Simulated flow compared to historic flow | DK1 | From SE3 | To SE3 |
| | | 132% | 187% |



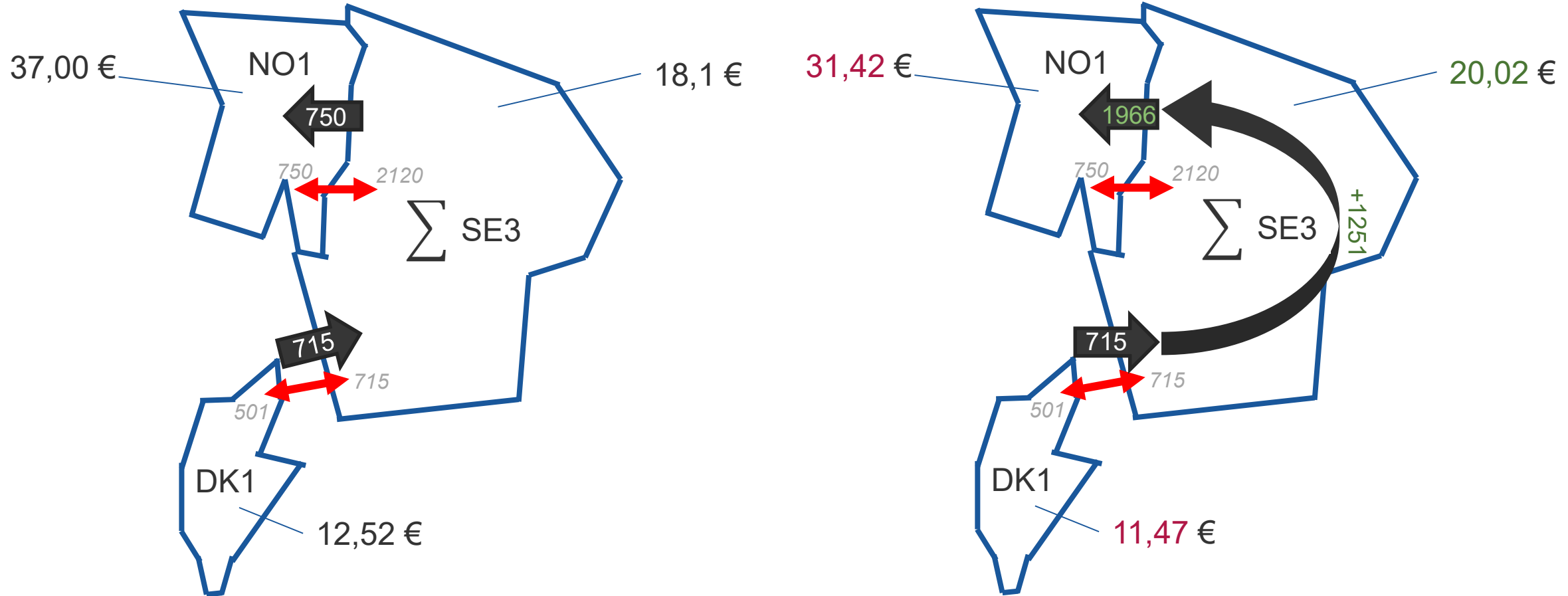
Flow analysis SE3-NO1

Sum allocation included



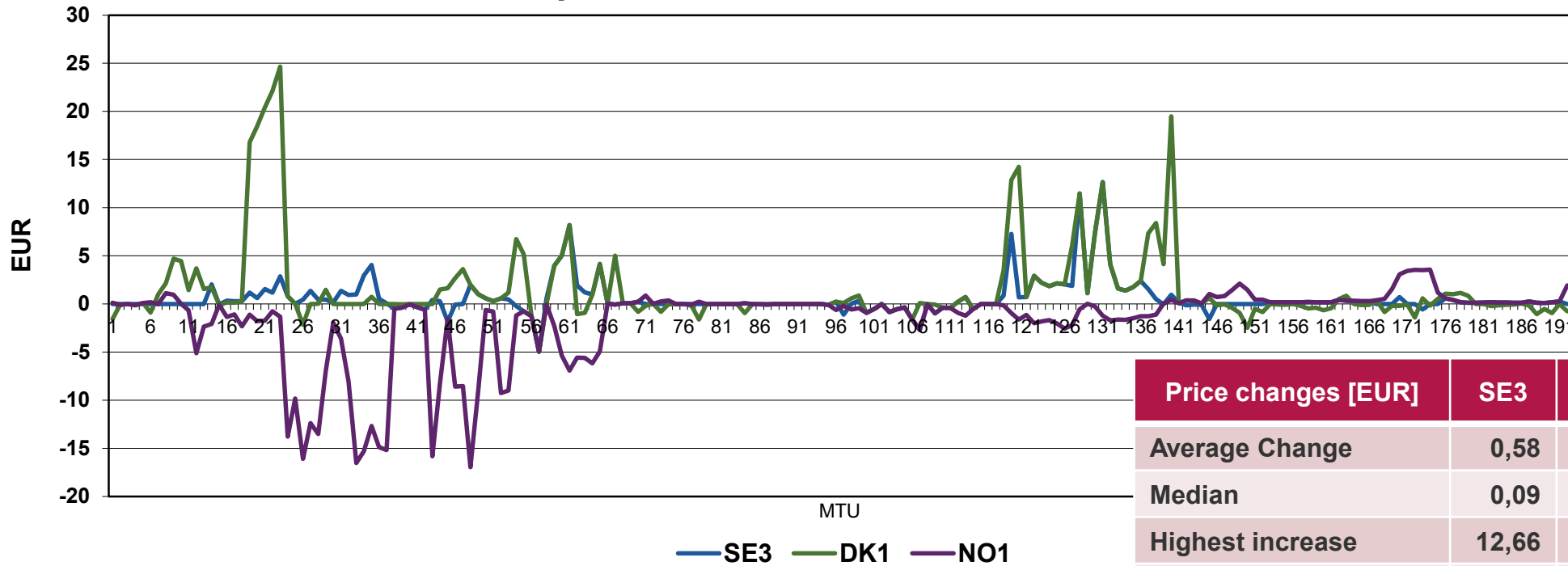
Flow analysis: historic compare to simulated

Historic – without sum allocation **MTU 62** Simulated – with sum allocation



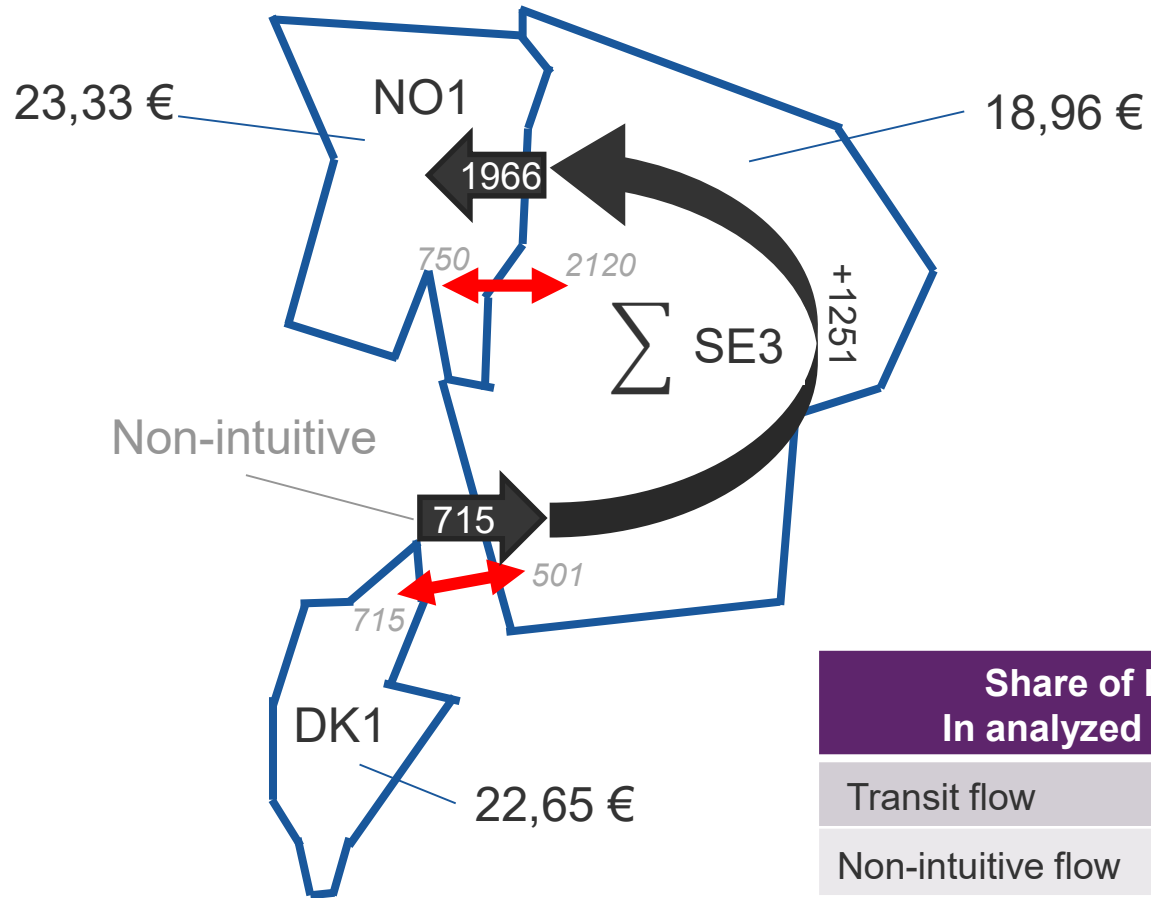
Increased trade capacities due to the sum allocation result often in larger flows but often in small price change

Difference in price between simulation and historic



| Price changes [EUR] | SE3 | DK1 | NO1 |
|---------------------|-------|-------|--------|
| Average Change | 0,58 | 1,49 | -1,65 |
| Median | 0,09 | 0,00 | -0,05 |
| Highest increase | 12,66 | 24,64 | 3,57 |
| Biggest decrease | -4,95 | -4,95 | -16,95 |

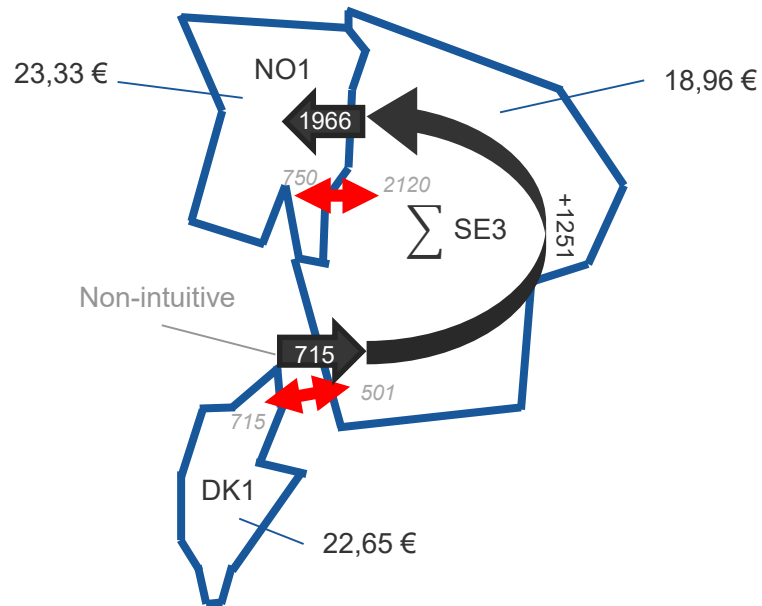
Non-intuitive flows – why do they occur?



- Total socioeconomic welfare increases due to transit flow
- Transit flows may cause non-intuitive flow

First step is implementation in DA time frame – will in some cases limit trading possibilities in ID time frame

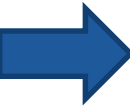
DA outcome



Initial ID trading capacities

SE3>NO1: 0 MW
SE3>DK1: 0 MW
NO1>SE3: 3872 MW
DK1>SE3: 0 MW

Transit flow required to maintain operational security



Not having the functionality makes the market outcome space smaller, i.e. the ID market has tighter boundaries than the DA market

Risk associated with the implementation

- > Sum allocation in DA but not ID means different topologies that could create arbitrage in ID
 - > Non-intuitive flows may occur
 - > To remain inside operational security limits ID capacities have to be set to ensure firmness of DA transit
 - Arbitrage possibilities will generally not occur
- > The different topologies in DA and ID impact operations as physical flow is the result of day ahead and intraday trading
 - > Svenska kraftnät operational department assessed this not to increase the operational risk

Risk associated with the implementation

- > Information to the market
 - > The sum allocation will not be explicitly visible from capacities provided to the market, additional NUCS to display the function. But will be published transparent like all other Virtual areas used in a similar way.
- > Svenska kraftnät has already decided to request a change in the market coupling for the European day ahead trade
- > The change is only relevant before FB implementation → limited benefits if delayed implementation

Benefits

- > Possible to increase trade possibilities significantly without increasing the operational risks
 - > See analyses for quantification

Next steps

- > To get stakeholders feedback on the proposal for a new sum allocation Svenska kraftnät has organized this open consultation
 - > Please provide input before 31/1!
- > More information also in stakeholder webinar on East-West flows 20/1
 - > More info [here](#)

If you have any questions or additional comments please

contact us

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