The Nordic Capacity Calculation Methodology (CCM) project Stakeholder Forum

Arlanda Skycity @ Stockholm Airport

11 December 2018

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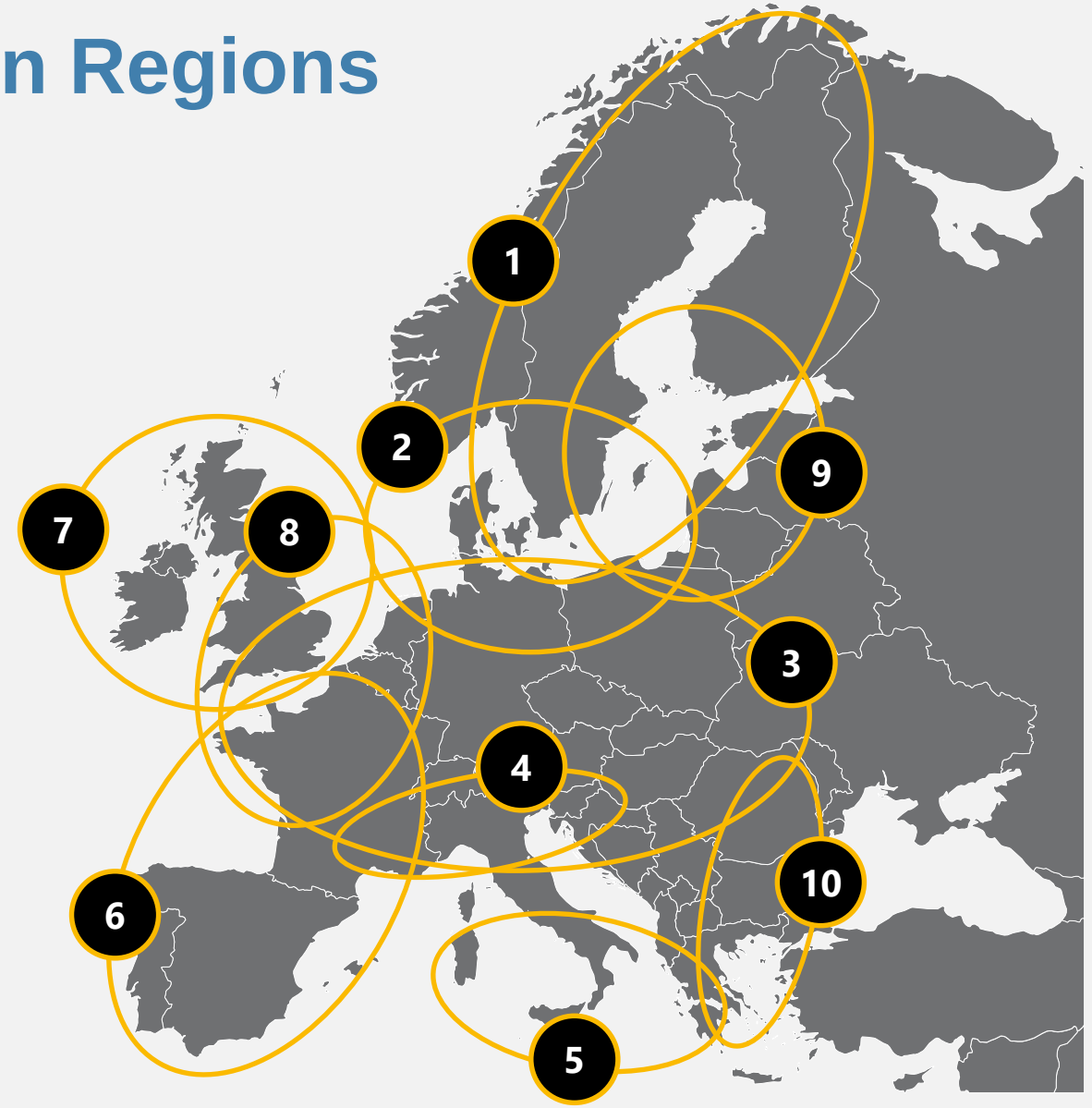
3. Core
4. Italy North
5. Greece-Italy (GRIT)
6. South-West Europe (SWE)
7. Ireland and United Kingdom (IU)
8. Channel
9. Baltic
10. South-East Europe (SEE)



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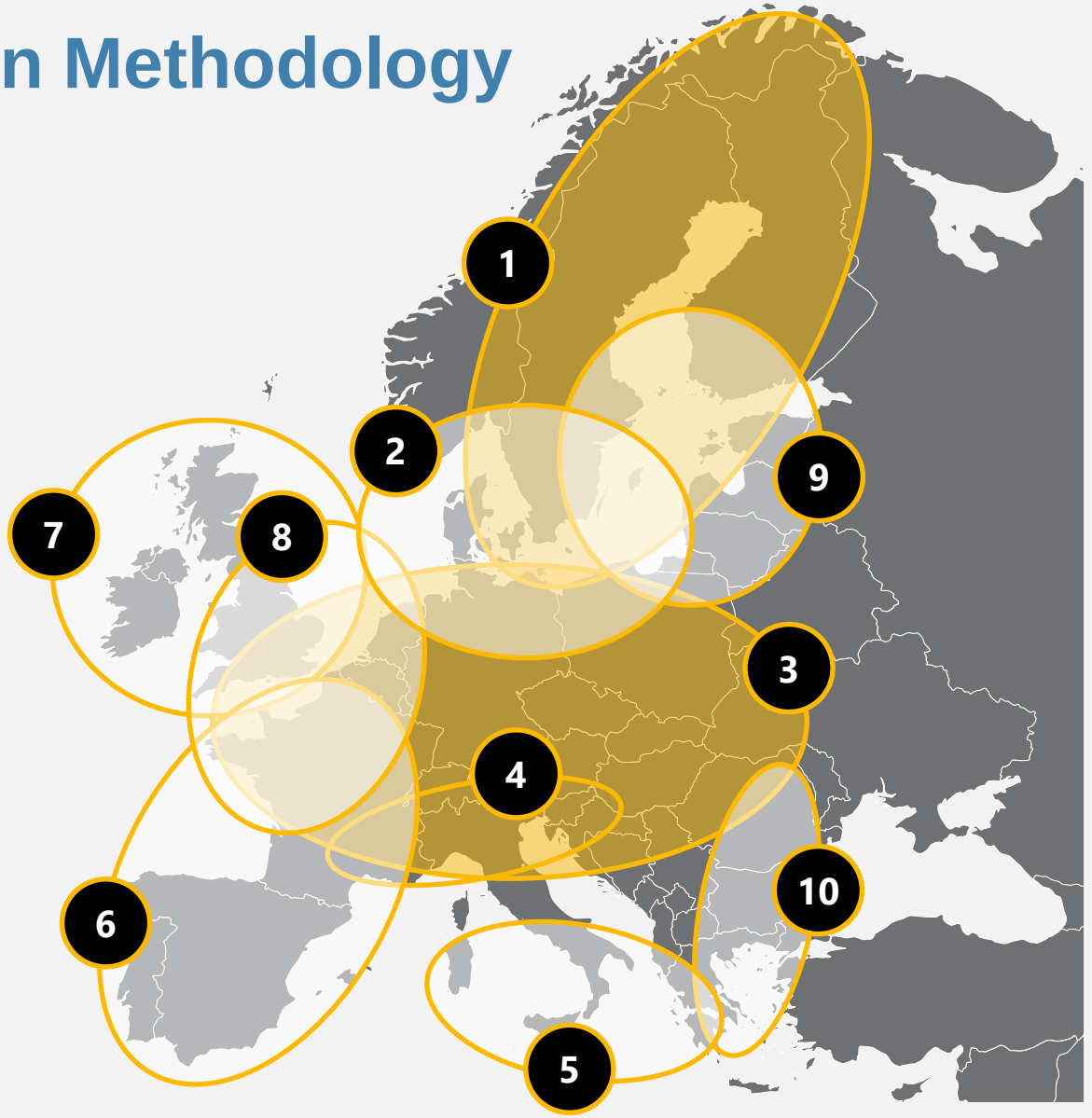
DA/ID Capacity Calculation Methodology proposals

1. Nordic
2. Hansa
3. Core
4. Italy North
5. Greece-Italy (GRIT)
6. South-West Europe (SWE)
7. Ireland and United Kingdom (IU)
8. Channel
9. Baltic
10. South-East Europe (SEE)

Flow Based

CNTC



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Nordic NRAs approved the DA and ID CCM

- On July 16 2018, the Nordic NRAs have approved the capacity calculation methodology for the DA and ID timeframes in the Nordic Region: https://nordic-rsc.net/wp-content/uploads/2018/10/Approval.pdf
- The NRAs of the Nordic CCR has also reached an agreement on the next steps to be taken by the NRAs of the Nordic CCR after the CCM Proposal, as described in their Annex 1: https://nordic-rsc.net/wp-content/uploads/2018/10/Annex.pdf

CCM for the Day Ahead timeframe:

- The Nordic TSOs propose to implement a flow-based capacity calculation approach for the Day Ahead Market timeframe.

CCM for the Intraday timeframe:

- As the long-term solution, the Nordic TSOs propose to implement a flow-based approach for the intraday timeframe, as soon as the intraday market platform is technically able to utilize flow-based capacities.
- As an interim solution, the Nordic TSOs propose to implement a coordinated net transmission capacity approach for the intraday market timeframe.

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Nordic NRAs approved the DA and ID CCM

And triggered:

- The Nordic work on the LT CCM methodology and regulatory approval process (on the agenda today)
  - ✓ FCA GL Article 10(1): *"No later than six months after the approval of the common coordinated capacity calculation methodology referred to in Article 9(7) of Regulation (EU) 2015/1222, all TSOs in each capacity calculation region shall submit a proposal for a common capacity calculation methodology for long-term time frames within the respective region. The proposal shall be subject to consultation in accordance with Article 6."*

- The tendering for IT tools at the Nordic RSC (on the agenda today)

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Key focus points upcoming year

- CCM methodologies and regulatory approval process
  - ✓DA/ID: Develop the CNE selection and RA application
  - ✓DA/ID: Address the RfA that the NRAs will issue
  - ✓LT: CCM development, public consultation, and NRA approval process
- Stakeholder involvement
- Data quality in the simulations / learning-by-doing process
  - ✓RSC CGMs are foreseen to be available in the coarse of 2019
- Support the CCM implementation at the RSC

- Some of these will be elaborated upon on the next slides, and in the agenda items following

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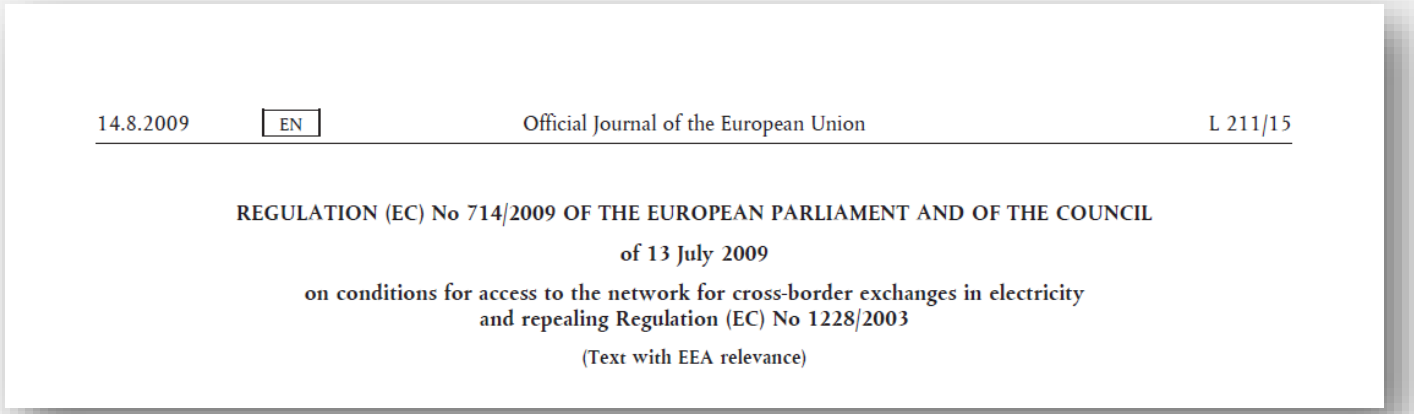
Why internal CNE management is an issue

DA/ID: CNE selection and RA application



14.8.2009 EN Official Journal of the European Union L 211/15

REGULATION (EC) No 714/2009 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 13 July 2009

on conditions for access to the network for cross-border exchanges in electricity and repealing Regulation (EC) No 1228/2003

(Text with EEA relevance)

- Network congestion problems shall be addressed with non-discriminatory market-based solutions which give efficient economic signals
- Maximise interconnection capacity, complying with safety standards of secure network operation
- Annex 1, 1.7:
  - ✓ *(…..) TSOs shall not limit interconnection capacity in order to solve congestion inside their own control area, save for the abovementioned reasons and reasons of operational security (…)*

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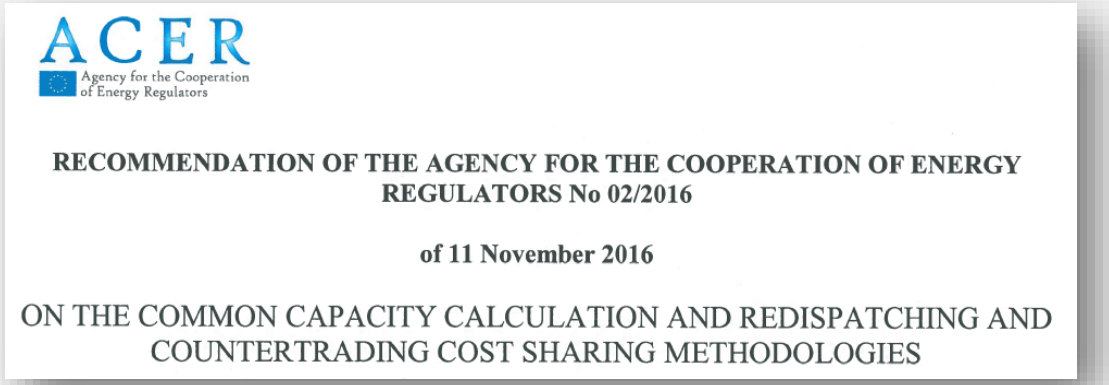
DA/ID: CNE selection and RA application

Regulation 714, Annex 1, 1.7 has been spelled out in the ACER recommendation HL principle #1



ACER
Agency for the Cooperation of Energy Regulators

RECOMMENDATION OF THE AGENCY FOR THE COOPERATION OF ENERGY REGULATORS No 02/2016

of 11 November 2016

ON THE COMMON CAPACITY CALCULATION AND REDISPATCHING AND COUNTERTRADING COST SHARING METHODOLOGIES

- A short term solution, where bidding zone re-configuration being mid term and efficient investment being long term
- High-Level Principle No. 1: On the treatment of internal congestion:
  - ✓ *As a general principle, limitations on internal network elements should not be considered in the cross-zonal capacity calculation methods. If congestion appears on internal network elements, it should in principle be resolved with remedial actions (…)*
  - ✓ *Any deviation from the general principle, by limiting cross-zonal capacity in order to solve congestion inside bidding zones, should only be temporarily applied and in those situations when it is:*
    - *(a) needed to ensure operational security; and*
    - *(b) economically more efficient than other available remedies*
- Key issue: If congestion appears on internal network elements, it should in principle be resolved with remedial actions

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DA/ID: CNE selection and RA application

Nordic TSOs have developed a methodology to manage internal CNEs in DA market

- Approach: Internal CNEs will (always) be taken into account in capacity allocation, but potentially increasing the available capacity for the market (RAM) → not considering internal CNEs by default will compromise operational security

- Available capacity for the market (RAM) will be increased *if*:
  - ✓ Remedial action (RA) resources can be expected to be available *and*
  - ✓ It is economically more efficient to take these RAs into account in CC compared to the alternative; submitting the internal CNEs for capacity allocation based on the "true" RAM

- So, the idea is to perform two tests (in a weekly/daily process) in order to calculate the capacity for internal CNEs
- Initial step in process is to identify relevant CNEs

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DA/ID: CNE selection and RA application

Test #1: the operational security test

- TSOs perform an assessment of resources that can be expected to be available for re-dispatch of internal CNEs
- The point of departure can be a gross-list of resources and then excluding resources which:
  - ✓ Are expected to be activated in the DA market
  - ✓ Contracted to provide reserves to the TSOs
  - ✓ Forced or planned outage
  - ✓ Etc……
- Inherent in this is to assess the impact on CNE of re-dispatch resources (PTDFs)
- Please note: we don’t foresee any resources to be reserved (prioritized) for this purpose in terms of providing an option payment

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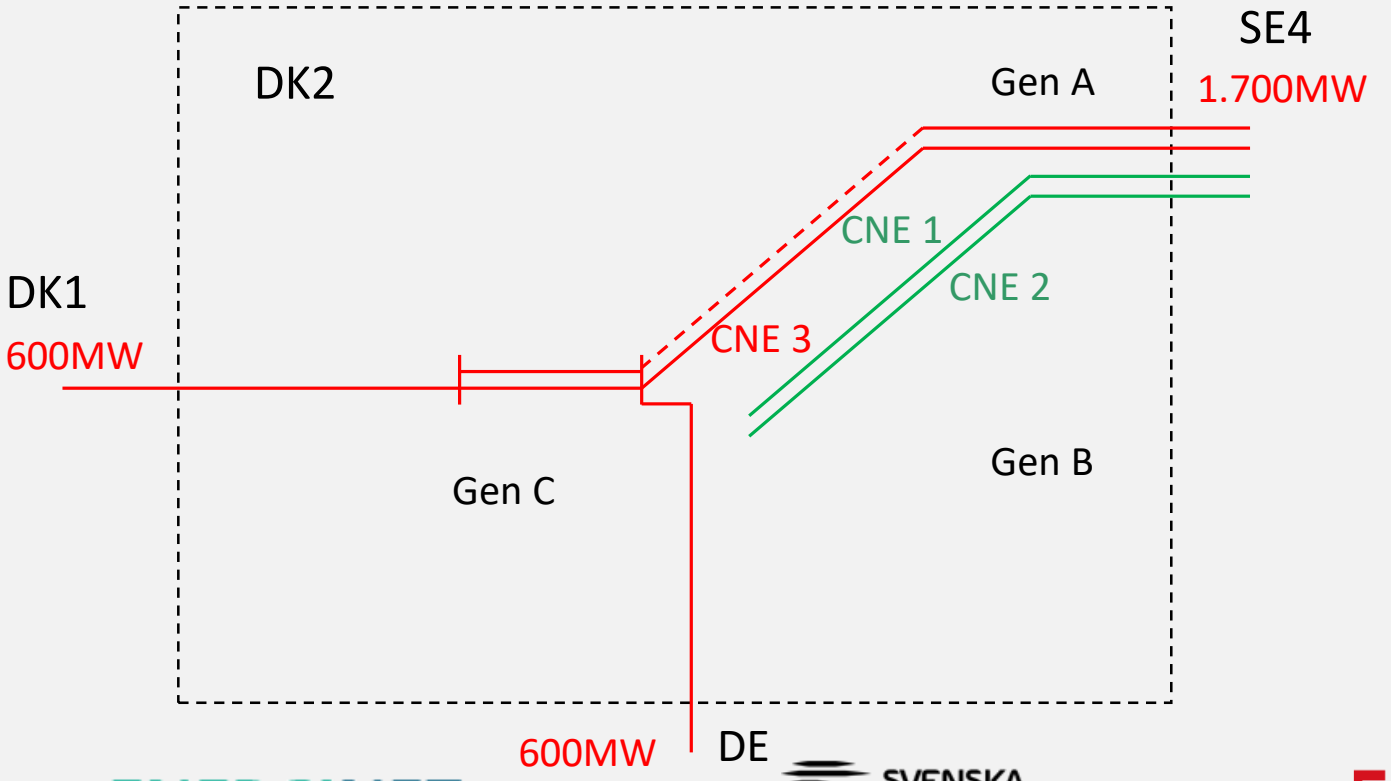
Example

The situation ex ante:

- A simple version of the DK2 power system
- The dashed red 400kV line is out, thus it is not possible to have full flow on interconnectors from DK1/DE and to SE4
- The two green 132kV line are CBs where the red full 400kV line is CO (N-1)
- Total capacity CNE 1 + CNE 2: 700MW



Red numbers are max capacities

IGM:
DK1→DK2 200MWh
DE→DK2 200MWh
DK2←SE -700MWh
DK2 NP: +300MWh

Gen A 150MW:	↑ 10MW ↓ 100MW
Gen B 100MW:	↑ 0MW ↓ 0MW
Gen C 100MW:	↑ 100MW ↓ 100MW

Re-dispatch availability:
A ↑ 10MW, C ↓ 10MW

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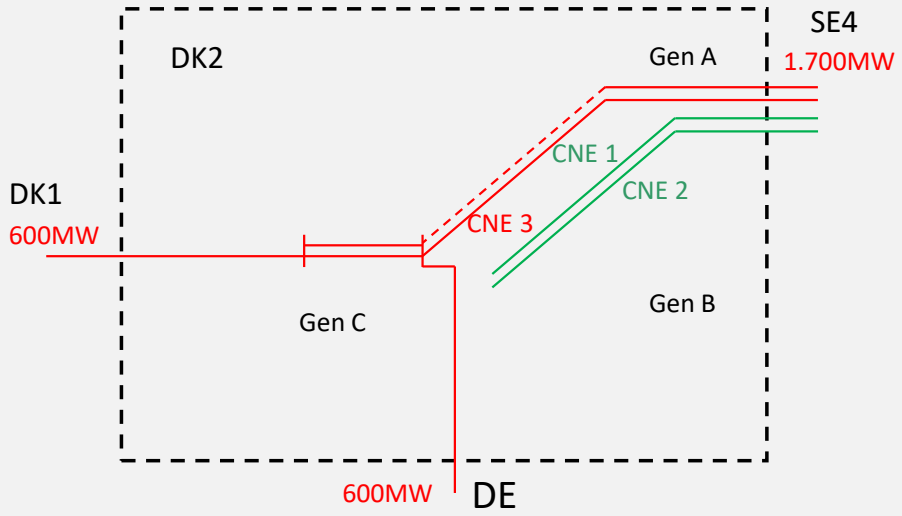
Example



Re-dispatch availability: A ↑ 10MW, C ↓ 10MW

CNE		Fmax, MW	RA, MW	RAM, MW	PTDF Gen A - Gen C
CNE 1	CNE1 CO3	300	5	305	0,5
CNE 2	CNE2 CO3	400	5	405	0,5

The situation ex post:

- All info on the expected balance and availability of re-dispatch are derived from the IGM
- Info from the IGM indicates that CNE 1 may become binding
- As there are 10 MW available for up-regulation, and the node-to-CNE 1 PTDF is 0.5, the RAM of CNE 1 can be increased from 300 MW to 305 MW
- CNE 2 will enter capacity allocation at RAM = 405 MW (not binding)

Test #2: the economic efficiency test

- TSOs perform an assessment of the social cost of including re-dispatch in CC vs. social cost of not including:
  - ✓ If social cost of including in CC is lower than otherwise, it will be included
  - ✓ The equation:

$$\underbrace{\frac{P^r}{T^r} * (1 + R^r)}_{\text{Cost of re-dispatch}} < \underbrace{\frac{P^{cb}}{T^{cb}}}_{\text{DA cross-zonal cost}}$$

  - ✓ If the inequality sign applies, then the internal CNEs shall be submitted for capacity allocation, where the impact of RAs is reflected in RAM calculation
  - ✓ P^r/T^r is the marginal cost of redispatch, where T^r is the node-to-line PTDF
  - ✓ P^{cb}/T^{cb} is the marginal cross-zonal congestion cost, where T^{cb} is the zone-to-zone PTDF

NRA's Annex 1 to the CCM approval

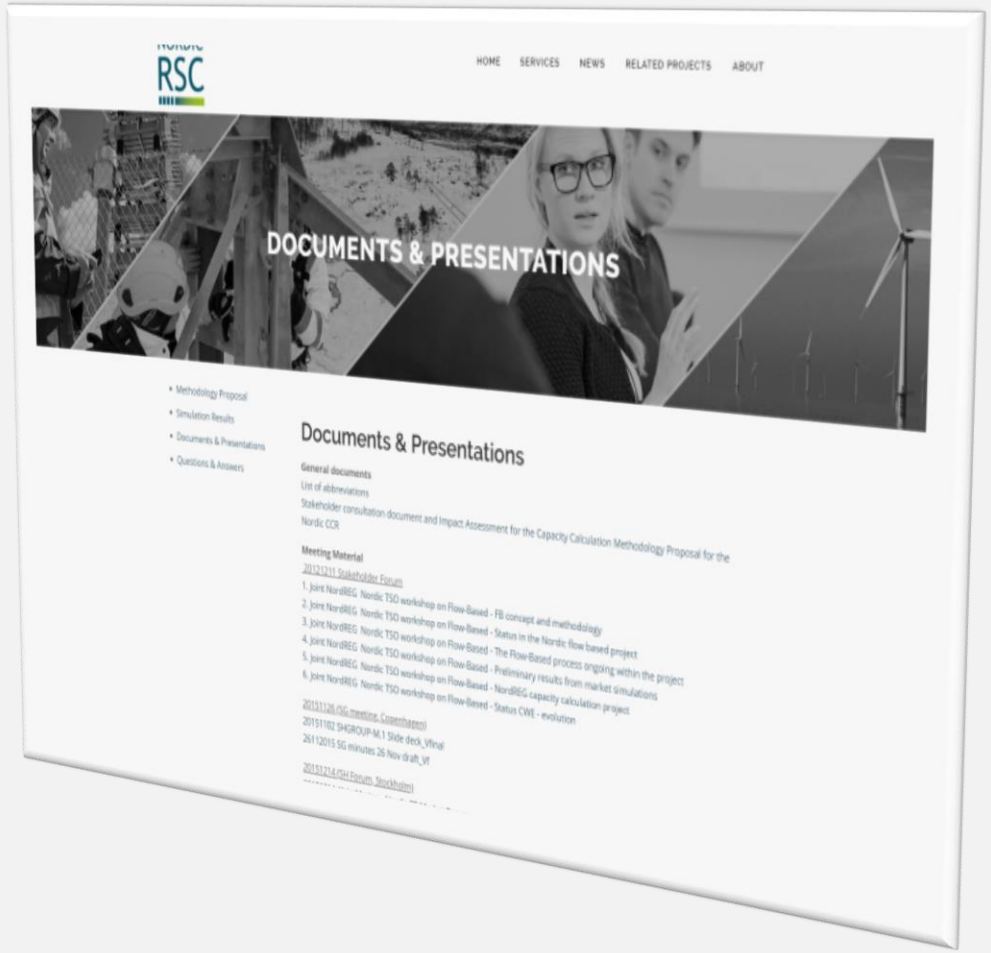
NRAs' Annex 1: https://nordic-rsc.net/wp-content/uploads/2018/10/Annex.pdf

The Annex states (amongst others):

- *The proposal does not provide sufficient clarity on the roles in capacity calculation, especially regarding dynamic stability calculation.*
- *The Regulatory Authorities of CCR Nordic agree that the TSOs should start preparing to refine the now agreed methodology with processes and elements to enable for the CCC to handle dynamic stability in capacity calculation on a regional level.*
- *The Regulatory Authorities of CCR Nordic agree also to initiate a request for amendment of the Capacity Calculation Methodology to clarify the roles and responsibilities of the CCC and individual TSOs by the end of 2018.*

Stakeholder involvement

- Stakeholder Group (SHG)
  - ✓Group with nominated members from industry and NRAs
  - ✓Detailed discussions and exchanges
- Stakeholder Forum (SHF)
  - ✓Open for all stakeholders
  - ✓Broader information forums
- Stakeholder Newsletter
- Stakeholder Information Platform (SHIP)
  - ✓Web platform, hosted by the Nordic RSC, for information exchange and discussion
  - ✓Open for all stakeholders



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CCM project and Nordic RSC

Support the CCM implementation at the RSC

CCM project

-

CCM methodology development

Nordic RSC

-

CCM implementation

(amongst others)

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Where are we now?

Please note: the date mentioned to start the external parallel is the earliest date feasible. The timeline is in the process of being updated!

2017 2017 2018 2019 2020 2021 2022 2022

Today

NRA: end amended DA/ID CCM approval process
Jul 16

Investment decision industrial tool
Aug 3

NRA: end of DA/ID CCM approval process
Mar 16

NRA: FCA CCM approval
Jun 16

Nordic DA CCM and intermediate ID CCM go-live
Feb 1

Target ID CCM go-live?
Feb 1

XBID able to handle FB constraints?
Nov 30

Sep 17
TSO: Submission of DA/ID CCM proposal to NRAs

May 16
TSO: amended DA/ID CCM proposal

Jan 16
TSO: FCA CCM submission deadline

Dec 31
Public //run quality criteria are met (industrial tool), and all TSO input data available

Dec 31
Go-live criteria are met

Nov 1
LT CCM go-live?

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2. Simulation setup in the CCM project
3. Results from the simulations of weeks 1-12, 2017
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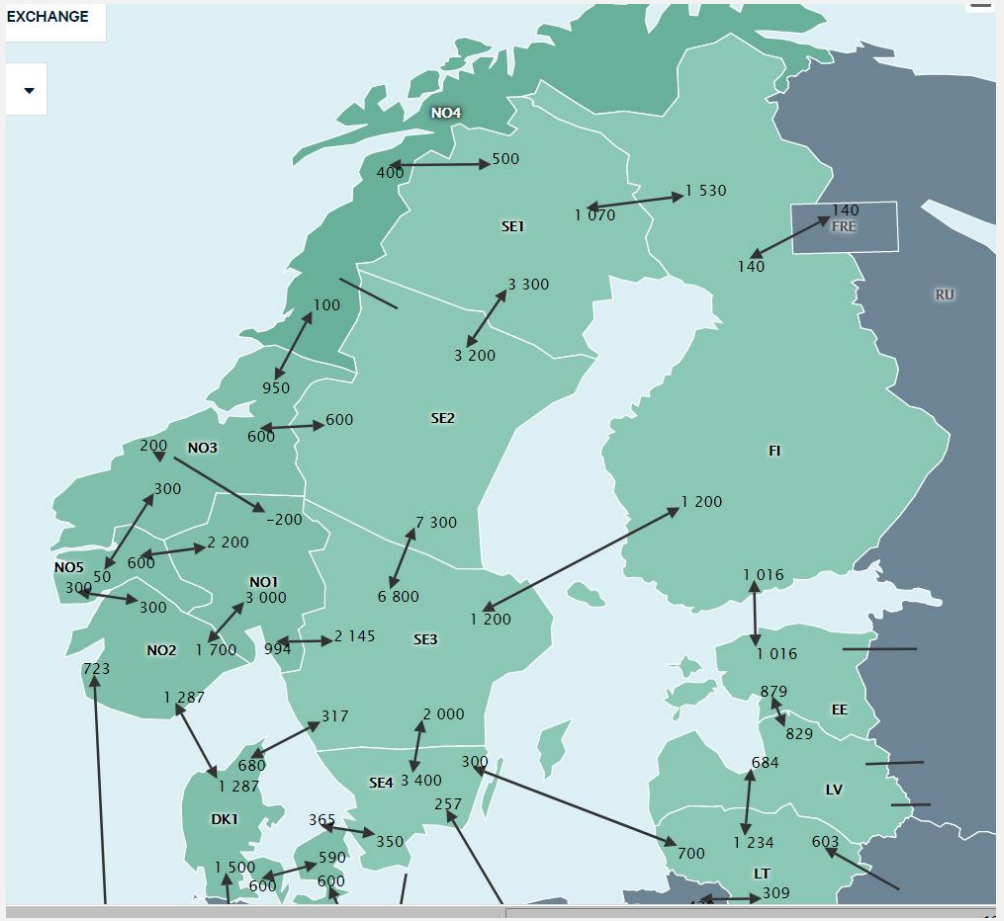
Capacity calculations today

What the TSOs see

What the market sees



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Capacity calculations today

What the TSOs see

- The system must be compliant with the N-1 criterion, i.e. there must be no overloads or other stability issues after any single fault
- Analyses for capacity calculations = identifications of network elements with potential congestions in the grid if cross-border exchanges are too large

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Capacity calculations today

What the TSOs see

- Analyses for capacity calculations = identifications of network elements with potential congestions in the grid if flows are too large

1. What grid elements can be overloaded?

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Capacity calculations today

What the TSOs see

- Analyses for capacity calculations = identifications of network elements with potential congestions in the grid if flows are too large

1. What grid elements can be overloaded?
2. What remedial actions can we use to alleviate these overloads?

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Capacity calculations today

What the TSOs see

- Analyses for capacity calculations = identifications of network elements with potential congestions in the grid if flows are too large

1. What grid elements can be overloaded?
2. What remedial actions can we use to take care of these overloads?
3. If congestions are still present and market trades have an impact, what NTC capacities on what borders are appropriate?

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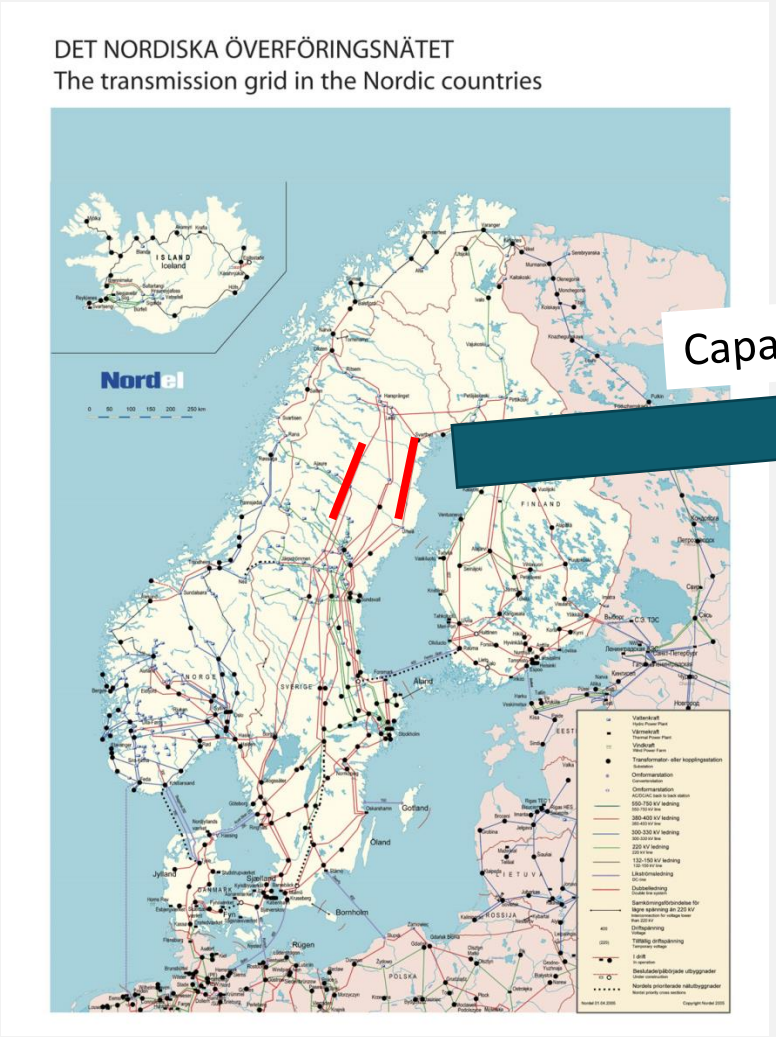
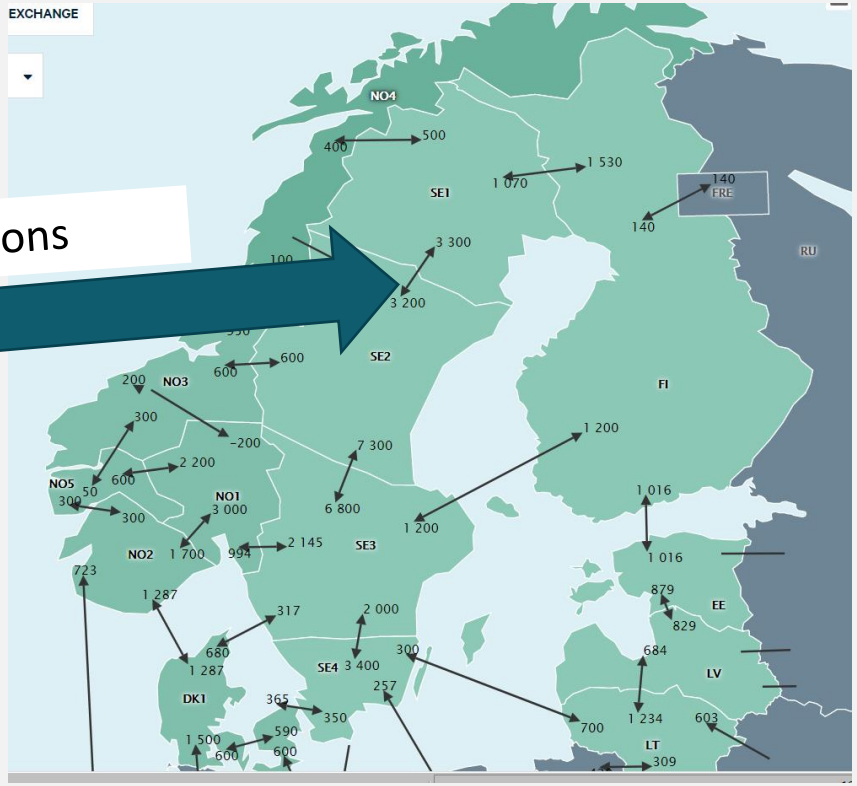
Capacity calculations today

What the TSOs see



Capacity calculations

What the market sees



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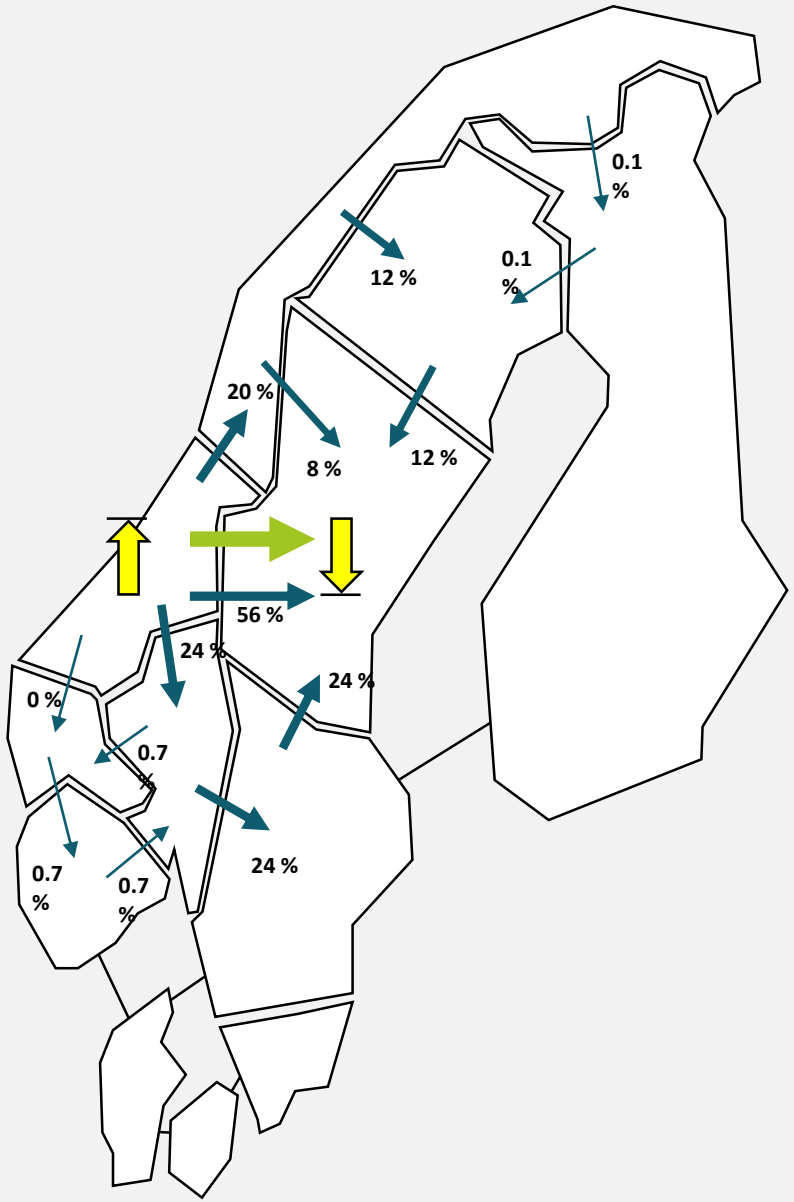
Transit flows

Impact on the bidding zone borders

Trades between bidding zones

	DK1-DE	DK1-SE3	DK1-NO2	DK1-DK2	DK2-DE	DK2-SE4	FIN-EE	FIN-SE3	FIN-NO4	FIN-SE1	NO1-NO2	NO1-NO3	NO1-NO5	NO1-SE3	NO2-NL	NO2-NO5	NO3-NO4	NO3-NO5	NO3-SE2	NO4-SE1	NO4-SE2	SE1-SE2	SE2-SE3	SE3-SE4	SE4-DE	SE4-LT	SE4-PL
DK1-DE	1																										
DK1-SE3		1																									
DK1-NO2			1																								
DK1-DK2				1																							
DK2-DE					1																						
DK2-SE4						1																					
FIN-EE							1																				
FIN-SE3								1																			
FIN-NO4									0								0			0	0						
FIN-SE1									1	1							0			0	0						
NO1-NO2		0									0.9	0.2	0		0.7		0.2										
NO1-NO3	0							0	0.1		0	0.4	0.1	0.2			0.2	0.4	0.2	0.1	0.1		0				
NO1-NO5		0									0.1		0.8		0.6		0.7										
NO1-SE3	0							0	0.1		0	0.6		0.8		0	0.2	0.6	0.2	0.1	0.1		0				
NO2-NL															1												
NO2-NO5		0									0.1		0.2	0	0.3		0.2										
NO3-NO4	0								0.2			0.1		0		0.5	0.1	0.2	0.2	0.3	0.1						
NO3-NO5													0.1		0.1		0.1										
NO3-SE2	0								0.2		0	0.4		0.1	0	0.4	0.4	0.6	0.2	0.2	0.1	0					
NO4-SE1									0.6	0		0.1		0		0.4	0.1	0.1	0.6	0.5	0.1						
NO4-SE2									0.1			0.1				0.1	0.1	0.1	0.1	0.2	0						
SE1-SE2									0.4	0		0.1		0		0.5	0.1	0.1	0.3	0.6	0.9						
SE2-SE3	0							0	0.1		0	0.6		0.2	0	0.2	0.6	0.2	0.1	0.1		1					
SE3-SE4																							1				
SE4-DE																								1			
SE4-LT																									1		
SE4-PL																										1	



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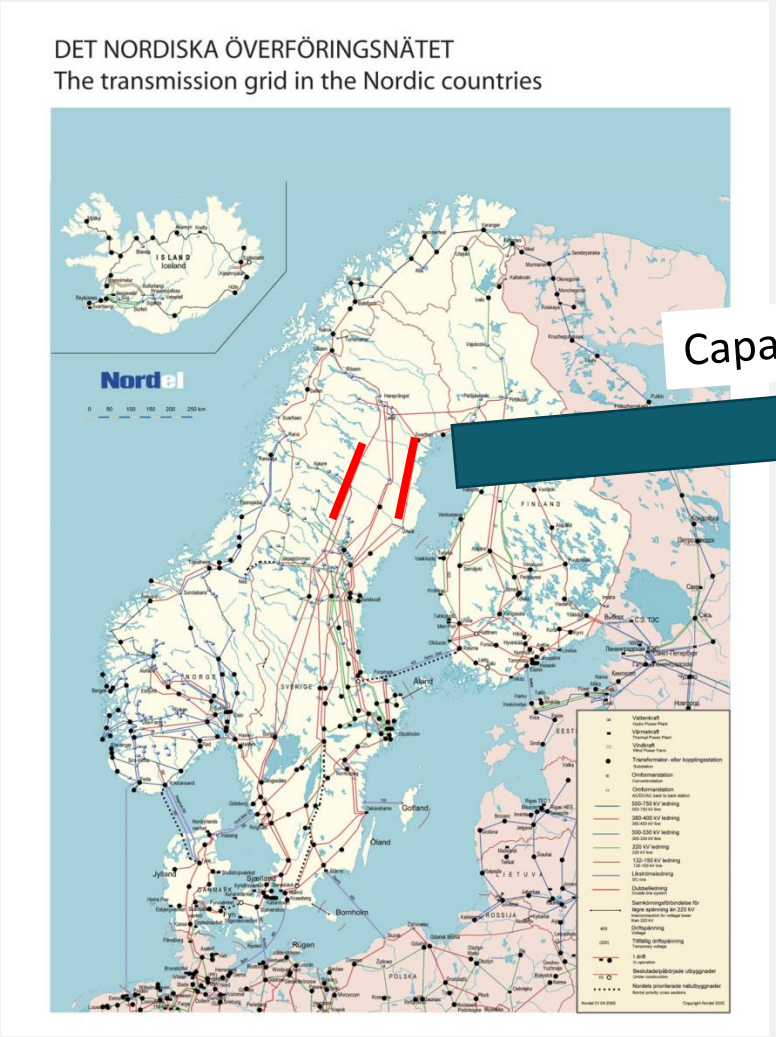
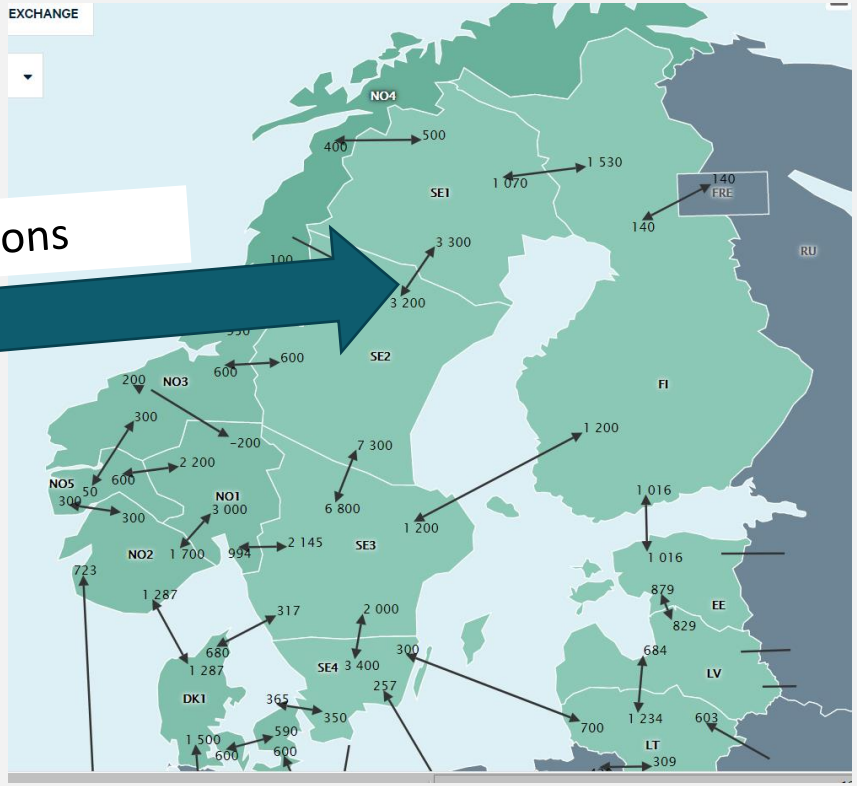
Capacity calculations today

What the TSOs see



Capacity calculations

What the market sees



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Capacity calculations today

What the TSOs see

What the market sees

The capacities on different borders depend on each other.

<u>Difficult to consider today in a good way.</u>

With FB, the market is made aware of the impact of cross-border exchanges on all borders.

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Capacity calculations today

What the TSOs see

- Many cross-border exchanges may impact the same grid element
- How to distribute capacities among all borders?
- We don't know D-2 where the capacity is most needed.

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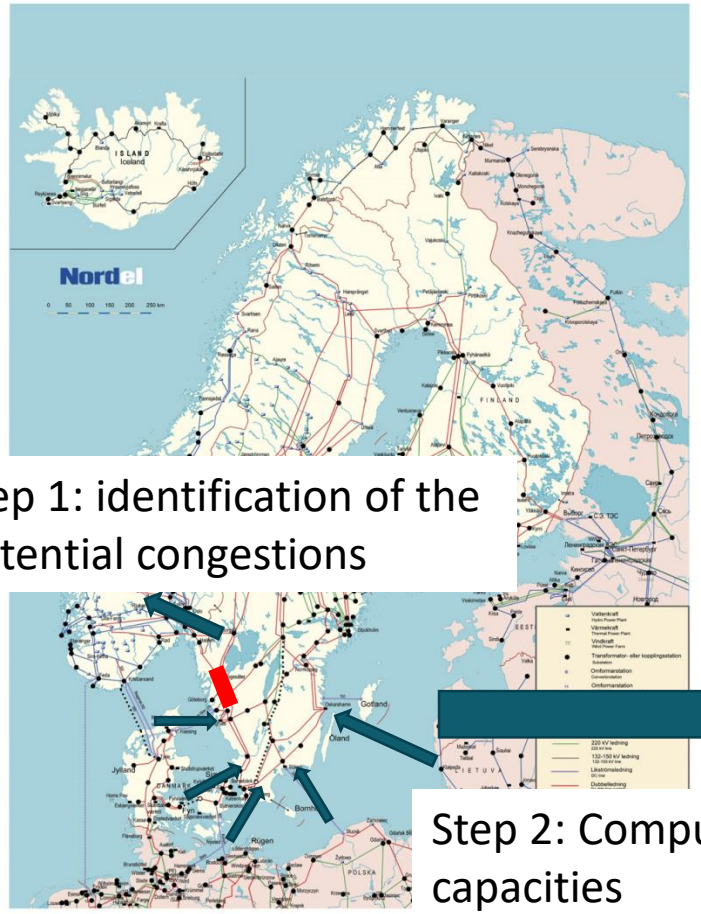
Capacity calculations today

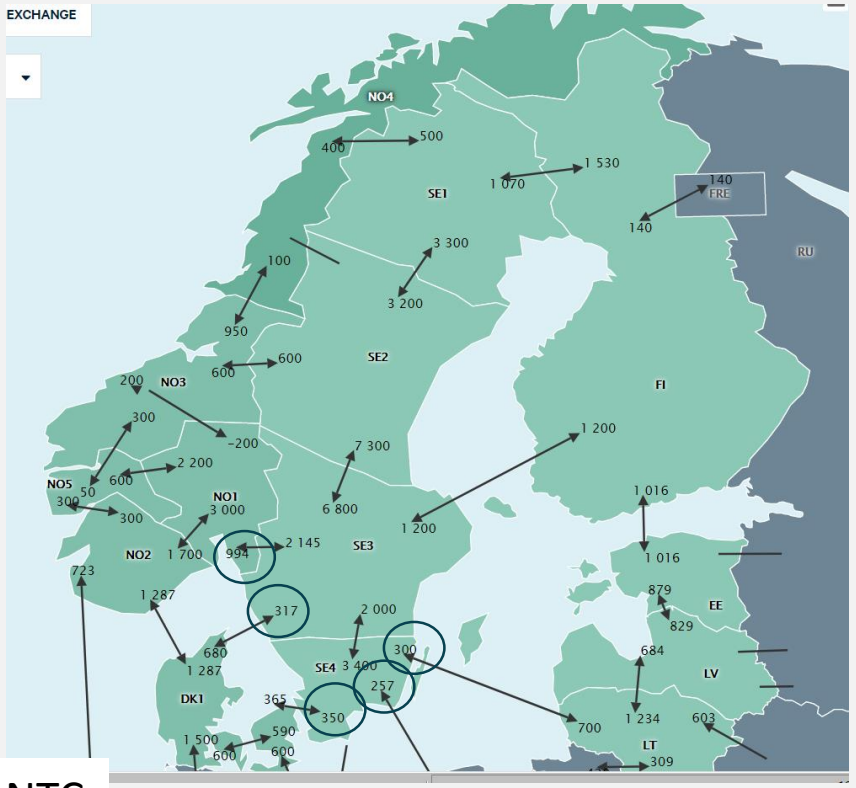
What the TSOs see



Step 1: identification of the potential congestions

Step 2: Computation of NTC capacities

What the market sees



Step 3: Capacity allocation

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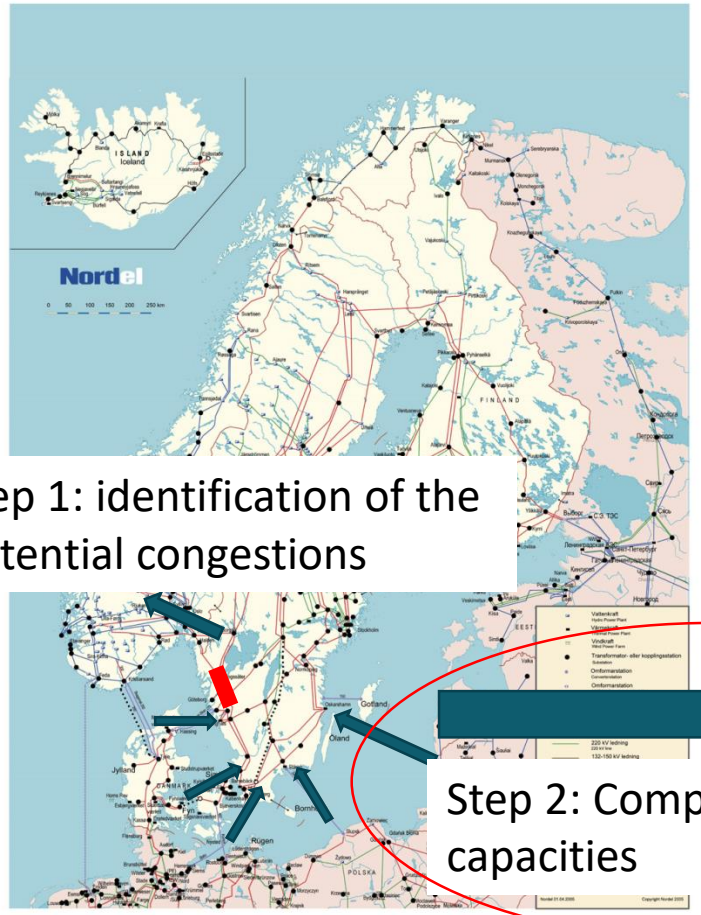
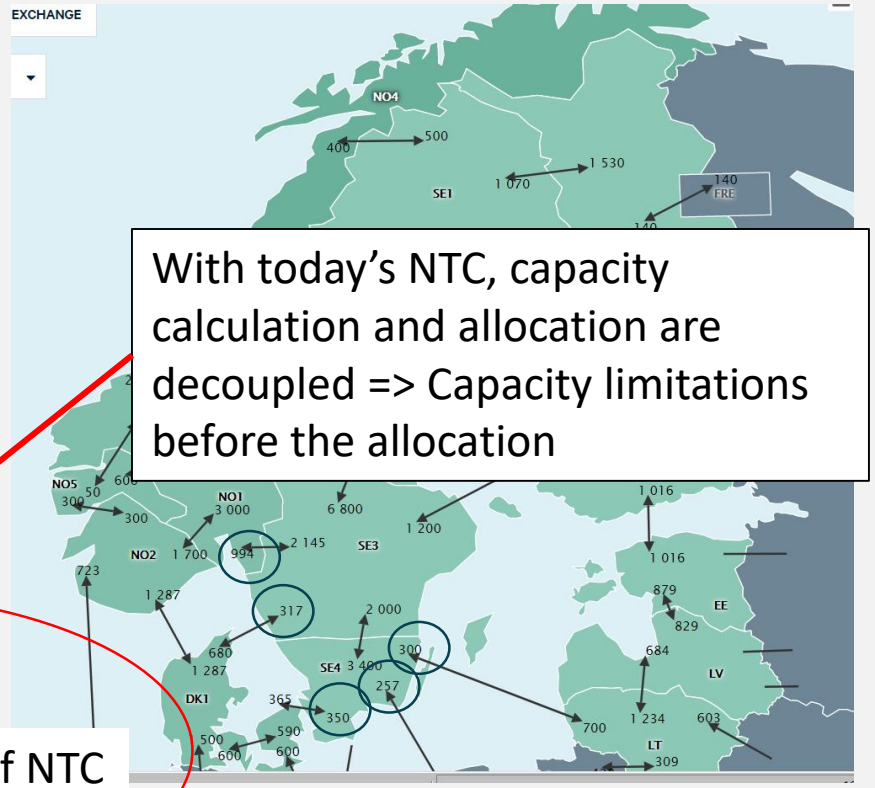
Capacity calculations today

What the TSOs see



What the market sees



Step 1: identification of the potential congestions

Step 2: Computation of NTC capacities

With today's NTC, capacity calculation and allocation are decoupled => Capacity limitations before the allocation

Step 3: Capacity allocation

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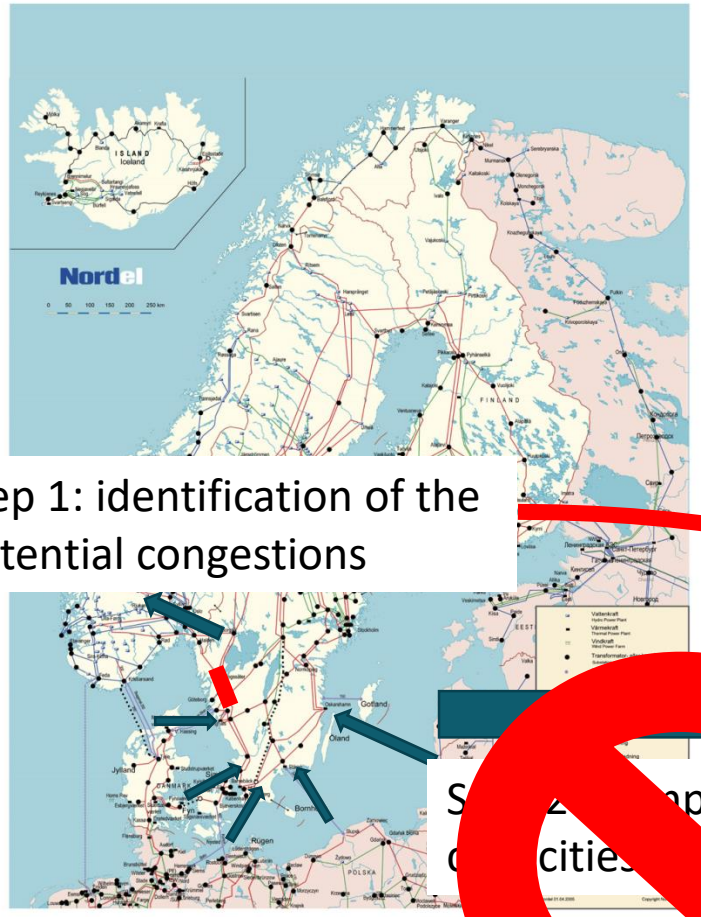
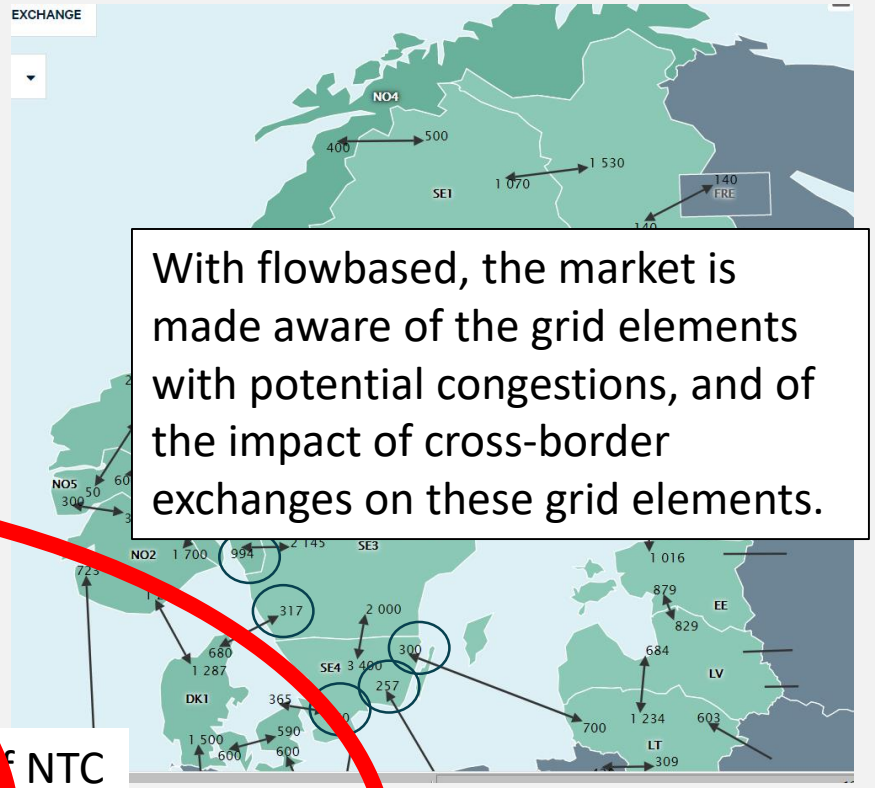
Capacity calculations tomorrow – Flowbased

What the TSOs see



What the market sees



Step 1: identification of the potential congestions

With flowbased, the market is made aware of the grid elements with potential congestions, and of the impact of cross-border exchanges on these grid elements.

S… 2 …nputati… …f NTC
c… …cities

Step 2: Capacity allocation

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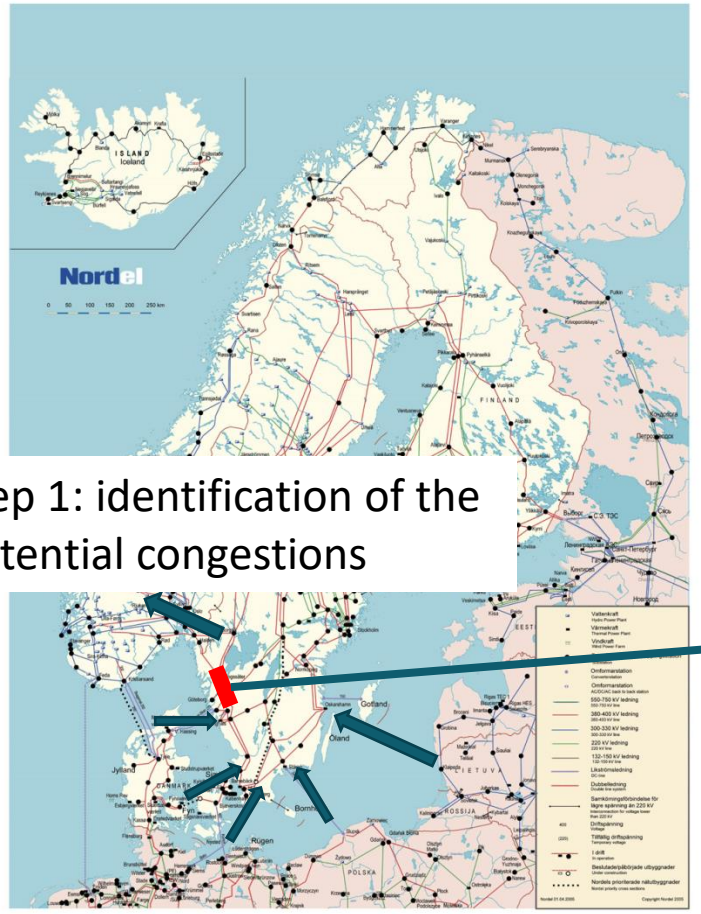
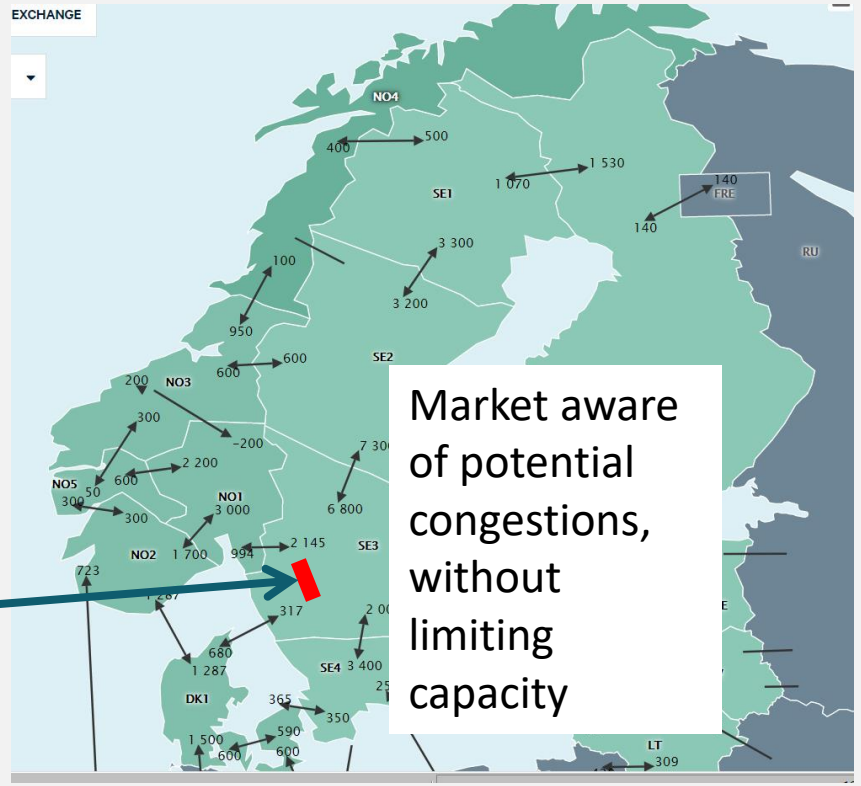
Capacity calculations today

What the TSOs see



Step 1: identification of the potential congestions

What the market sees



Market aware of potential congestions, without limiting capacity

Step 2: Capacity allocation

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3. Results from the simulations of weeks 1-12, 2017
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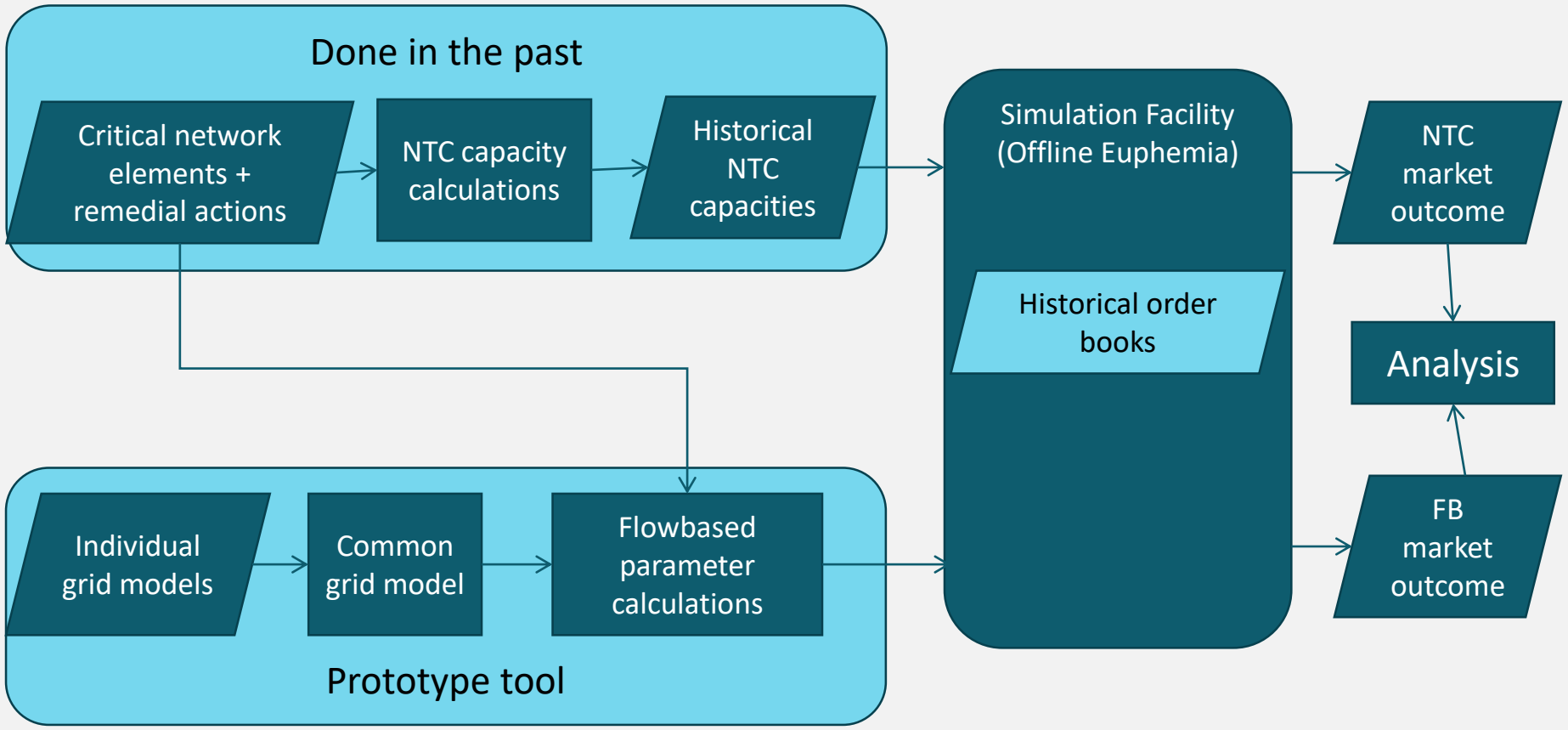
Simulation setup in the CCM project



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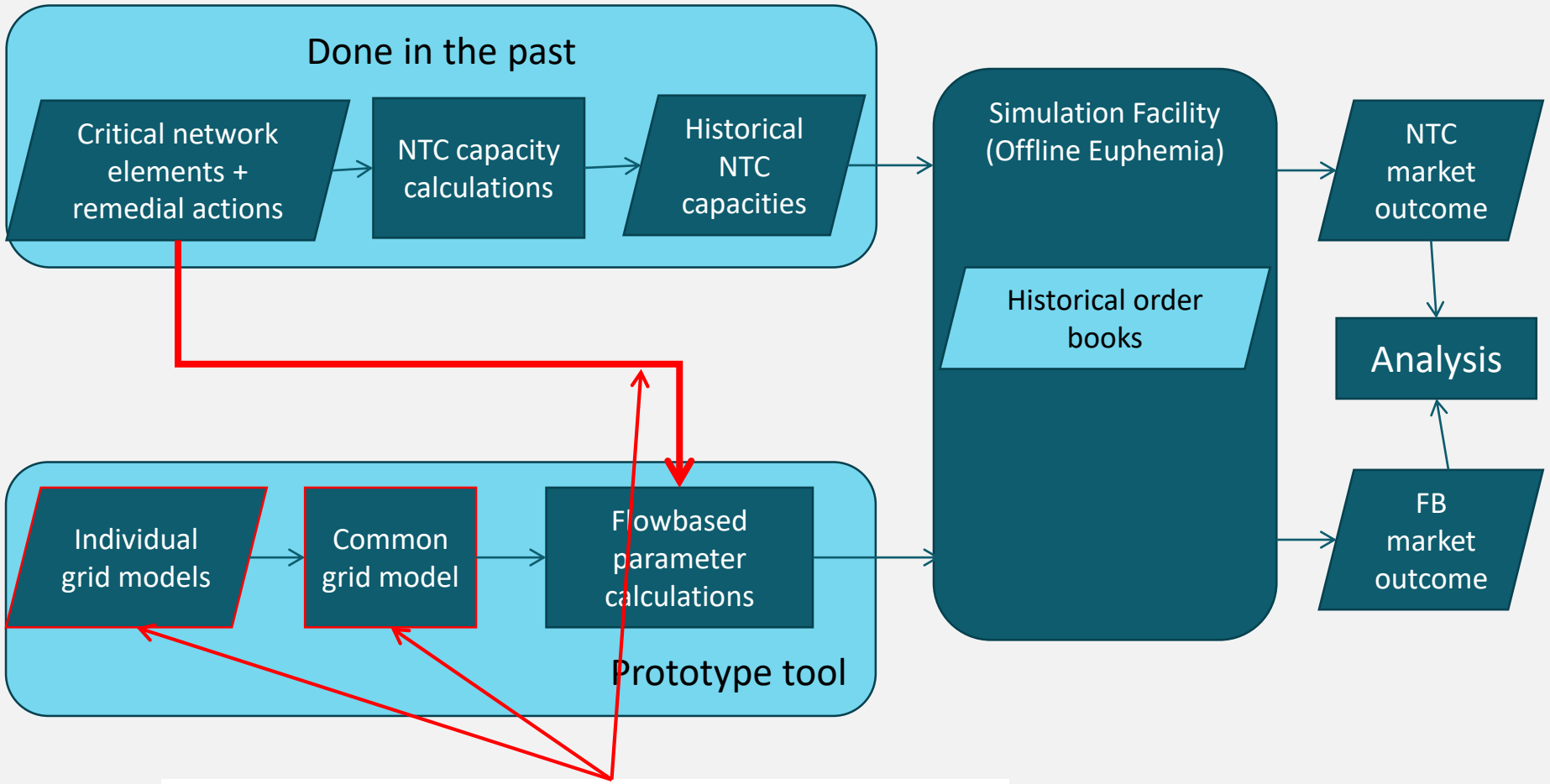
Simulation setup in the CCM project



Not straightforward due to lack of industrial tools

Requirements for fair comparison

To do fair comparisons between NTC and FB, we need to ensure that:

- The same critical network elements considered
- The same remedial actions considered
- The common grid model is a forecast D-2

Hours for which the above requirements are not met are removed from the analysis.

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Agenda

1. Flowbased – recap.
2. Simulation setup in the CCM project
3. **Results from the simulations of weeks 1-12, 2017**
4. Summary

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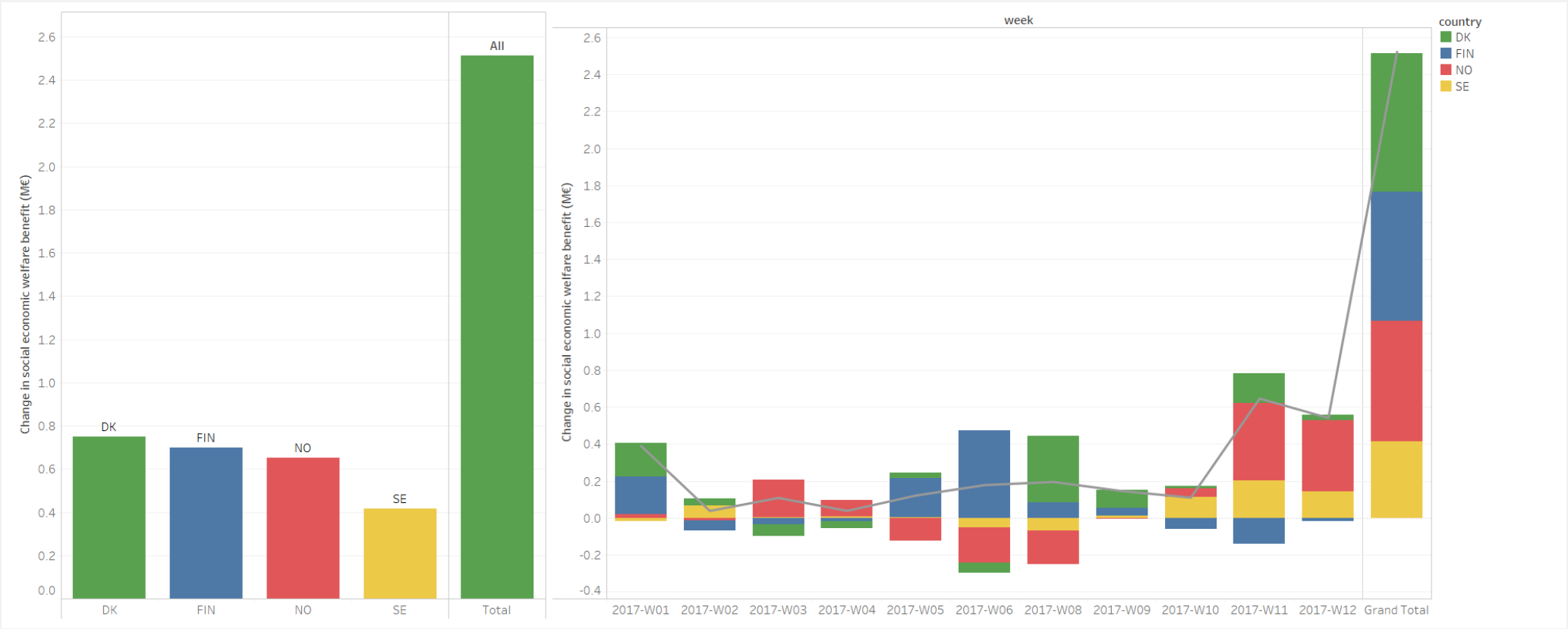
Socioeconomic welfare gains, week by week



- Three typical situations
  - Windy nights and better handling of the West Coast corridor => Lower prices => Higher consumer surplus
  - High loads + congestions in the Norwegian grid and on Sweden's Cut 2 => Difficulty to export cheap power from NO4 and Northern Sweden. Better handling of congestions with FB => Higher welfare.
  - Available capacity in the grid => No big change in SEW but redistribution between actors.

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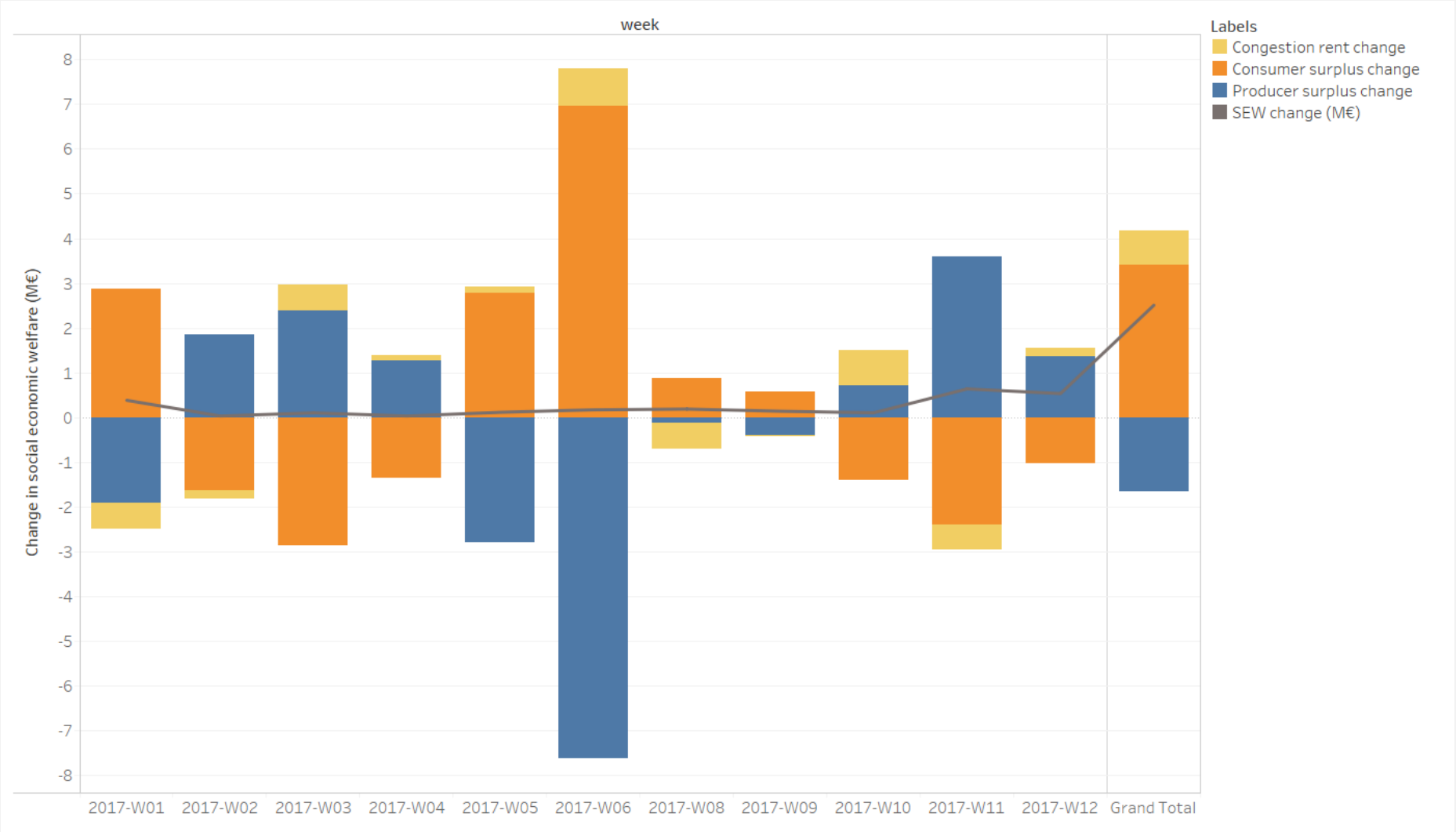
Socioeconomic welfare gains, cont.



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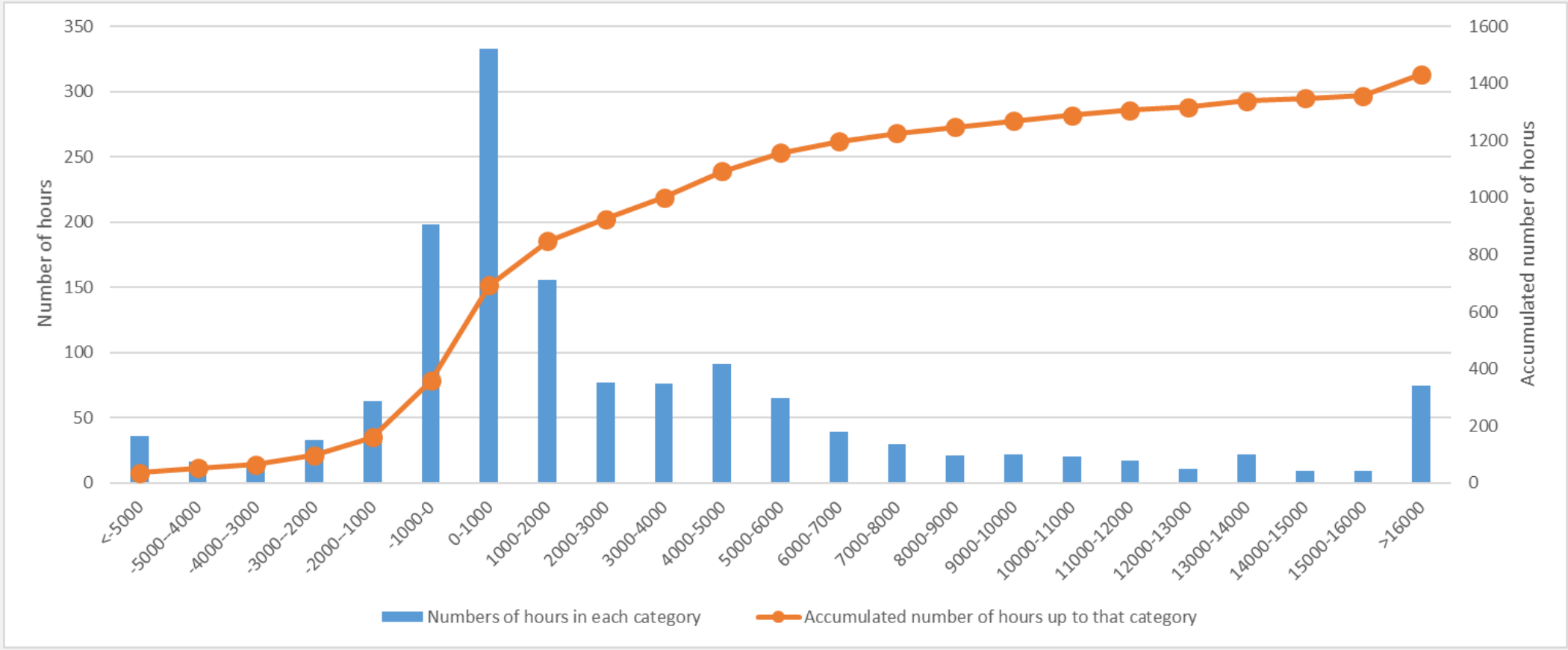
Statistical distribution of socioeconomic welfare gains



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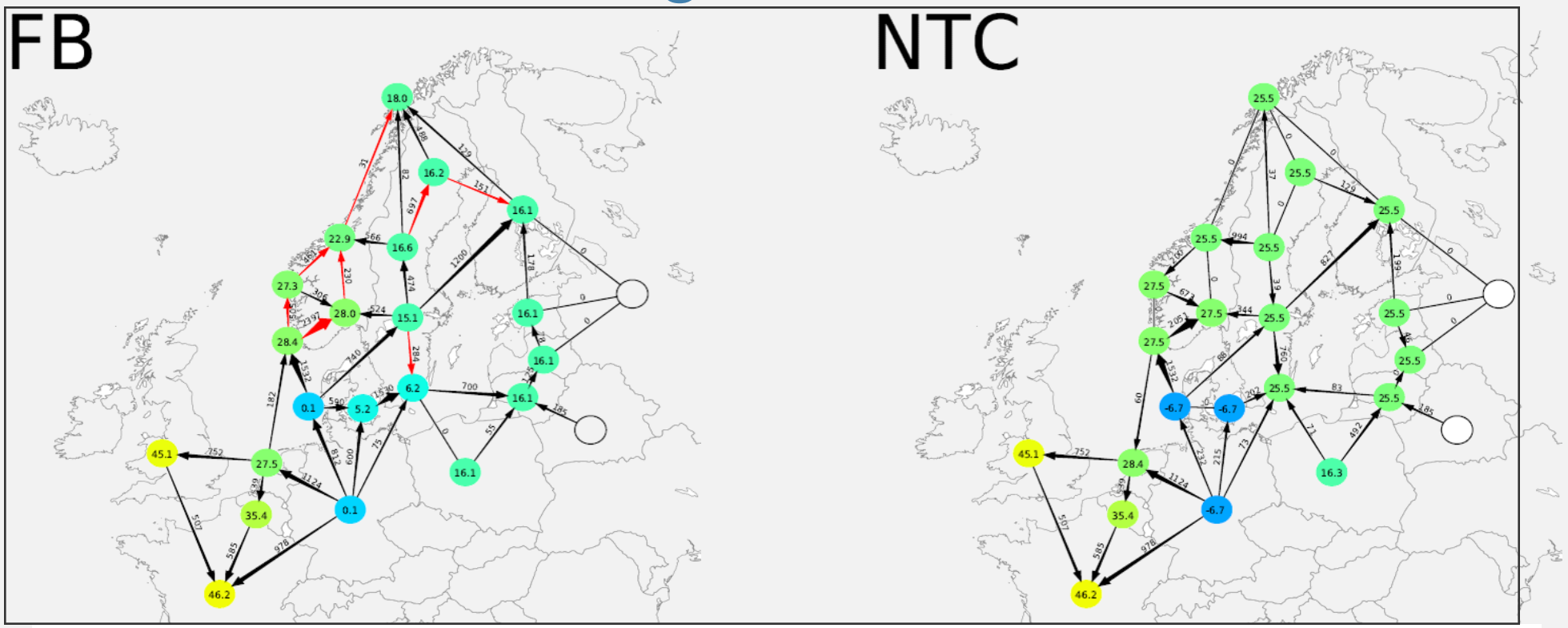
Week 1: 4 January, 03.00: A windy night



- A lot of wind to be exported from DK/GE to the Nordics
- With NTC, limitations on DK1->SE3 and DK2->SE4 due to West Coast corridor
- With FB, capacity allocation in the market considers directly the West Coast corridor without need for limitations.

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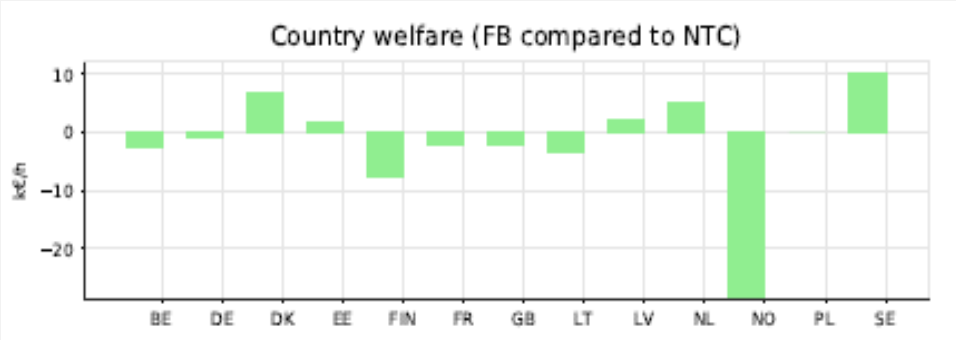
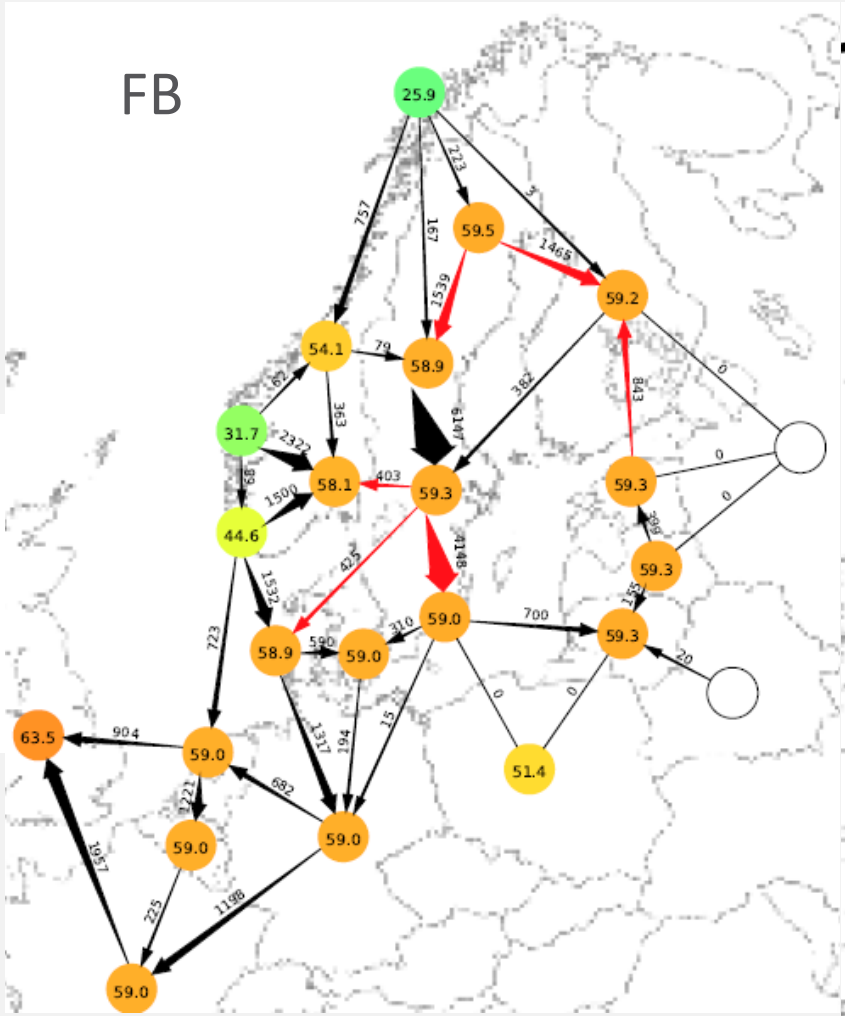
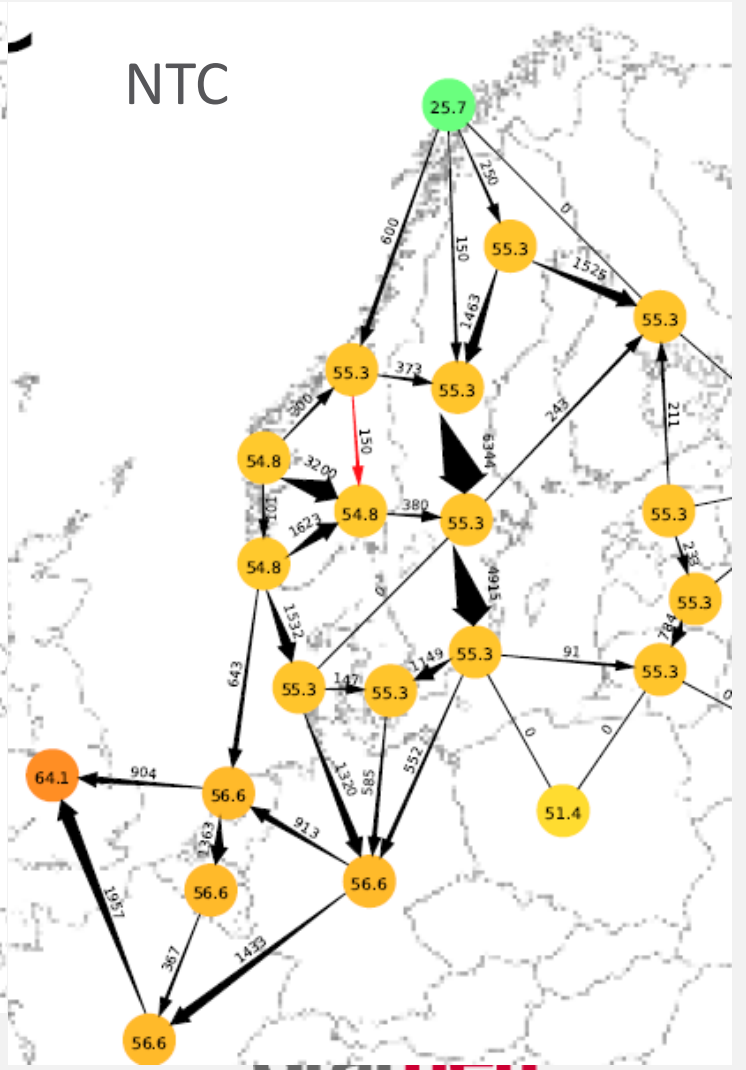
Week 10, 07-03-2017 18:00

- In the hours with NTC overloads, FB is maximizing the capacity from NO2 and NO5 with non-intuitive flows from SE3 to NO1
- Negative change in SEW – mainly driven by a large reduction in Norwegian SEW







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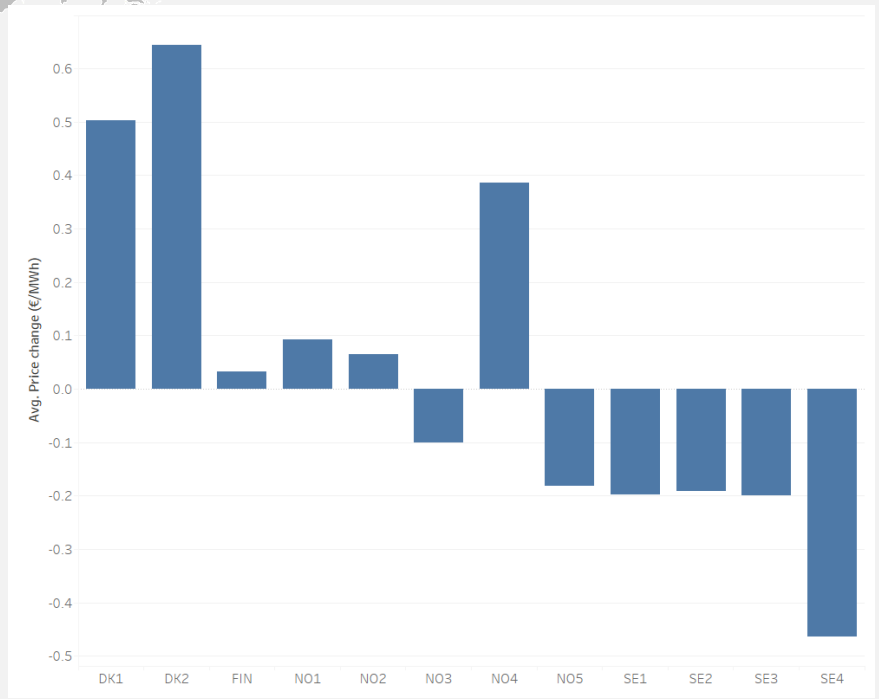
Prices, averages from the 11 weeks of simulations



- Increase in DK1 and DK2
  - More export during windy nights
- Decrease in NO5 and increase in NO4
  - Shift of using producing in NO5 to producing in NO4
- Decrease in SE
- Mainly unchanged in FI
- Overall a slight increase in prices: 0.22 €/MWh

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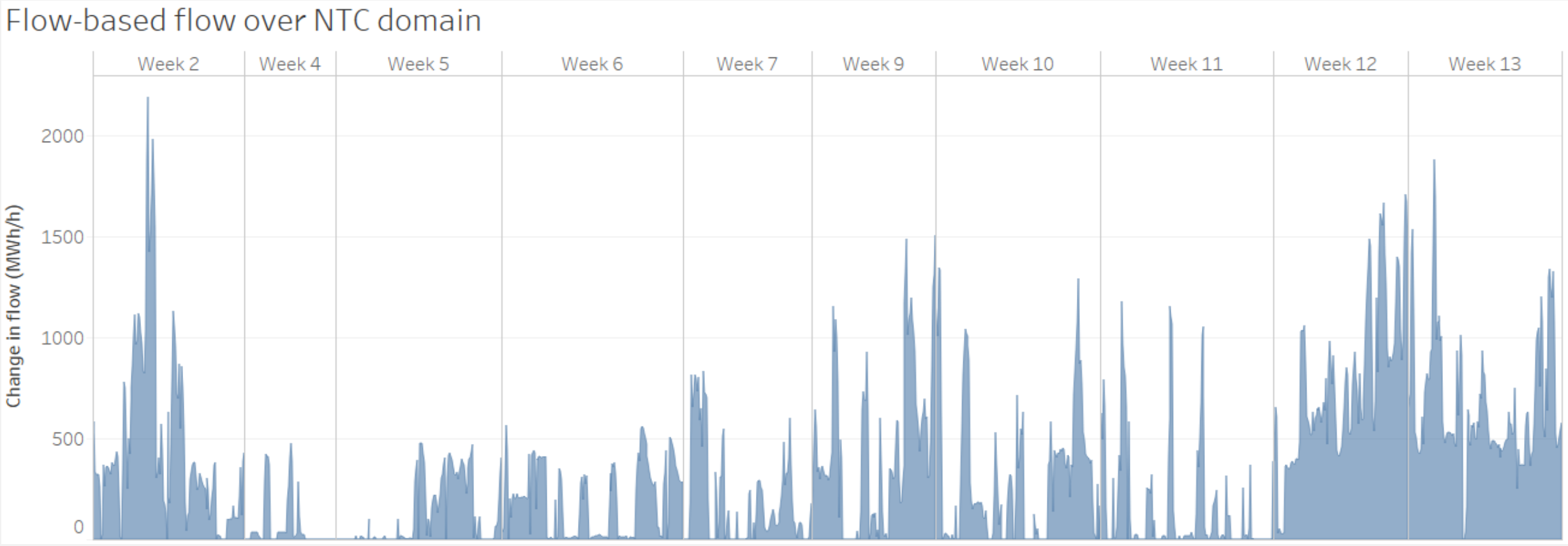
Use of extra capacity with FB



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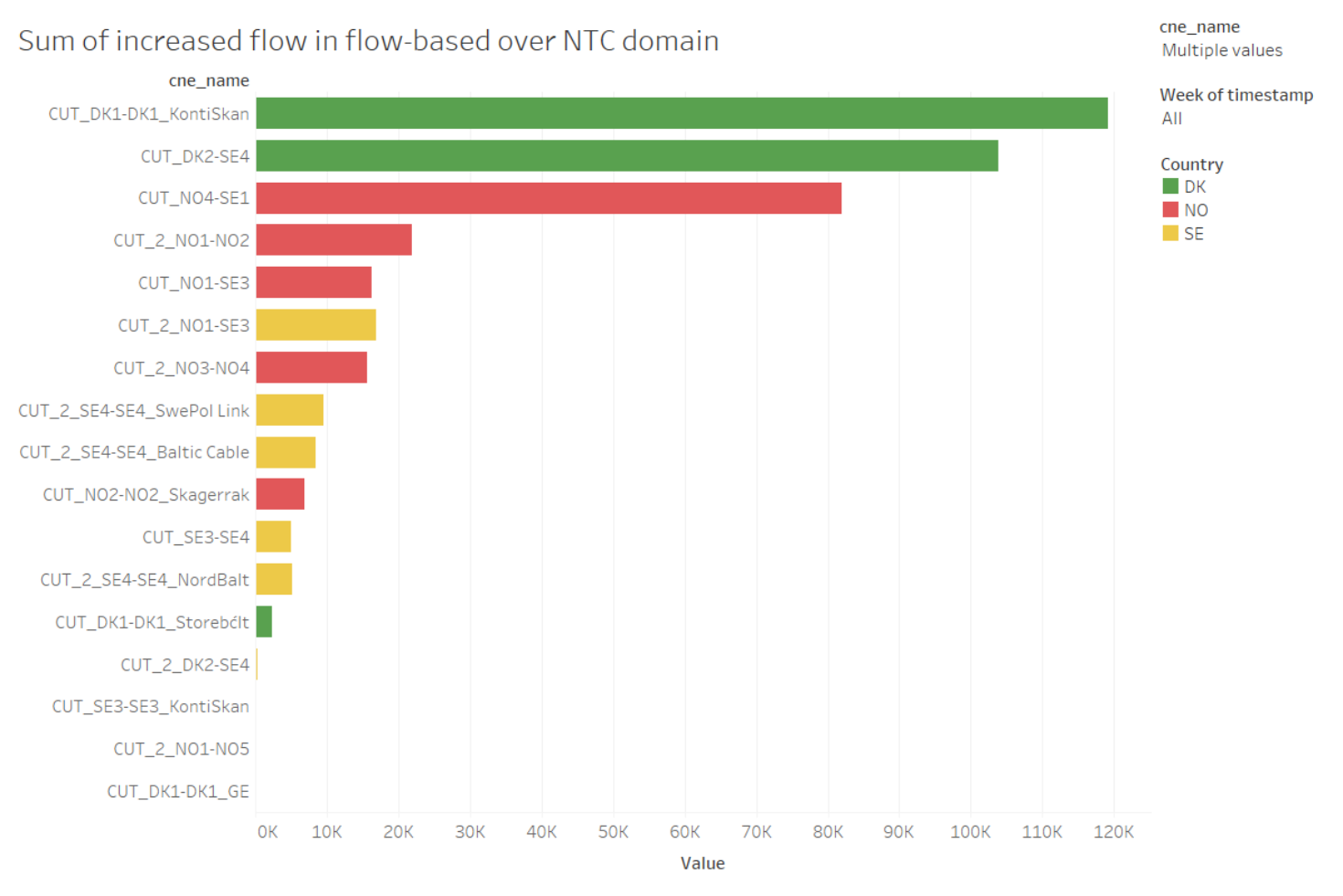
Use of extra capacity with FB



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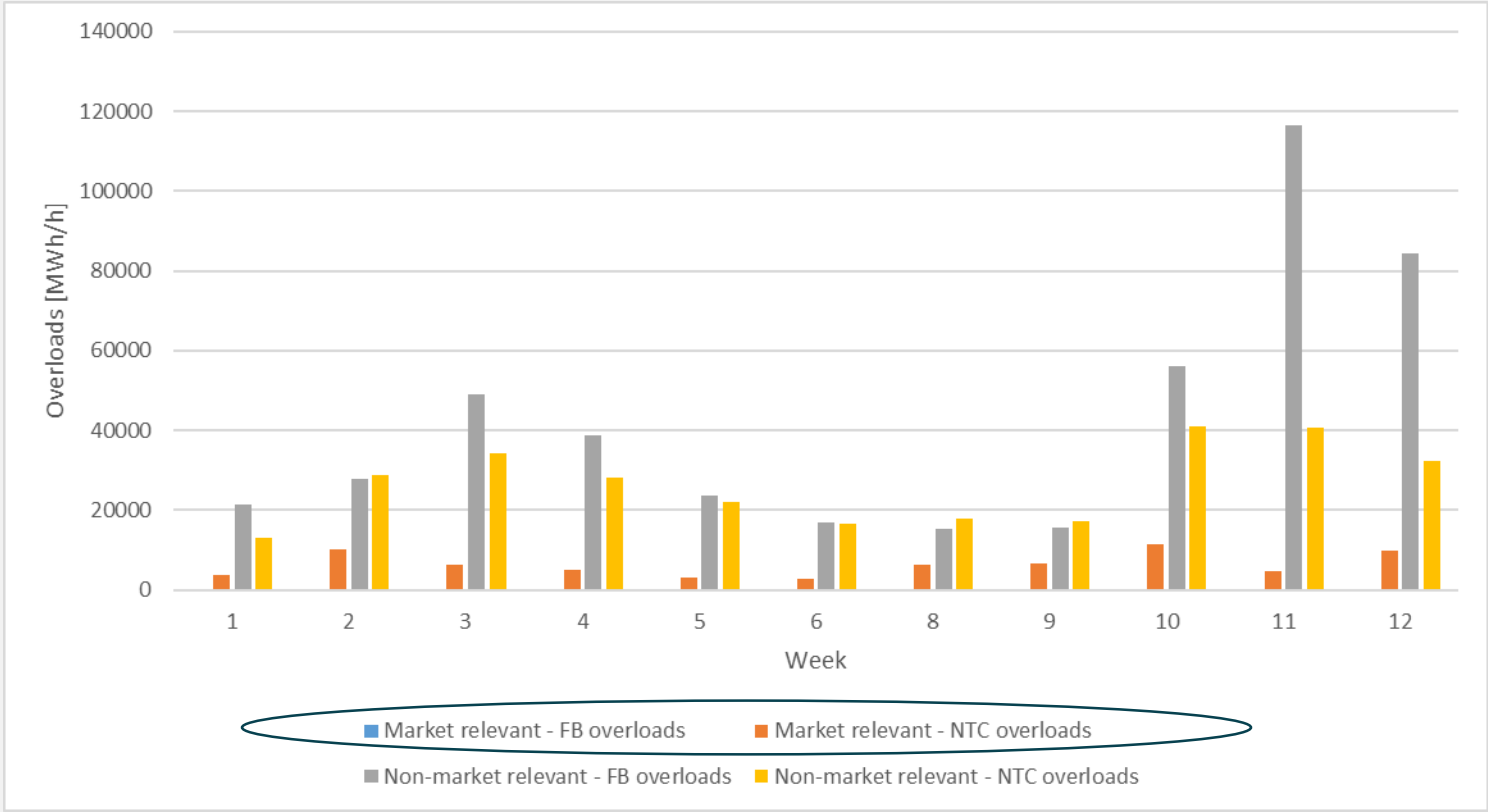
Power system security: Impacts on overloads

- Two types of network elements: market-relevant and non-market relevant
- Market-relevant network elements receives at least 15% of cross-border trades

- Current NTC capacities are not always N-1 secure => Can create overloads on market-relevant network elements
- With FB, the market is aware of the market-relevant network elements => No overload on them



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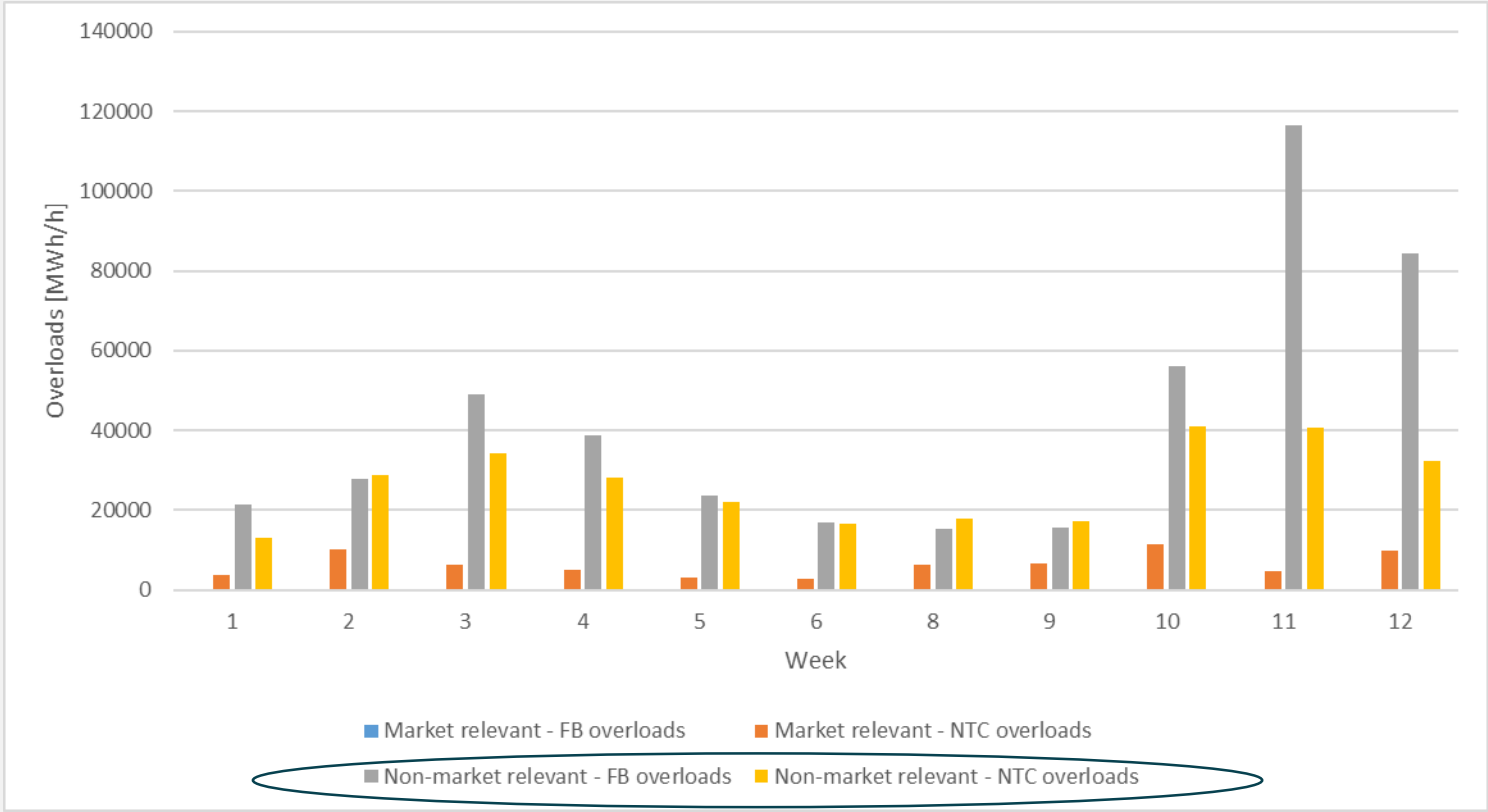
Power system security: Impacts on overloads

- Two types of network elements: market-relevant and non-market relevant
- Market-relevant network elements receives at least 15% of cross-border trades

- Non-market relevant network elements are not considered in FB
- Some of them may be considered in current NTC (no 15% threshold applied today in current CNTC)
- Increase of non-market relevant overloads indicate that the capacity in the system is used to a greater extent.



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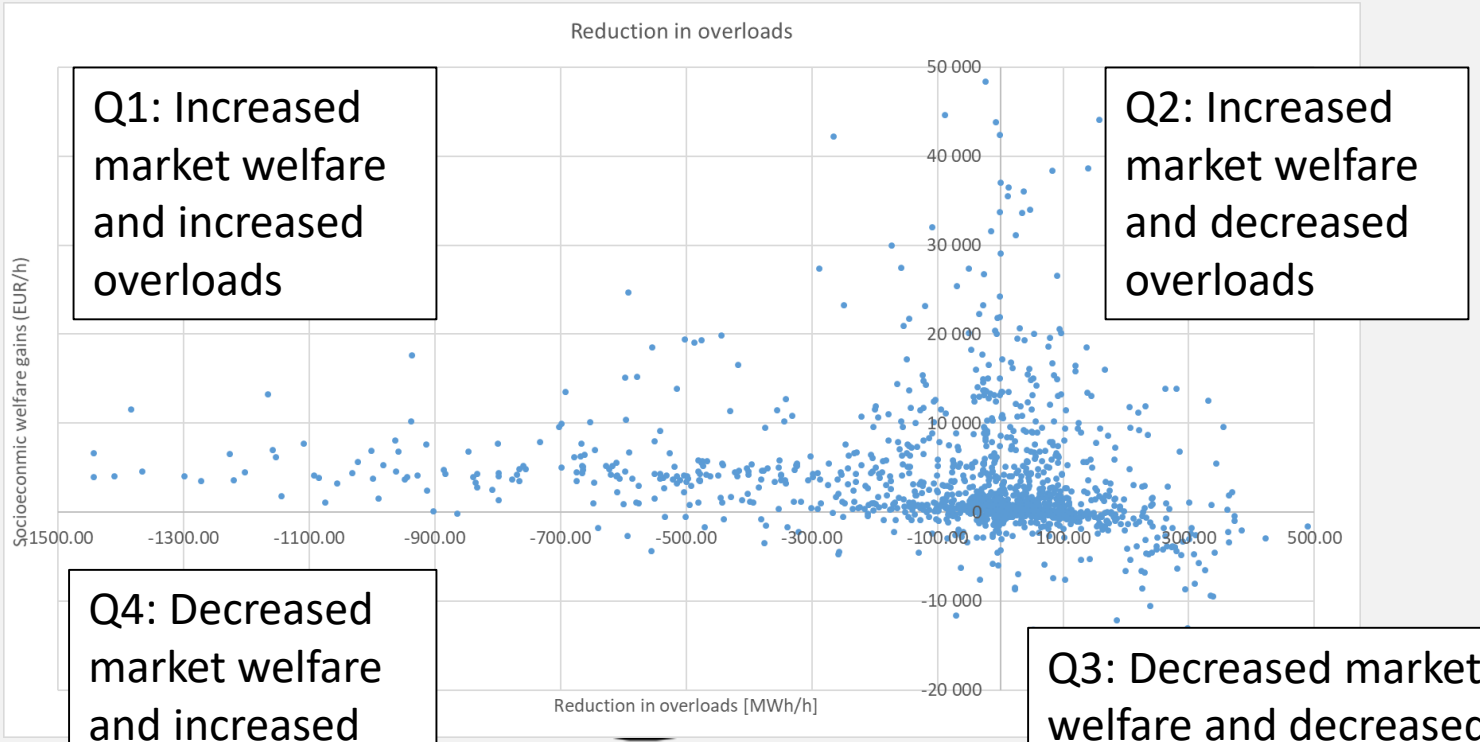
Power system security and SEW, hourly results

Average overloads NTC-FB [MW]	Average surplus FB-NTC [Euros]	Median overloads NTC-FB [MW]	Median surplus FB-NTC [Euros]
-73	3480	-5	1085

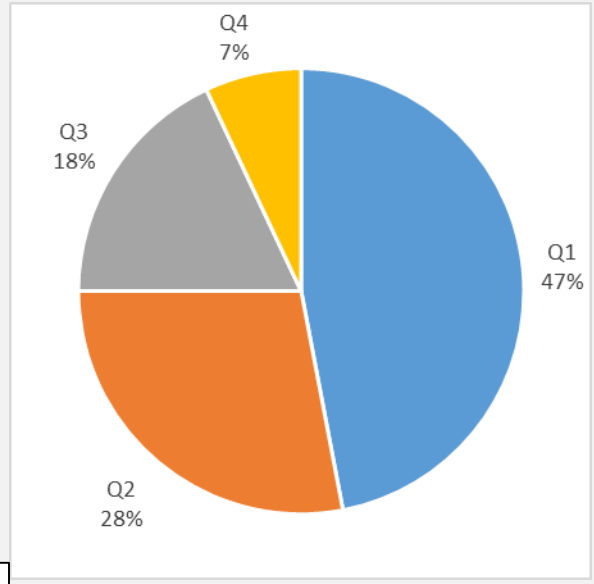


Q1: Increased market welfare and increased overloads

Q2: Increased market welfare and decreased overloads

Q4: Decreased market welfare and increased overloads

Q3: Decreased market welfare and decreased overloads



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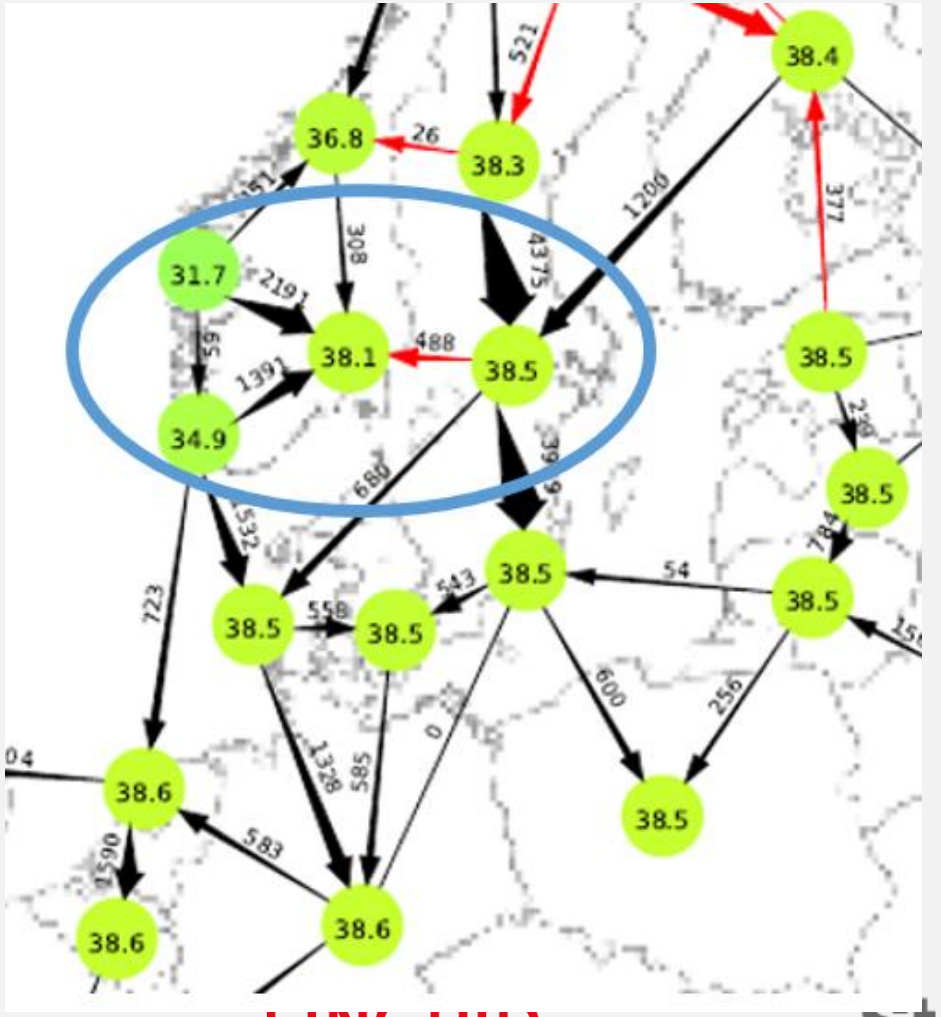
Loops / non-intuitive flows as optimization

- Non-intuitive flow from SE3 to NO1
- Optimizes import to NO1 from areas with larger price differences (NO2 and NO5)



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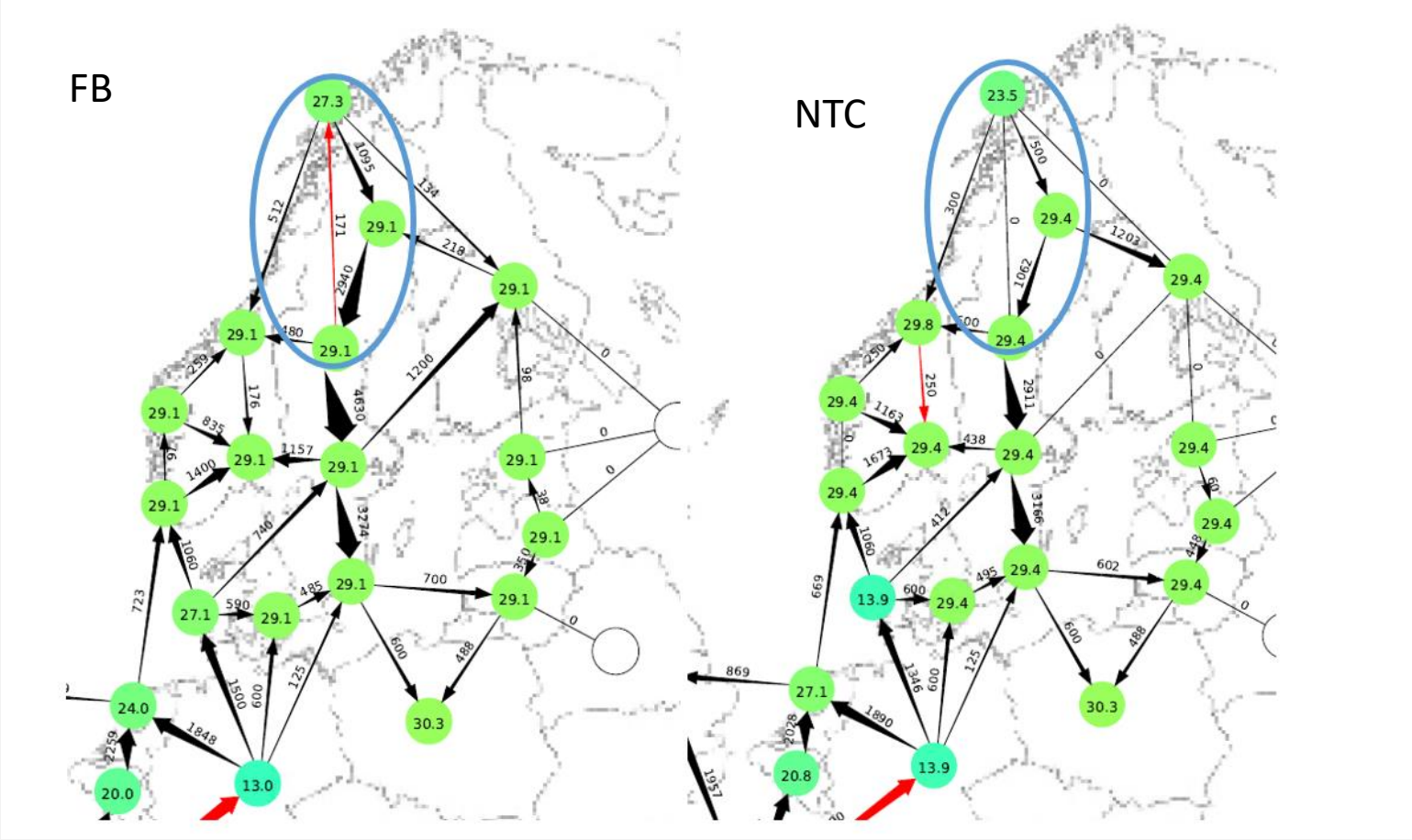
Loop / non-intuitive flows due to the physical grid

19 March 2017: 10.00 – 11.00



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Agenda

1. Flowbased – recap.
2. Simulation setup in the CCM project
3. Results from the simulations of weeks 1-12, 2017
4. **Summary**

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Summary

1. In average, welfare gains when changing to FB compared with current NTC
2. Welfare loss for some hours due to unsecure NTC capacities
3. Structural congestions such as West Coast corridor and export limitations in Norway dealt with in a more efficient way with flowbased:
   - No need to limit capacities ex ante.
   - Instead: full capacities + critical network elements given to the market => capacity allocated in the market in a more efficient way.

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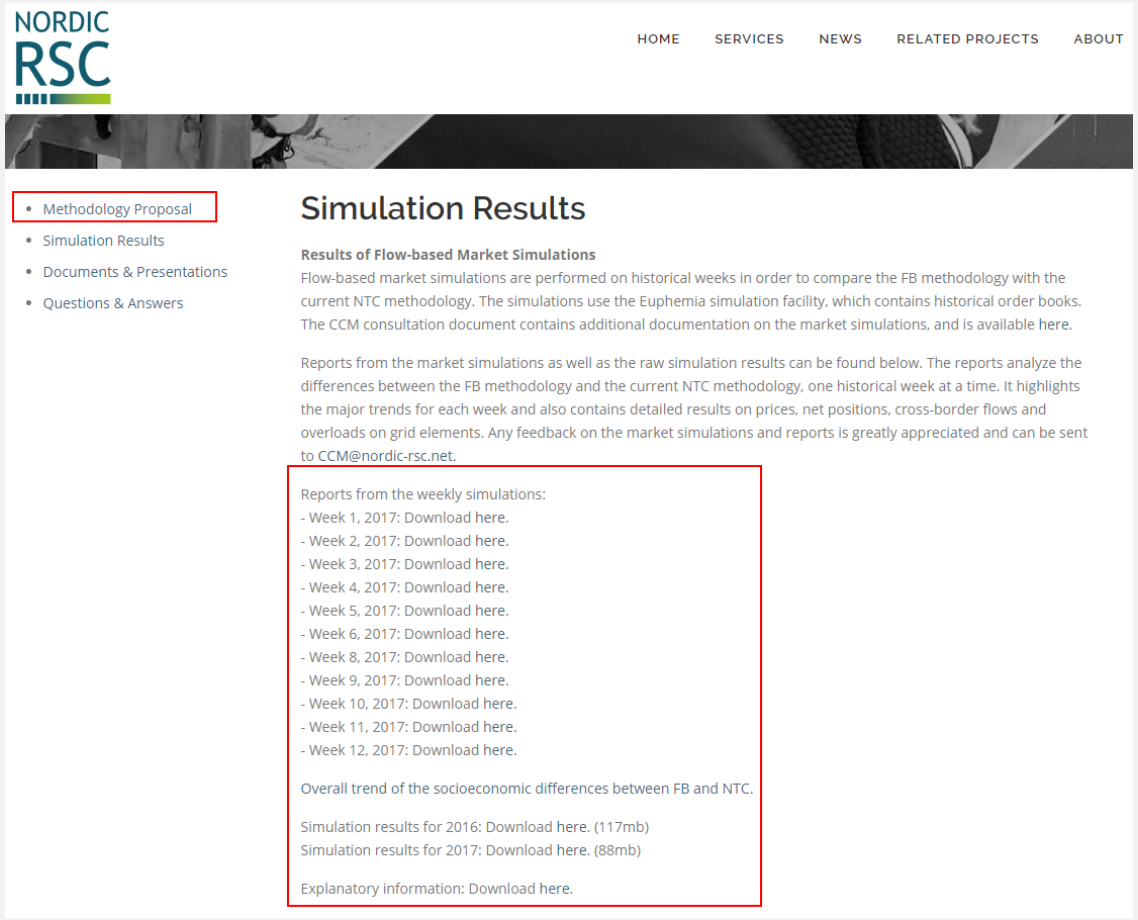
Other information



- External report for every week of simulation
- Graph with overall trends over the simulated weeks
- Zip files with the data used in the simulations.

- Feedback on these reports is very appreciated (CCM@nordic-rsc.net)

- Short analysis of the simulated week included: is it something that you need or do you prefer to only get the raw numbers?

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Agenda

- Introduction
- Timeplan
- CCM
- Splitting of capacity

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Introduction

- Guideline on forward capacity allocation - We distinguish between the size of long-term capacity and the amount / split of long transmission rights (LTTR):
- Size of long-term capacity - Article 10:
  - ✓TSOs in capacity calculation regions (CCRs) must submit a long-term capacity calculation (FCA CCM) proposal by 6 months after approval of CCM for the day ahead market
  - ✓→this is jointly prepared between the Nordic TSOs
- Quantity and split of LTTR Article 16:
  - ✓Method for split capacity on different transmission products (month, year) and applies only to TSOs that have (have) long transmission rights
  - ✓→this is developed by only Energinet for use on DK1-DK2 (Storebælt)

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Time plan

Stakeholder Forum
Dec 11

Submission of final CCM proposal to NRAs
Jan 16

Legal CCM proposal ready + internal consultation document
Nov 16

Implementation after implementatio of:
- **GCM**
- **Single allocation platform**
- **Coordination Capacity calculator (RSC)**

NRA meeting
Oct 30

Jul | Aug | Sep | Oct | Nov | Dec | 2019 | +2021

Jun 1 - Nov 15 — **Develop FCA CCM**

Oct 1 - Nov 15 — **Develop supporting document**

Oct 1 - Nov 15 — **Develop legal document**

Nov 16 - Dec 17 — **Public consultation and internal TSO consultation**

Dec 17 - Jan 16 — **Finalization of the CCM proposal and SC approval**

Dec 24 - Jan 4 — **Holiday period**

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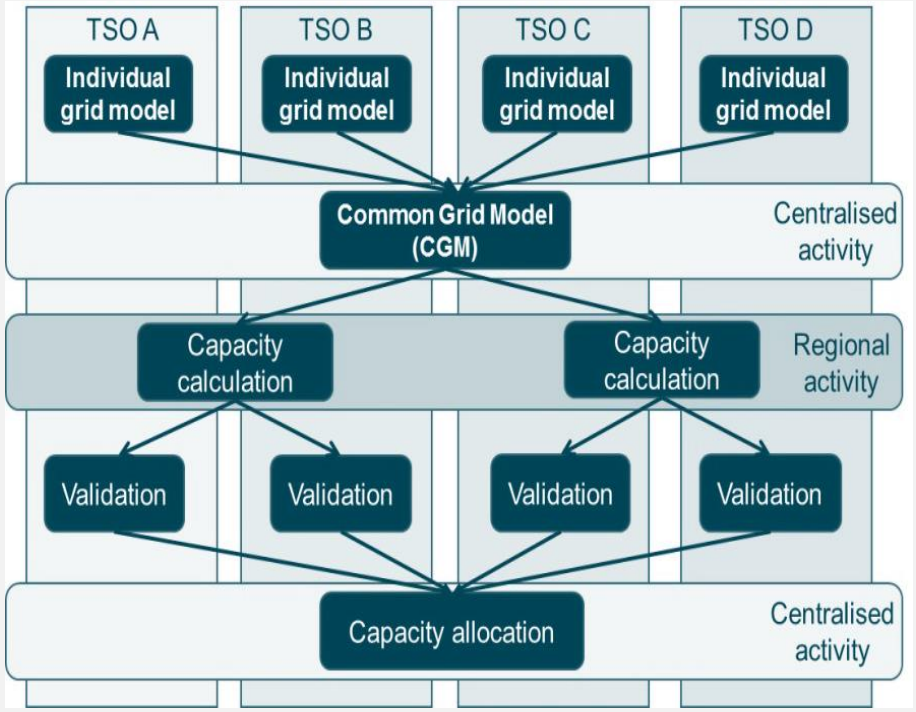
Capacity calculations are based on a scenario approach

- Long-term capacity calculation uncertainty is handled through a security analysis based on 8 scenarios for CGM input parameters for years and 2 scenario parameters for CGM input parameters for month



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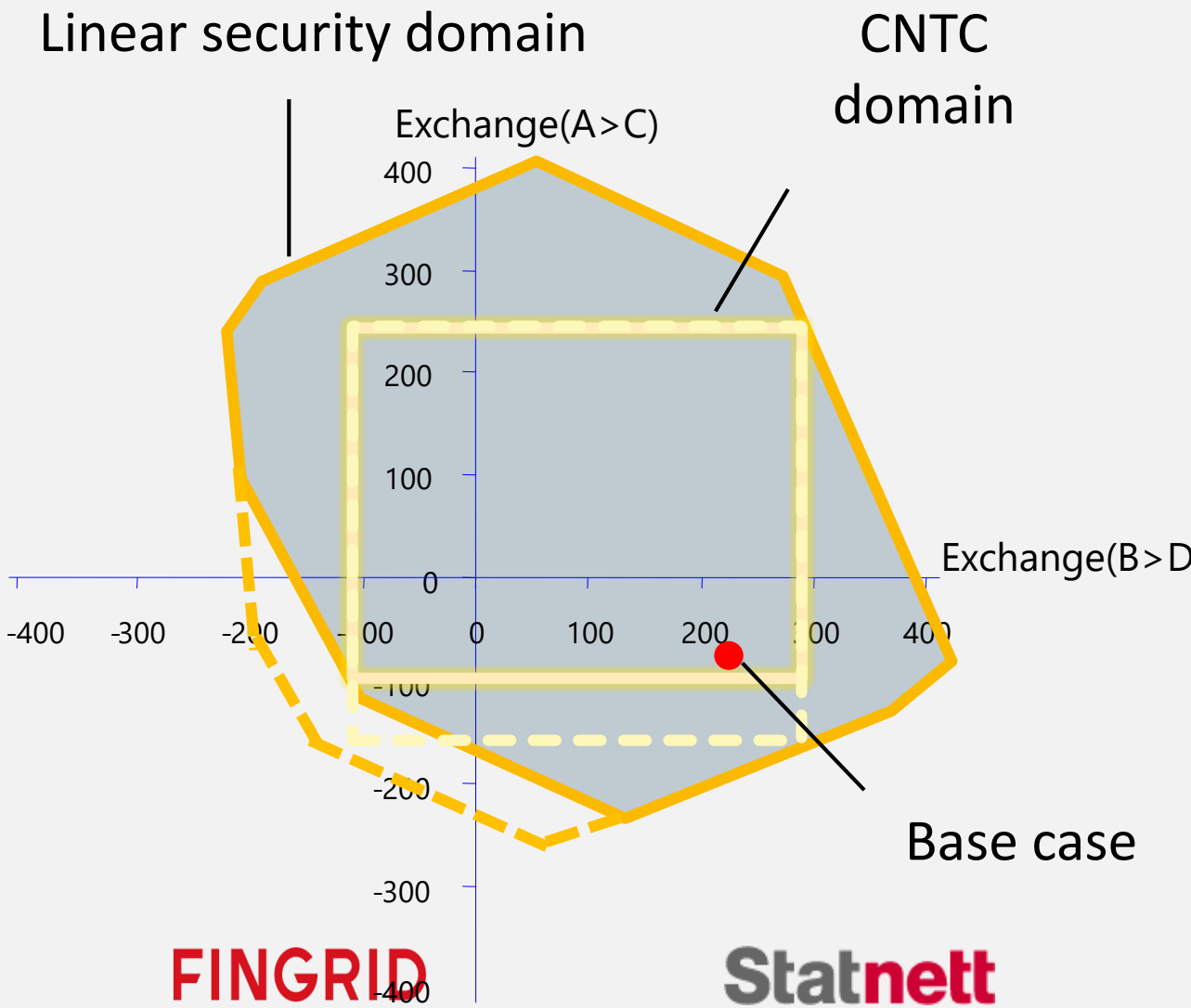
Proposal for long term capacity calculation method

- From market perspective, to some degree basically same end result as today
- The method is about calculating the highest possible capacity (CNTC domain), where the allowed exchange between two bid areas is independent of exchanges on other connections
- Two elements:
  - ✓ "Extend" a CNTC domain within the linearized security domain
  - ✓ Consider whether the domain in one corner / edge ("unnecessary") limits allowed market outages in another corner / edge



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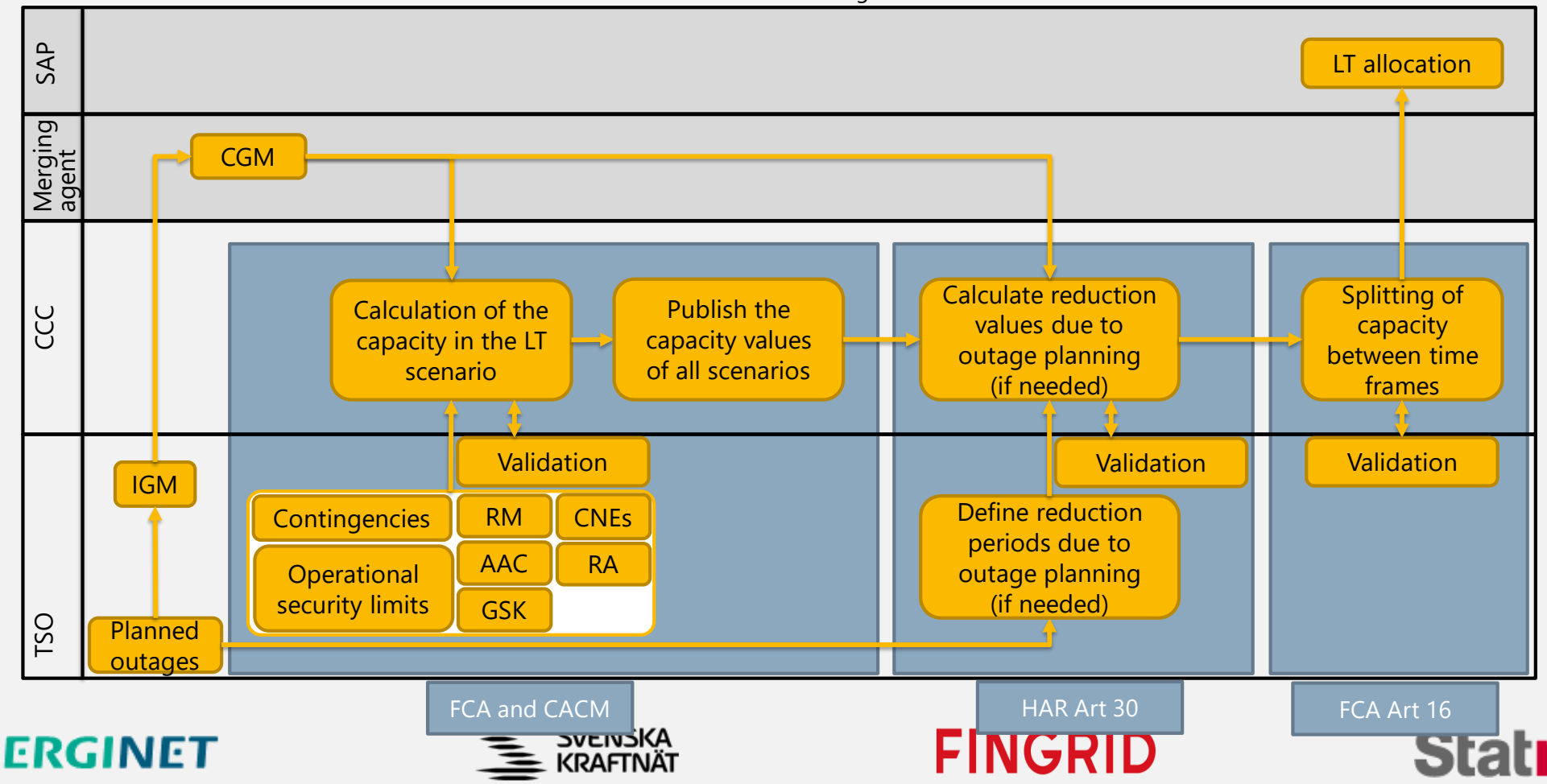
Business Process

- The calculated capacity is used as input for determining the amount of transmission rights

High-level LTCC business process

CCC - coordinated capacity calculator
SAP – Single Allocation Platform



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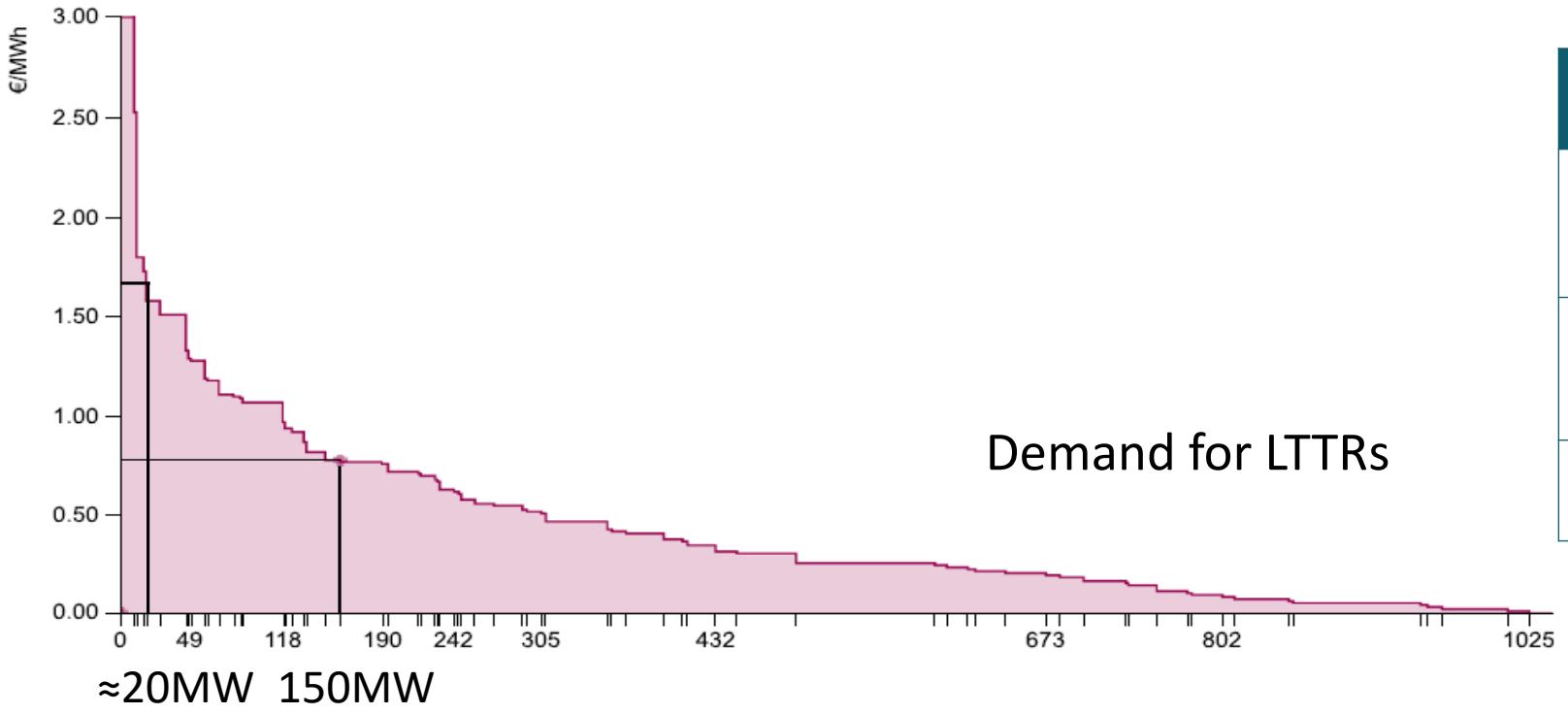
Method for determining the amount of transmission rights

- Calculate the amount that ensures against underselling - example



	€/MW/time
Auction price	0,77
Average price spread	1,57
Underselling	0,80

Underselling definition: Auction price is systematically lower than the actual spread in the day ahead market

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Why will the Energinet counteract underselling?

- Systematic underselling means that the price of long-term capacity is always sold to less than it is worth in the spot market
- Systematically "over" sales will, conversely, indicate that the market needs more capacity
- Socio-economic argument:
  - ✓Underselling means that Energinet may need to raise tariffs
  - ✓Down side: Tariffs lead to a "tax distortion" as tariffs does not reflect a 100% efficient design
  - ✓Transmission rights lead to better risk management of market risk
  - ✓up-side: lower retail prices

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Agenda -RSC

7	Status update on implementation at the RSC	14:15 – 14:45

1. Background for the Nordic RSC
2. Current status
3. Implementing Nordic CCM

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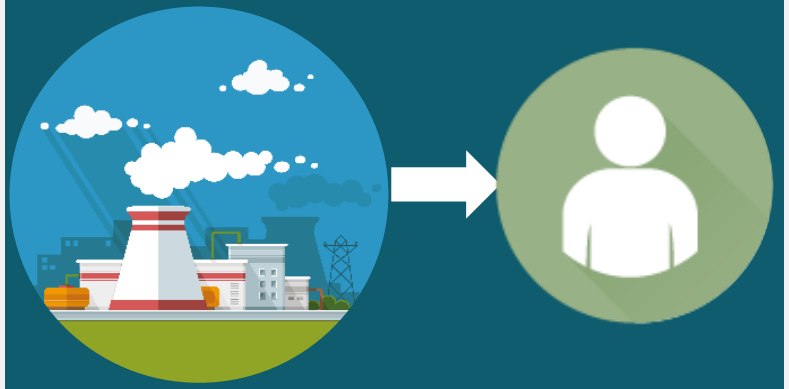
Complexity increases with Energy transistion

PAST

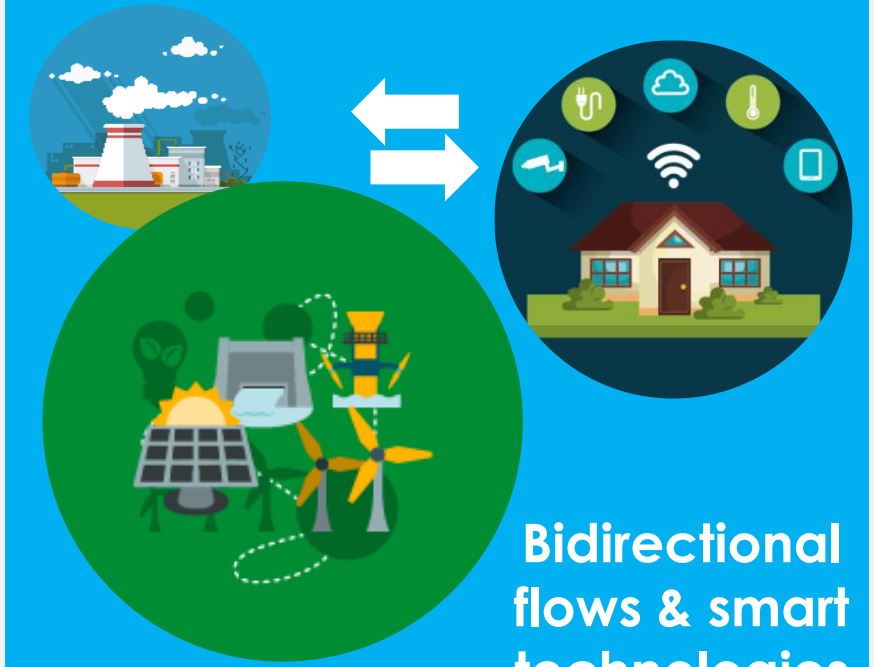


One-way power flows

Predictability

PRESENT

Variability & decentralisation



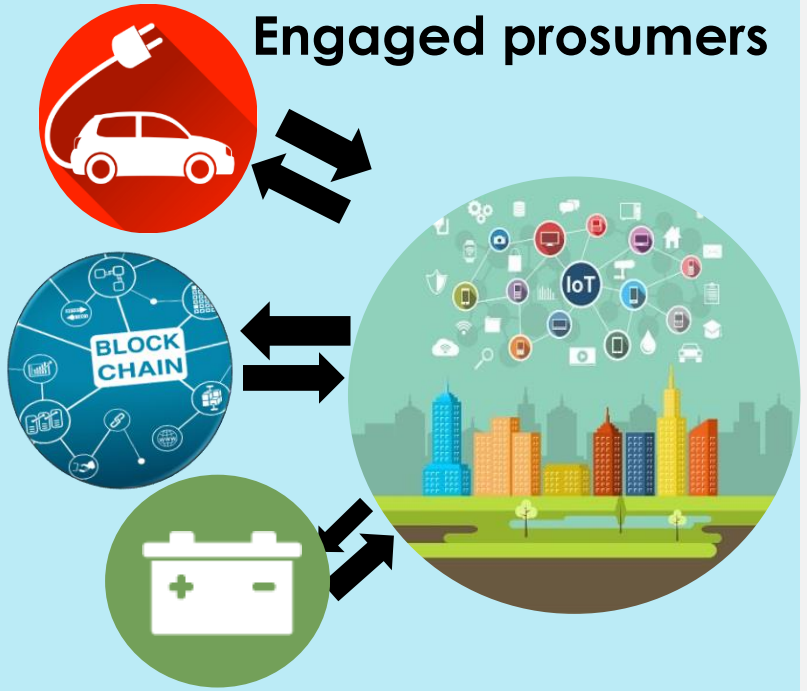
Bidirectional flows & smart technologies

FUTURE?

Smart, data-centric system

Electrification of transport

Engaged prosumers



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How to tackle complexity?

Implement the EU codes

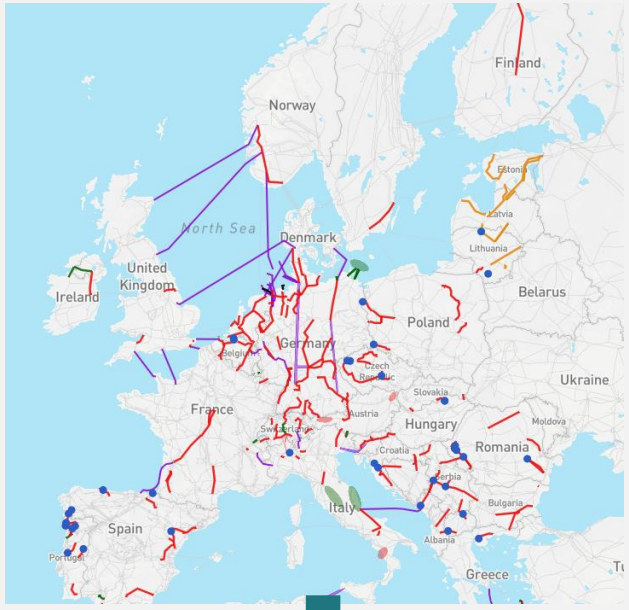
Enabling more RES & demand response connections

flow based

balancing markets

Regional security coordinators

Strengthen the grid



Nordic Solution report

Enhance existing cooperation at all levels

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Nordic Regional Security Coordination

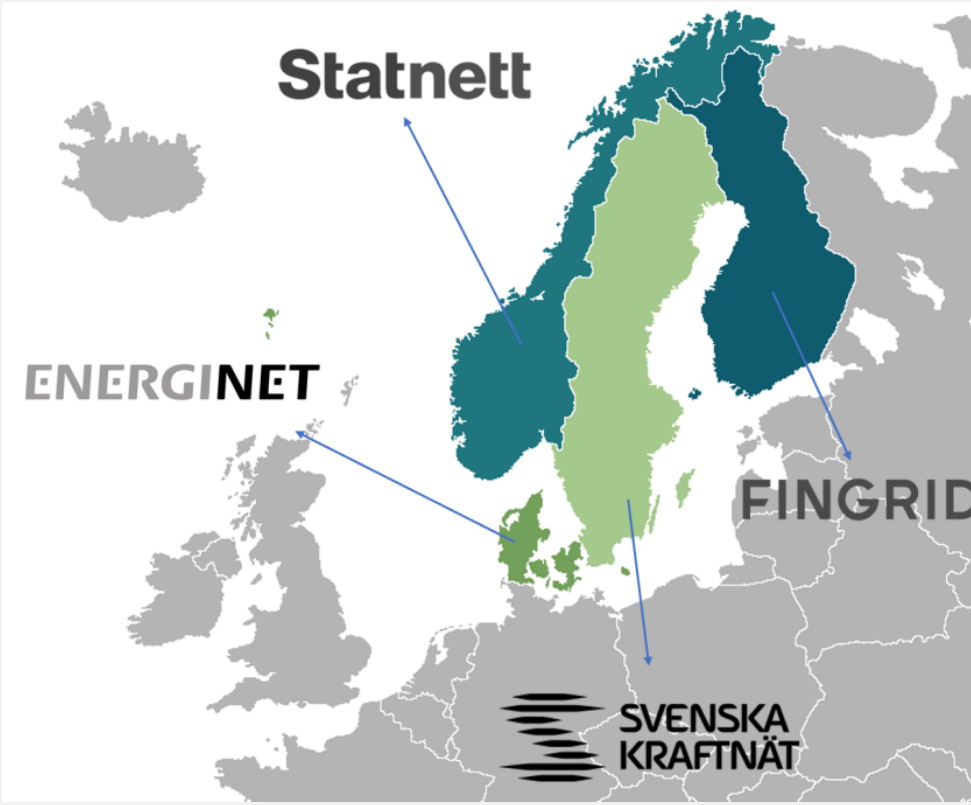
❖ Background

1. Enhancing Nordic Power System Cooperation
2. European Network Code implementation

❖ Purpose

Support the Nordic TSO´s in two key focus areas:

1. Maintain Security of Supply in the Nordic Area
2. Optimize the availability of the Green Nordic Power Grid



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Different power systems and traditions

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Different Nordic challenges and opportunities

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Nordic RSC and TSO´s implement 5 regional processes

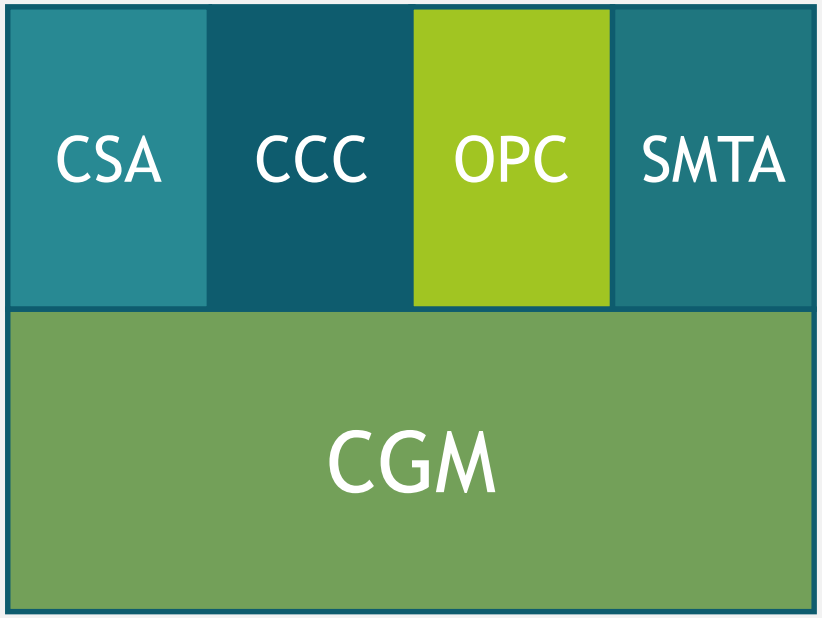
- IGM → CGM: Individual Grid Models → Common Grid Model
- CSA: Coordinated Security Analyses
- CCC: Coordinated Capacity Calculation (Flow Based/CNTC)
- SMTA: Short & Medium Term Adequacy
- OPC: Outage Planning Coordination

Individual Grid Models → Common Grid Model

CGM = Forecasted grid states (flows, topology) for several timeframes (Y-1, M-1, W-1, D-2, D-1, ID)

Common data model for the Nordics and Europe

Shared data is the basis or foundation for all the regional processes



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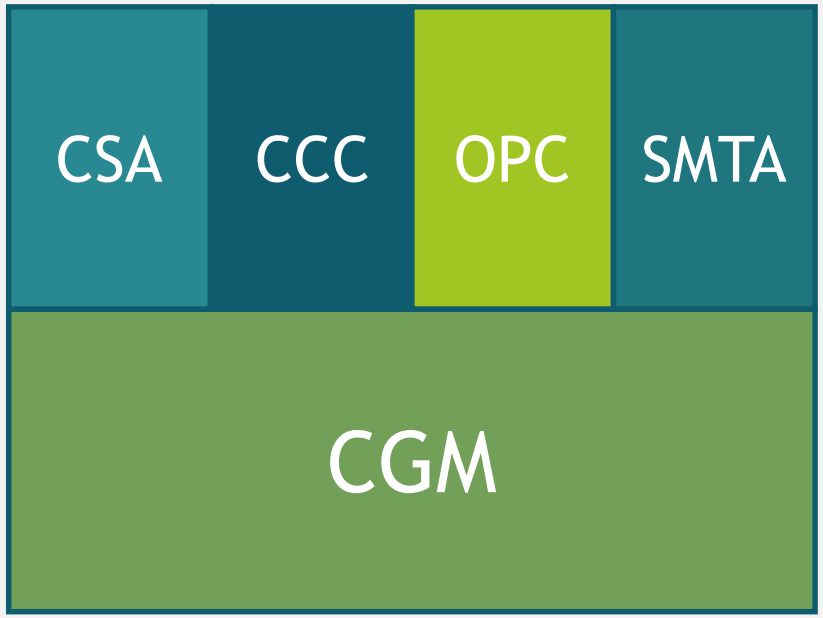
Status of service delivery



The Nordic RSC operates today 3 business processes together with the Nordic TSO´s:

1) Coordination and provision of NTC data (CCC 0.1)
2) Coordination of outage planning (W-1 and W-4) (OPC)
3) Coordination and analysis of Short term Adequacy (SMTA)

The further implementation of the processes

1) Creating a common Nordic Grid model (CGM)
2) Coordinated regional security analysis (CSA)
3) Provision of NTC data to more NEMO´s (CCC 0.2)

is scheduled for Q2 2019

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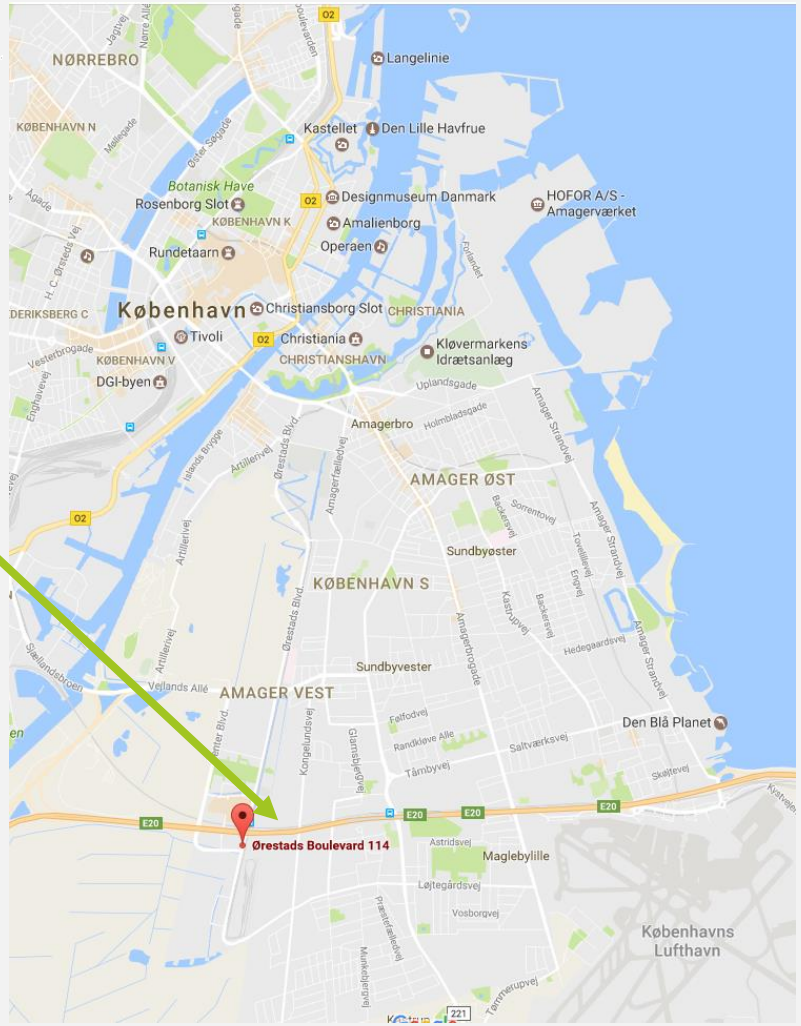
Nordic RSC Joint Office in Copenhagen



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Implementing the Nordic CCM

- Both Flow Based and CNTC are new, complex processes and requires dedicated IT solutions in Nordic RSC
- The basis for all calculations, a Common Grid Model, is even more challenging from several perspectives – e.g. Information Security, IT tooling, Standardized exchange formats, Robust and aligned processes
- EU – Tender for IT solutions was published 15. October 2018 – ”NorCap”
- Implementation of IT solutions and TSO-RSC-NEMO Business processes starts March 2019
- A stepwise implementation is foreseen
- Final IT delivery is planned for December 2020

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