Baltic Sea
Regional Group Investment Plan

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Baltic Sea

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entsoe

Reliable Sustainable Connected

Key drivers for Grid development and challenges for Baltic Sea Region

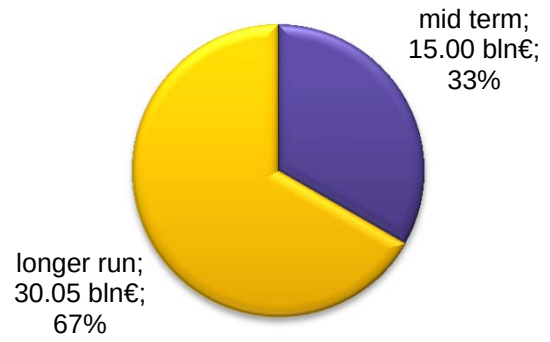
Key drivers:

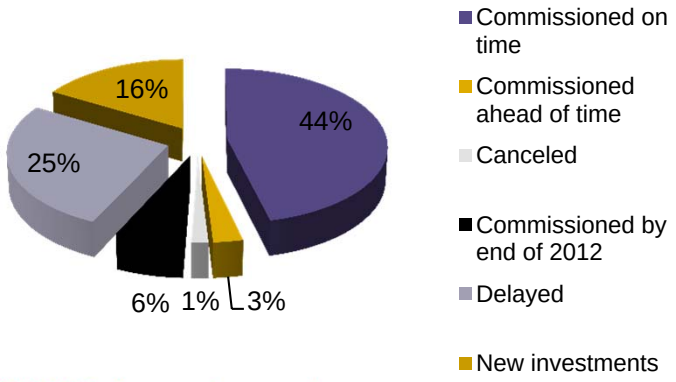
- Security of Supply
- Market integration in the whole Baltic Sea region
- Integration of RES – (and conventional)

Main challenges:

- High surplus expected in the Nordic countries will need to be transmitted to the Continental Europe
- Grid development may not be in time if RES targets are met as scheduled
- Large uncertainty regarding generator investments
- Baltic area will become more integrated with the rest of EU-area
- North South flow direction in all the Baltic Sea countries
- Due to the high wind power integration it is crucial to ensure sufficient regulating power

Investments shares of Mid-Term and Long-Term investments





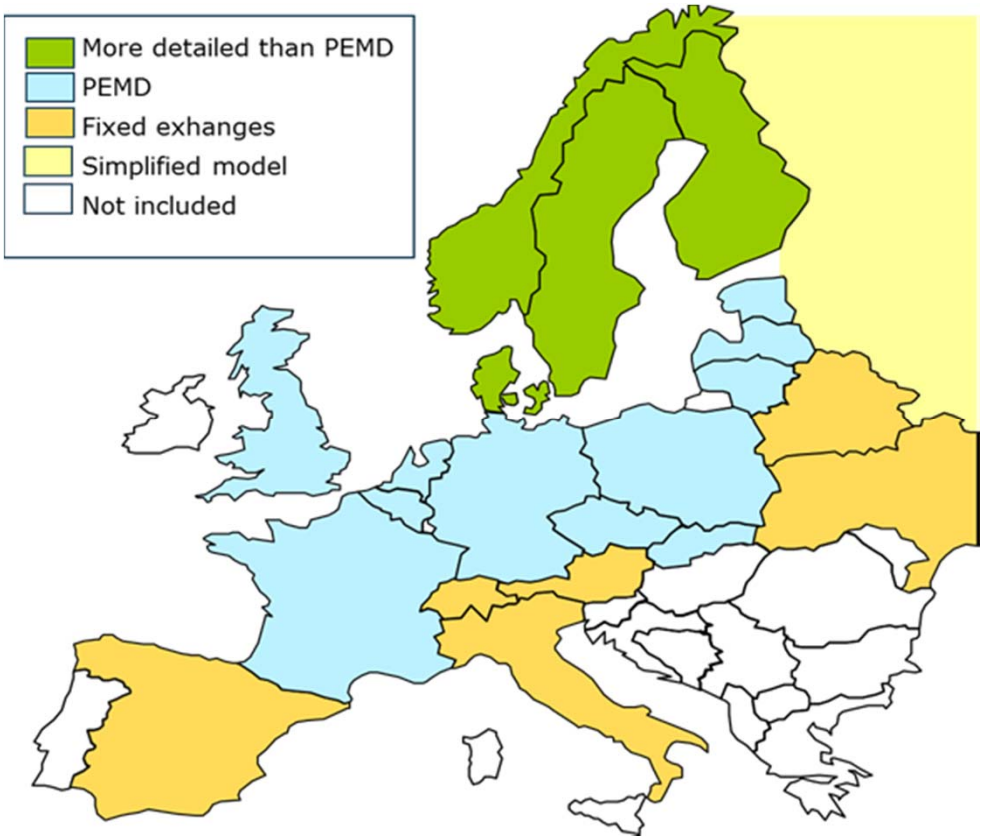
By the end of the decade…

44 projects of pan-E significance; 24000 km; About M€ 45 000 investments

Market results and base scenarios

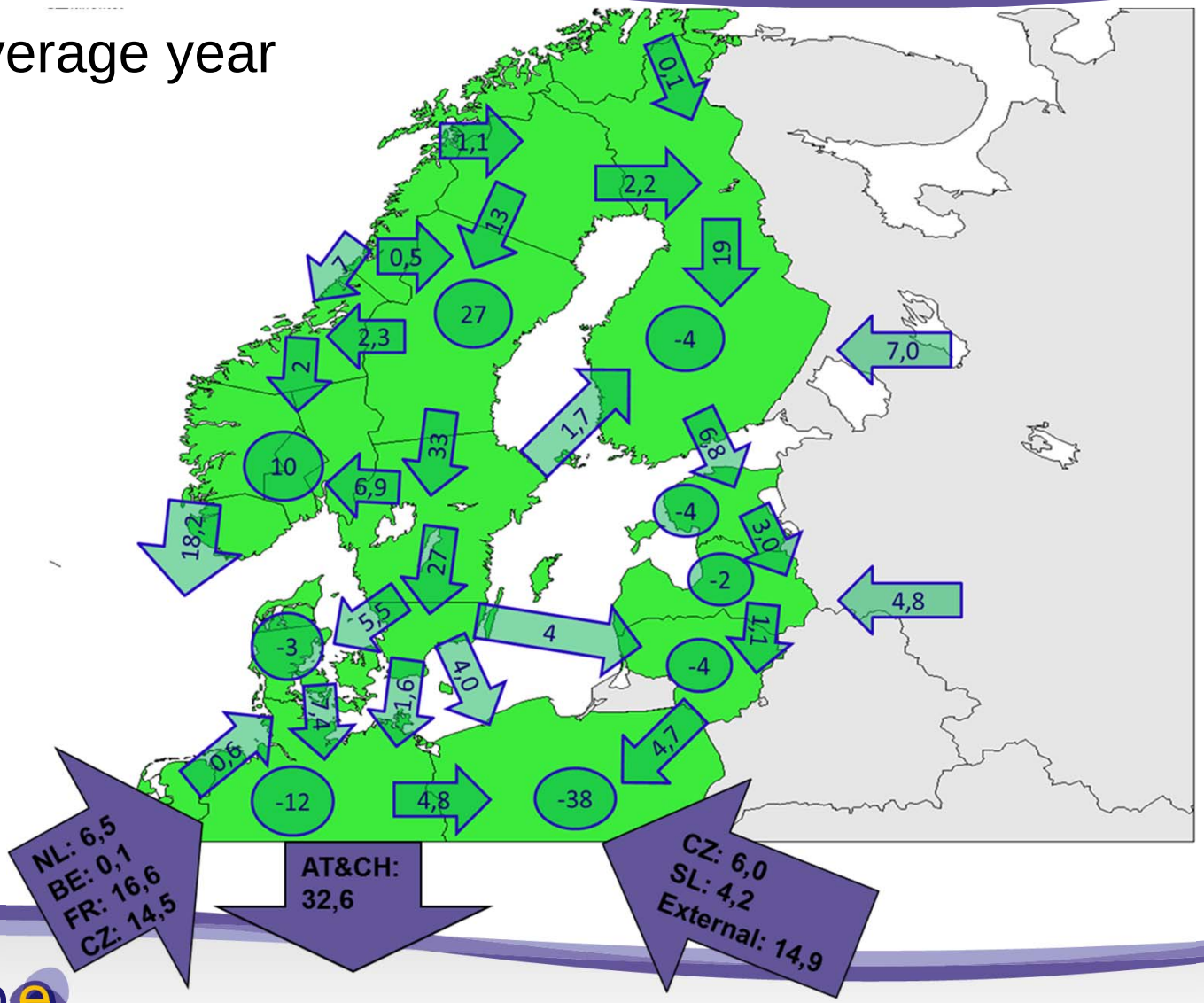
Border countries

- Perimeter country import to Poland modeled by reducing the consumption by the amounth of import (according to the decision of RG CEE to cover Ukranian and Belarus import)
- North-West Russia modeled as two market areas
- Kaliningrad assumed to be balanced in the base scenarios
- Belarus-Baltics flows not modeled due to lack of data
- Other border countries according to the time series from CCE



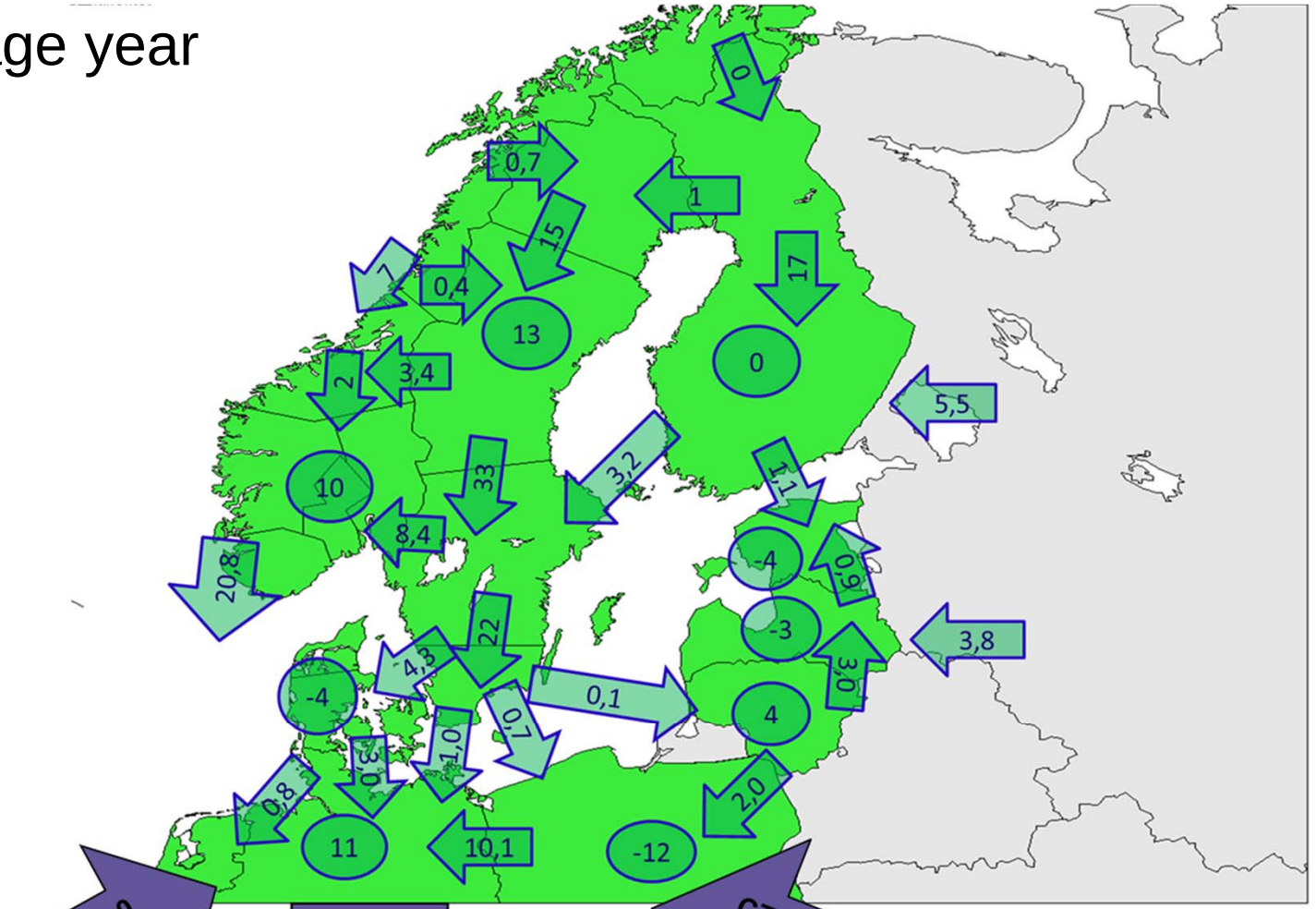
EU2020 with 2020 grid – Balances and netflows (TWh/a)

Average year



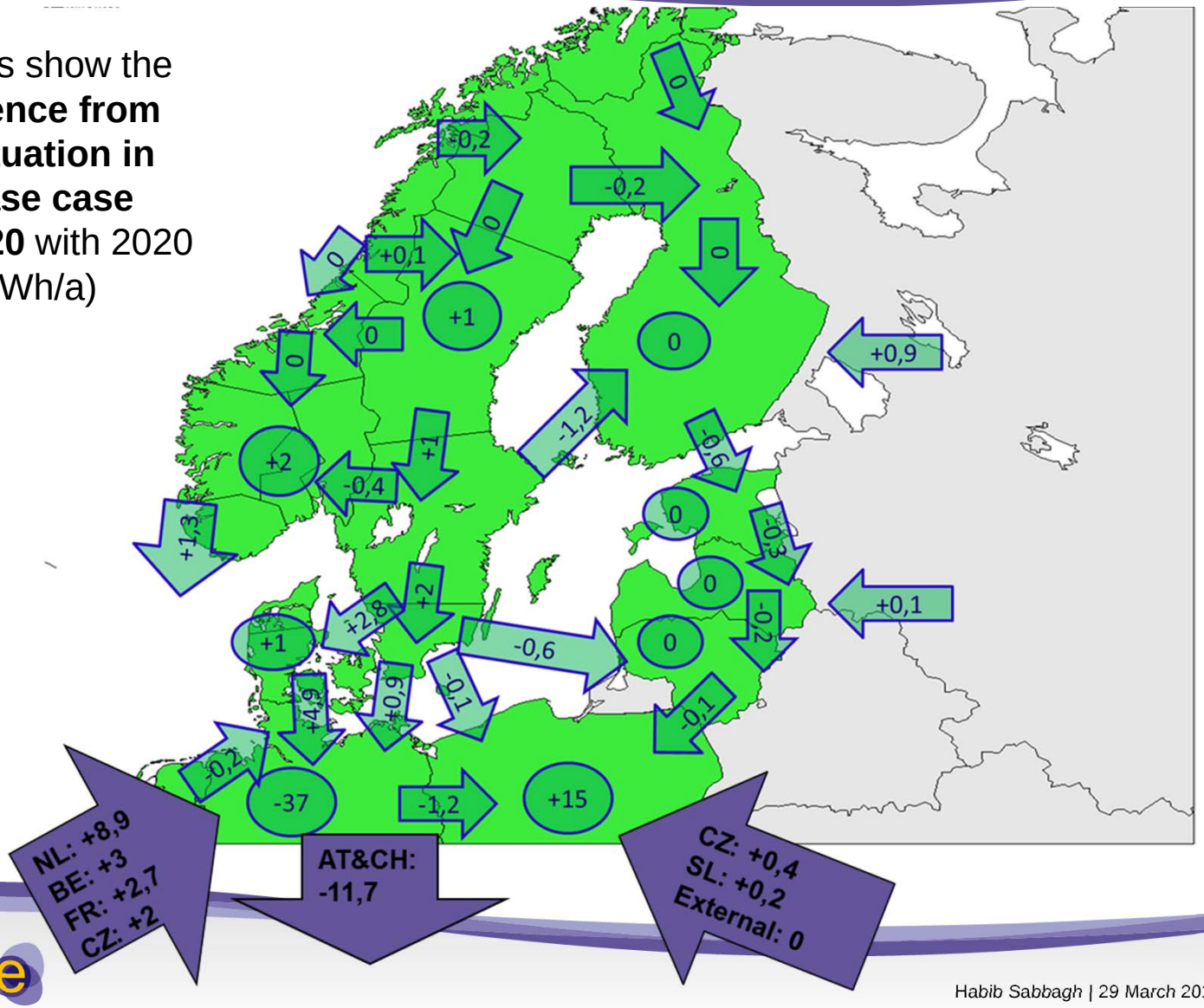
B2020 with 2020 grid – Balances and netflows (TWh/a)

Average year



EU2020 with 2020 grid / Nuclear shutdown - Balances and netflows

Figures show the **difference from the situation in the base case EU2020** with 2020 grid (TWh/a)



Adequacy results (MAPS)

- The figure below shows the areas wich were included in MAPS simulations.
- The cases that were simulated
  - o No import
  - o Generation type failure (BWR)
  - o Gas availability

With 2020 grid

- in both scenarios all areas as green, meeting the agreed criteria for LOLP

With 2015 grid

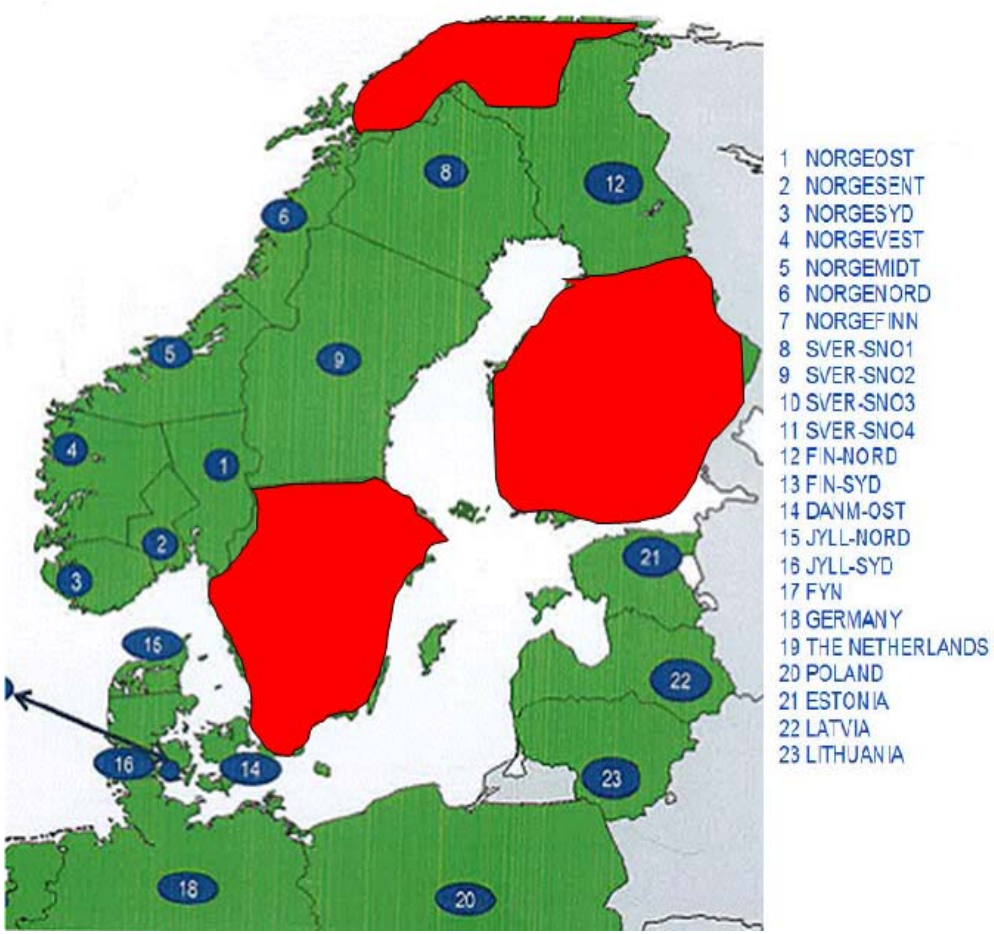
- Arctic area not meeting the criteria, shows as red or yellow in cases

With 2015 grid

- South Sweden/Finland as red for BWR failure case,
- South Finland also yellow for Gas restriction case

First areas to be affected with load increase:

- Själland, South Finland, South Sweden



Screening for investment needs after 2020

Aim of the screening process is to

- investigate the new scenarios
- assess transmission capacity needs in the 2020 scenarios
  - e.g. identify potential projects (for future analysis)

Data:

Scenarios: EU2020 & B

Two different situations of net transfer capacities

- NTC's for 2015 (Reference)
- NTC's for 2020 (Reference + expected projects 2015-2020)

Parameters used in screening proces

- Marginal benefits
- Duration curves
- Congestion rent
- Congestion hours
- …

Interconnections were additional investments migth be needed most

EU2020
Germany - France
Sweden - Poland
Germany - Poland
Norway - UK
Lithuania - Poland
Germany - Czech Republik
Sweden - Germany
Sweden - Lithuania
Norway - Netherlands
Norway - Germany
Sweden - Denmark West
Finland - Estonia

B2020
Germany - France
Norway - UK
Sweden - Germany
Sweden - Denmark West
Norway - Netherlands
Norway - Germany
Norway - Denmark
Germany - Czech Republik
Sweden - Denmark East
Germany - Belgium
Sweden - Poland
Lithuania - Poland

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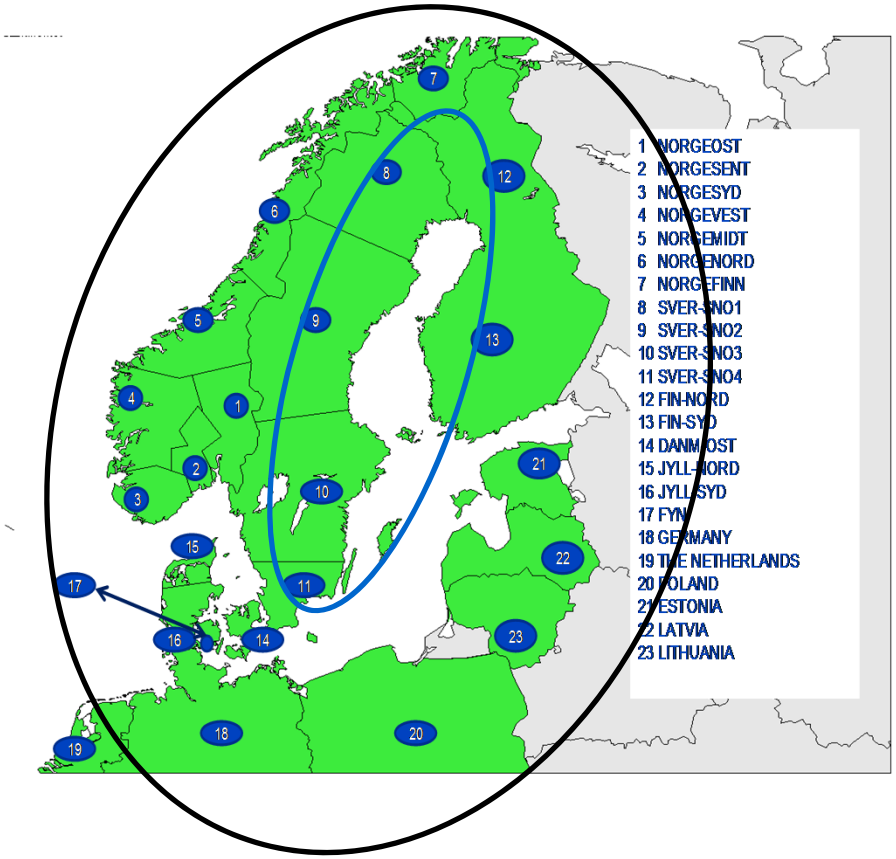
Grid analysis- general methodology



1. **Each planning case (snap shot) is selected in the market model.**
   Output from <u>market model</u> in each modeled area:
   - Production (generation mix)
   - Demand
   - Import/Export

2. **Each TSO is responsible for grid analyses in its own country. Interconnections between countries are handled bilaterally**

3. **Own country + neighbouring areas are scaled (production and load) in the <u>grid model</u> according to the snap shot as well as DC-links. Done by all TSOs.**

4. **Detailed adjustments (fine tuning of generators and loads) by each TSO in their own country**

5. **Contingency/Losses analyses performed by each TSO.**

Grid analysis – Results

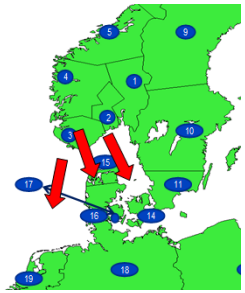
Snap shots

Sweden and Norway1

Highest simultaneous power flow between marked areas from market model

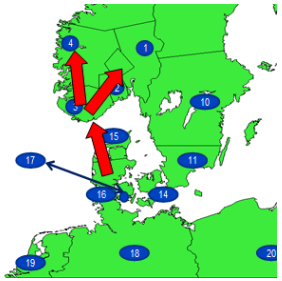
Sweden and Norway2

Highest simultaneous power flow from Norway to DE, DK and NL.



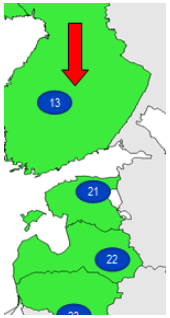
Denmark and Norway

Highest simultaneous power flow between marked areas from market model



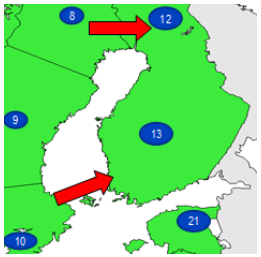
Finland

Highest simultaneous power flow between marked areas from market model.



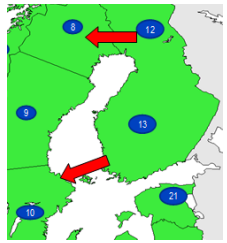
Finland and Sweden 1

Highest simultaneous power flow between marked areas from market model



Finland and Sweden 2

Highest simultaneous power flow between marked areas from market model



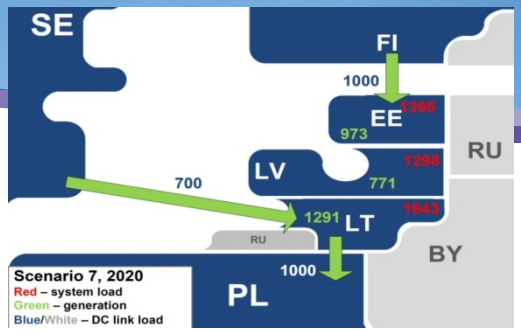
EU2020 scenario with investment portfolio included

Grid analysis – Results

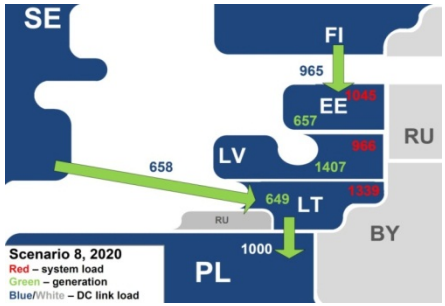
Snap shots

Baltic countries

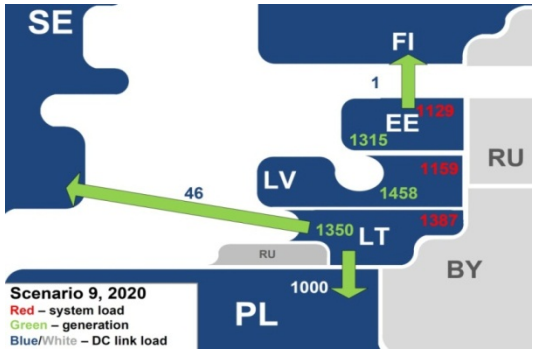
1.Maximum power flow on DC links



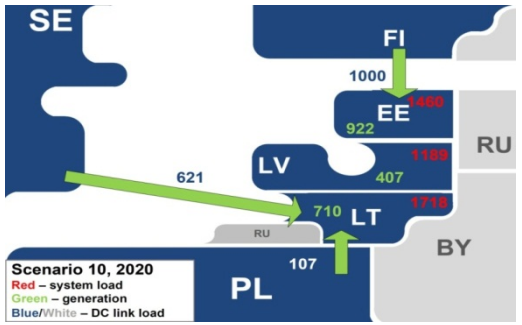
2.Maximum absolute transit EE – LV – LT



3.Maximum simultaneous energy surplus in EE, LV and LT (+ 450 MW)



4.Maximum simultaneous energy deficit in EE, LV and LT (-2330 MW)



EU2020 scenario with investment portfolio included