Preliminary results of the BS Regional Grid Investment Plan

Subgroup Network Development

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entsoe
Reliable Sustainable Connected

ENTSOE Regional Group Baltic Sea

Presentation of projects in the Regional Investment Plan 2012

Mid term 2016

Long term 2021

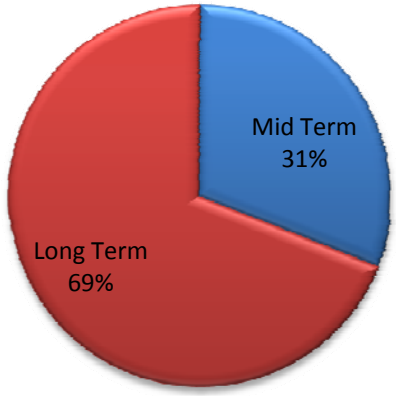
Grid analysis

Regional focus – RG BS – Preliminary data

By the end of the decade…

- 46 projects of pan-E significance
- 25000 km,
- About M€ 11 500 investments (without DE)

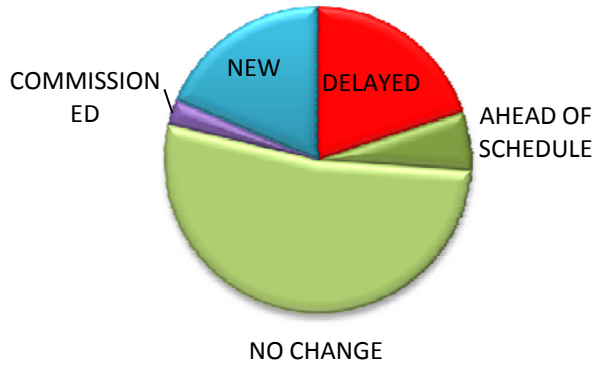
Investments in the RgIp plan



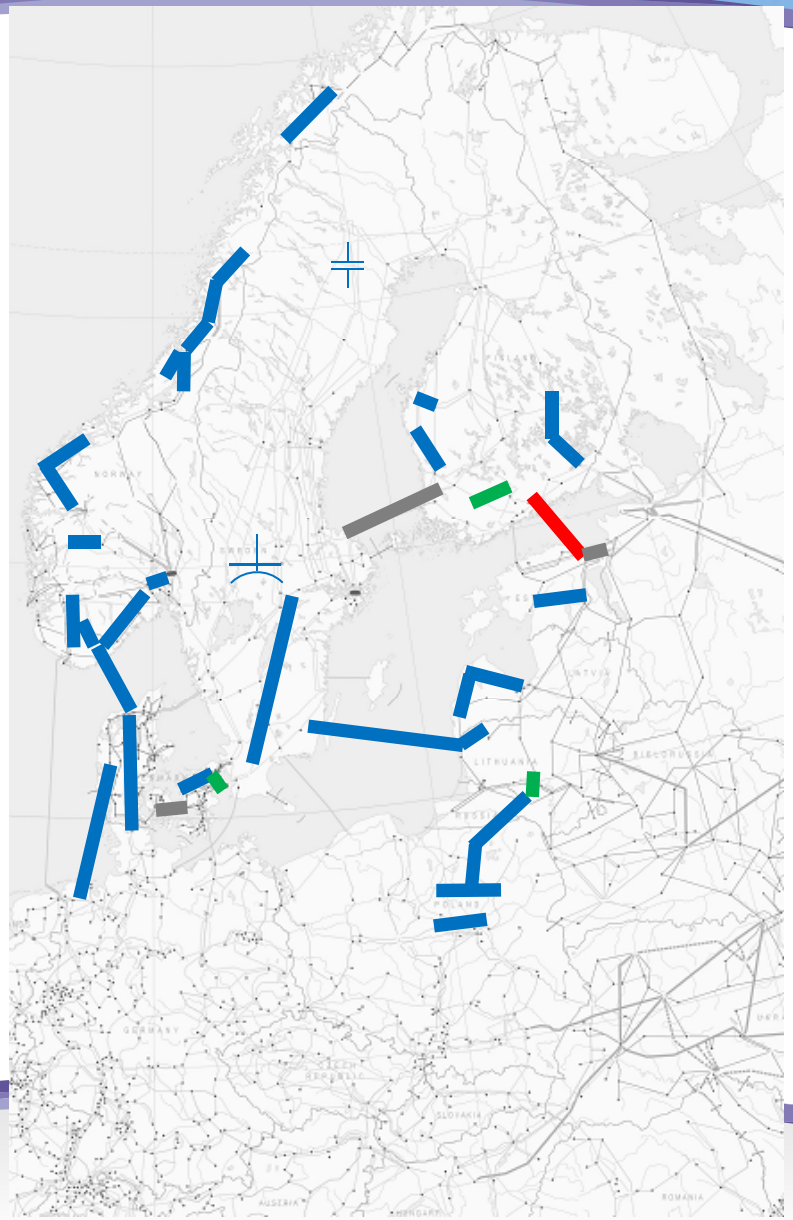
Project Monitoring

- The majority of the investments that were presented in the pilot TYNDP remain on schedule.
- Main reason for project delays are generation investment uncertainty and harmonization with other investments (priority aspects)
- A few projects have changed their structure
- Some projects are new after the pilot TYNDP
- Long permit granting procedures could become a problem

Status in 2012 compared to planned 2010



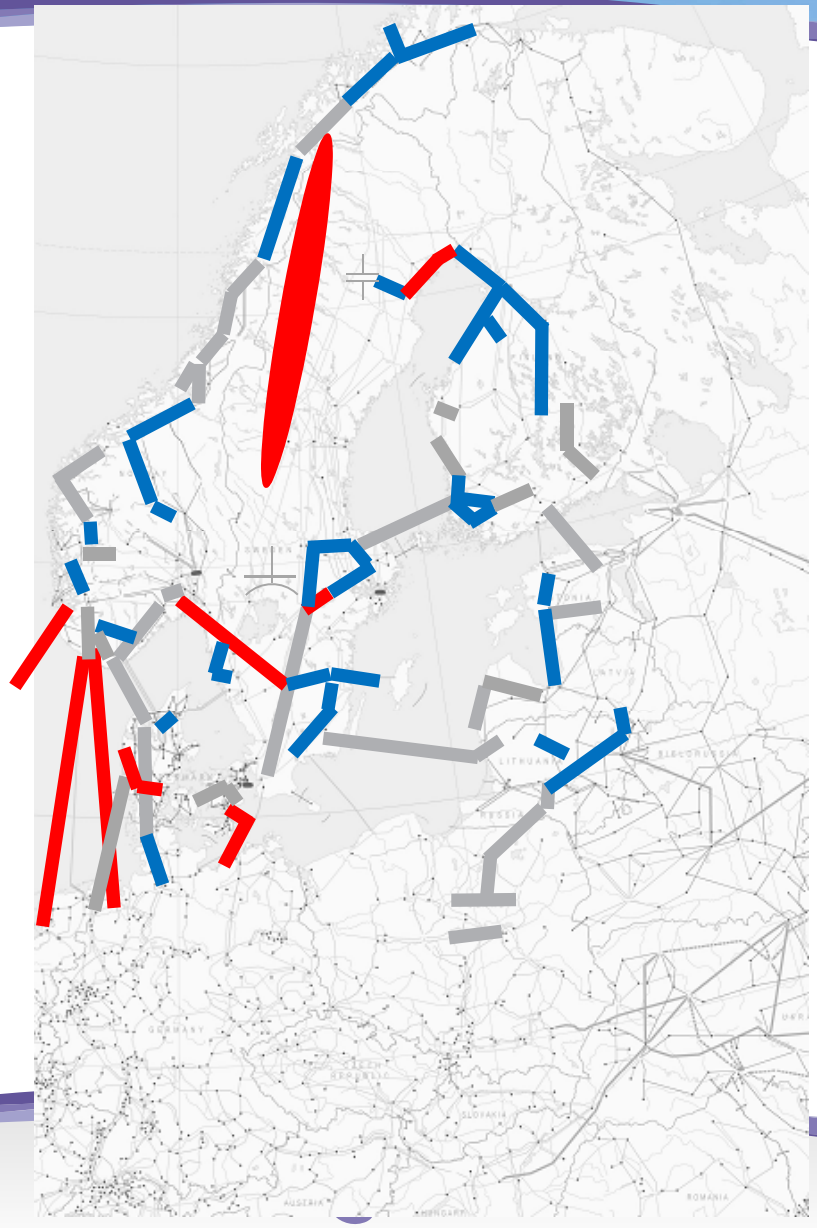
Medium term projects 2016 – projects under development



- Ofoten – Balsfjord (421)
- Ørskog – Fardal/Sogndal (413)
- Skagerrak 4 (426)
- COBRA (DK – NL) (427)
- South West link (southern part) (402)
- NordBalt (383)
- EstLink2 (391)
- Grobina – Imanta (385, Kurzeme Ring step 1)
- LitPol Link (368, 376, PL – LT)

- Nedre Røssåga – Namsos (418) , Namsos – Klæbu (415) – Aura/Viklandet (416)
- Sima – Samnanger (413a)
- Kristiansand – Rød (405), Rød – Sylling (411), Oslofjord cables (412)
- Kristiansand – Tonstad – Saurdal (406)
- Yllikkälä – Huutokoski (392)
- Hikiä – Forssa (394)
- Seinäjoki Ulvila, Ventusneva - Tuovila Kristinestad Pyhänselkä (393)
- Kassø –Tjele (Upgrade to double circuit, 428)
- Asvæsværket – Kyndbyværket (432)
- Glentegård and H.C.Ørstedværket (433)
- Series compensation cut 1 (SE) + shunt compensation cut 2 (SE) (398)
- Klaipeda – Telsiai (377)
- Grobina – Imanta (385)
- Kruonis – Alytus (379)
- Łomża – Ełk (370)
- RigaCHP1 – Imanta (384)
- Ostrołęka – Narew (371)
- Siedlce Ujrzanów – Miłosna (369)
- Tartu – Sindi (387)

Investment portfolio 2021 and beyond

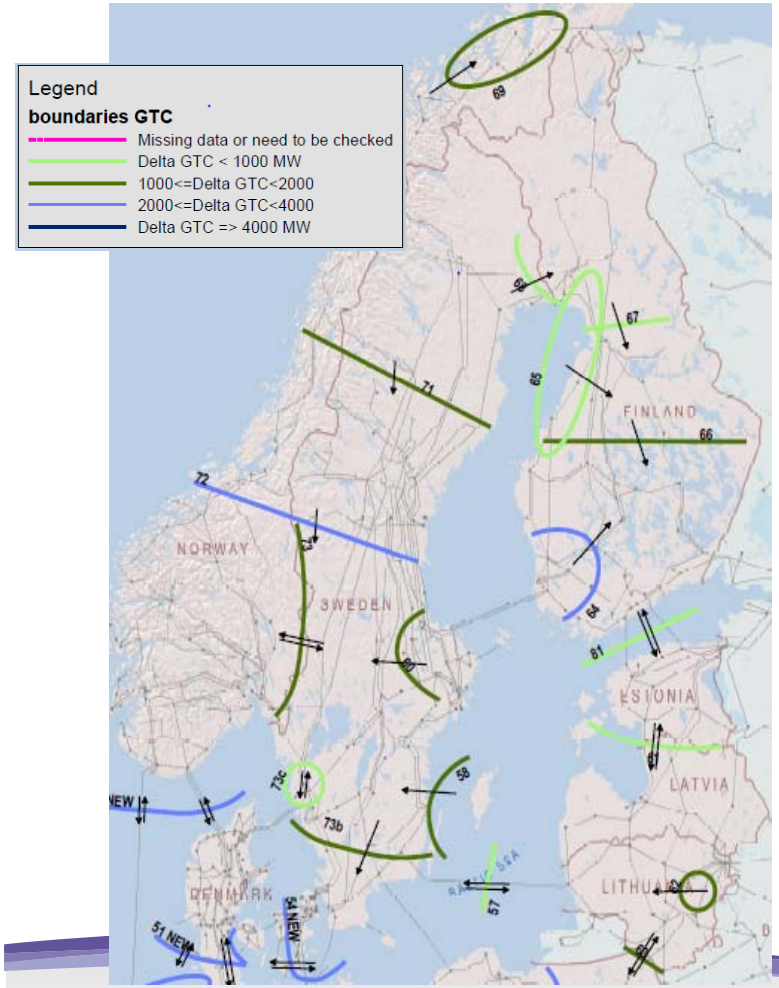


- Balsfjord – Hammerfest, Skaidi – Varangerbotn (422, 423)
- Norway - Germany (NO – DE) (142)
- HVDC link NO – UK (424)
- NorNed 2 (425)
- DK west – DE upgrade (429, 144)
- Kriegers Flak Combined Grid Solution (CGS) (141)
- Third AC-connection FI – SE (396)
- Scandinavia north – south reinforcement (403)
- South West link (western part) (402)
- HVDC link to Gotland (401)
- Latvian - Estonian third interconnection (386)

- Liksna - Visaginas – Kruonis (380, 381)
- Ekhyddan – Barkeryd (400)
- Svartisen – Nedre Røssåga (NO3)
- Råbäcken – Letsi/Betåsen (SE4)
- Harku – Sindi (388)
- Idomlund - Tjele (436), Revsing – Landerupgård (430)
- Lindbacka – Västerås, Ängsberg – Lindbacka, Forsmark – Stackbo, Forsmark – Hamra (399, SE1-3, SE5-6)
- Seinäjoki Ulvila, Ventusneva - Tuovila Kristinestad Pyhänselkä (393)
- Keminmaa – Pyhänselkä (FI5)
- Rauma – Forssa/Lieto/Ulvila (OL4)
- Skogssäter – Stenungsund – Stenkullen (SE9)
- Ekhyddan – Nybro – Hemsjö (SE8)
- Tonstad – Arendal (407,)
- Fardal – Aurland (414)
- Kristiansand – Tonstad – Saurdal (406)
- Aura/Viklandet – Fåberg (417), Storheia – Orkdal / Trollheim (420)
- Panevezys – Musa (378)
- Vilnius – Neris (382)

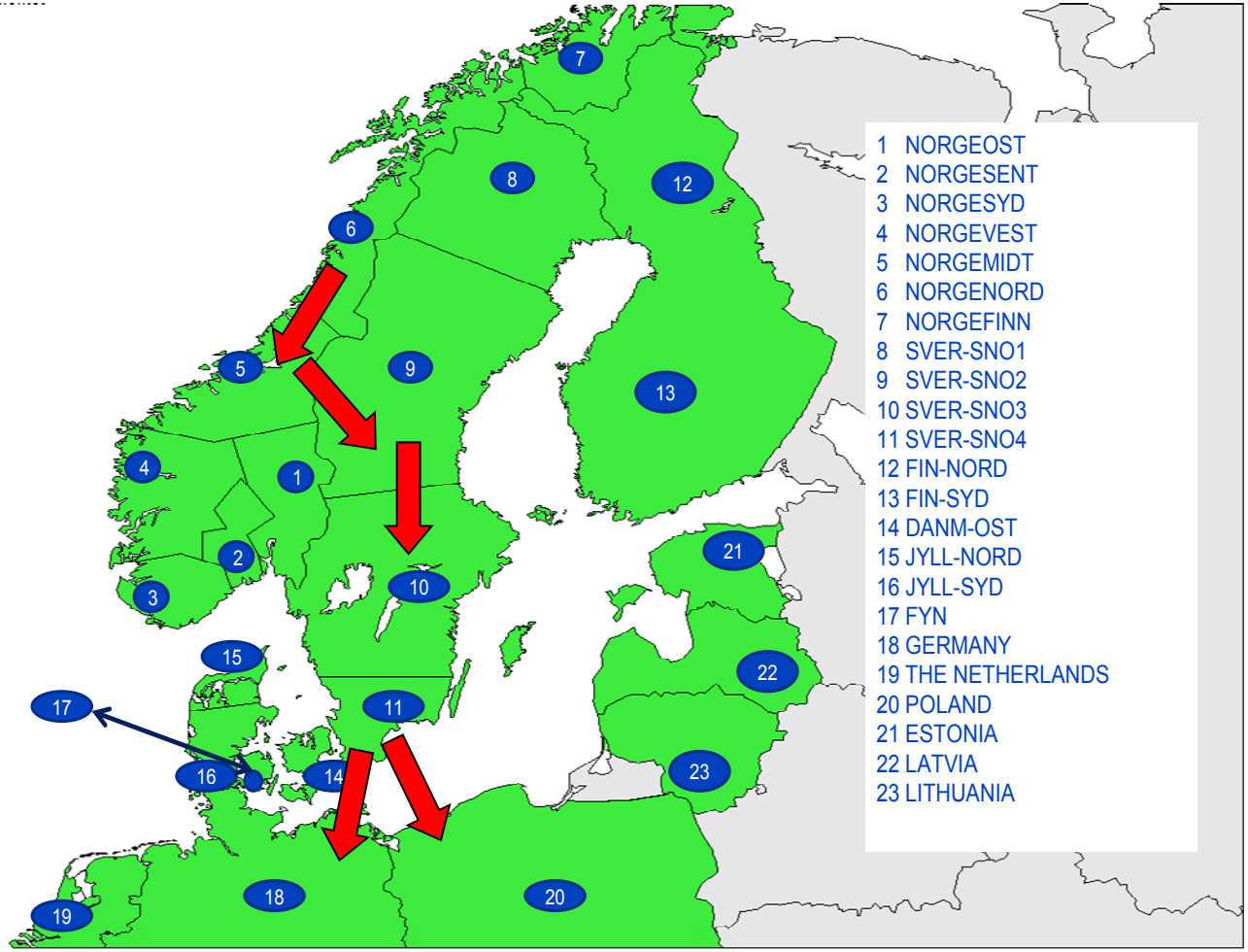
Boundary improvements – Preliminary data

GTC increase



Transmission adequacy

Grid analysis – Sweden and Norway 1



Snap shot

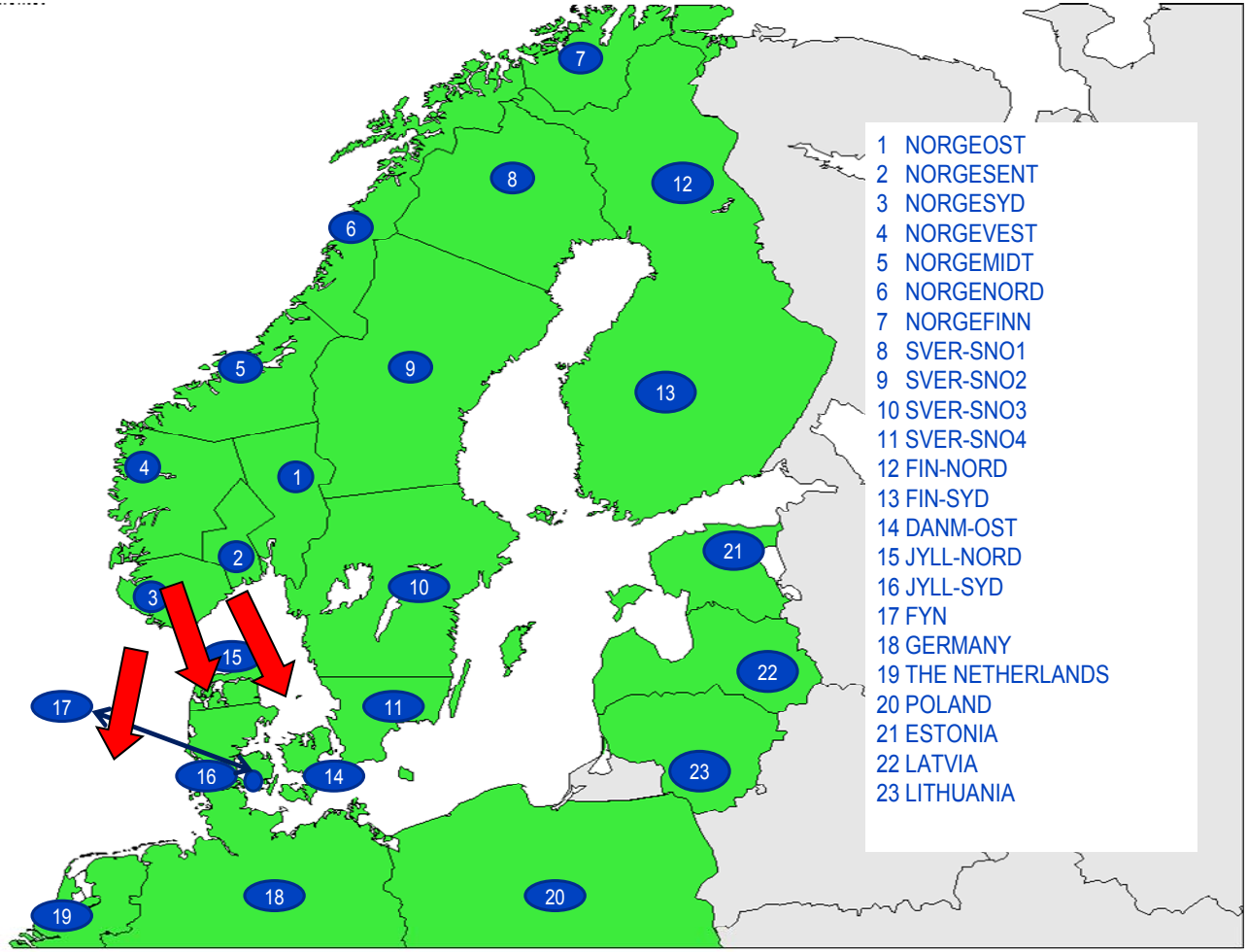
Highest simultaneous power flow between marked areas from market model

EU2020 scenario with investment portfolio included

Country balances in neighbour areas (MW):

	Gen.	Load
SE	19500	14300
NO	13600	12700
FI	10400	8700
DK	2900	3400
DE	40700	45600
LT	500	1300
PL	11400	14200

Grid analysis – Sweden and Norway 2



Snap shot

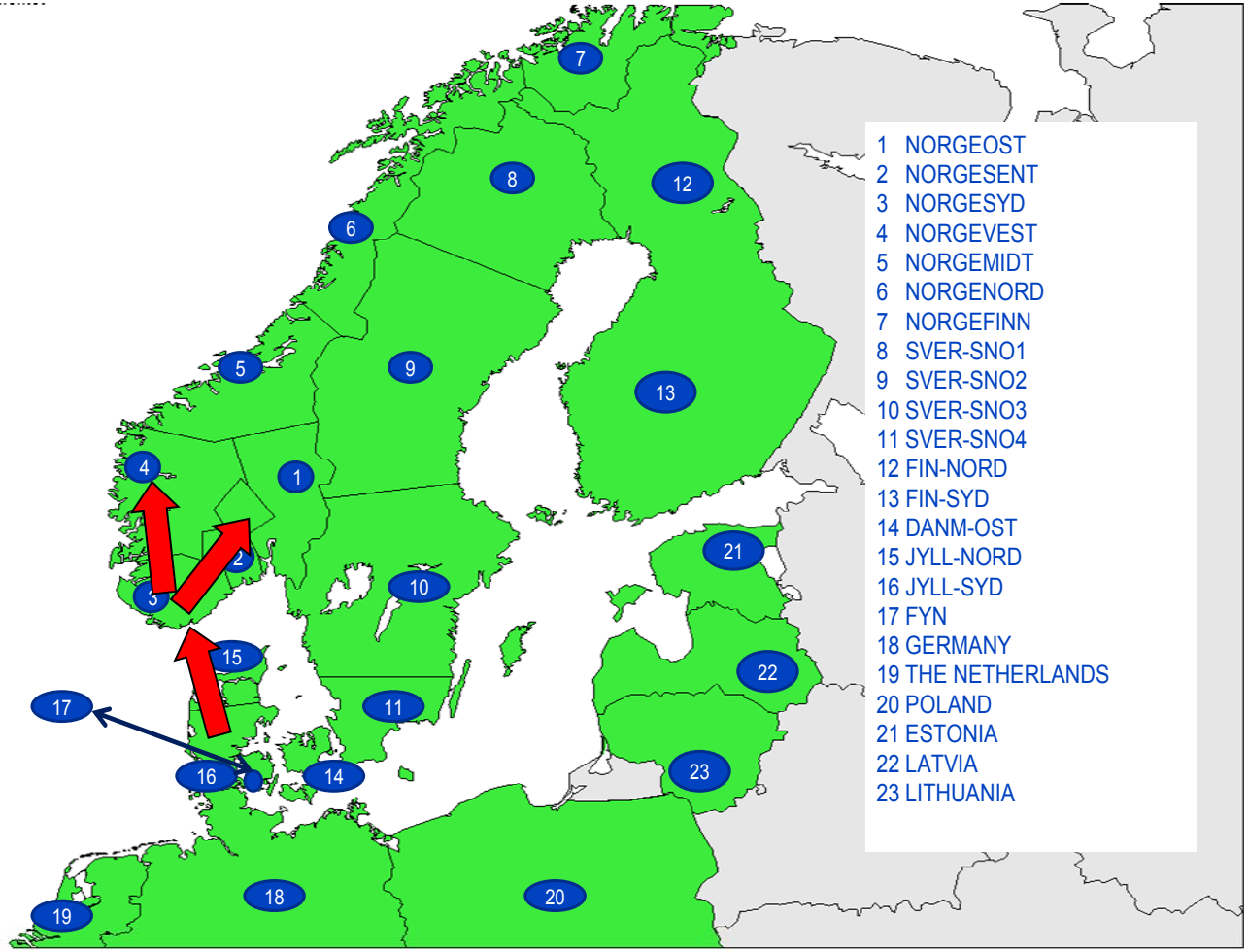
Highest simultaneous power flow from Norway to DE, DK and NL.

EU2020 scenario with investment portfolio included

Country balances in neighbour areas (MW):

	Gen.	Load
SE	19000	15200
NO	20300	13700
FI	10500	10000
DK	500	4700
DE	54300	62600
LT	900	1400
PL	14300	17800

Grid analysis – Denmark and Norway



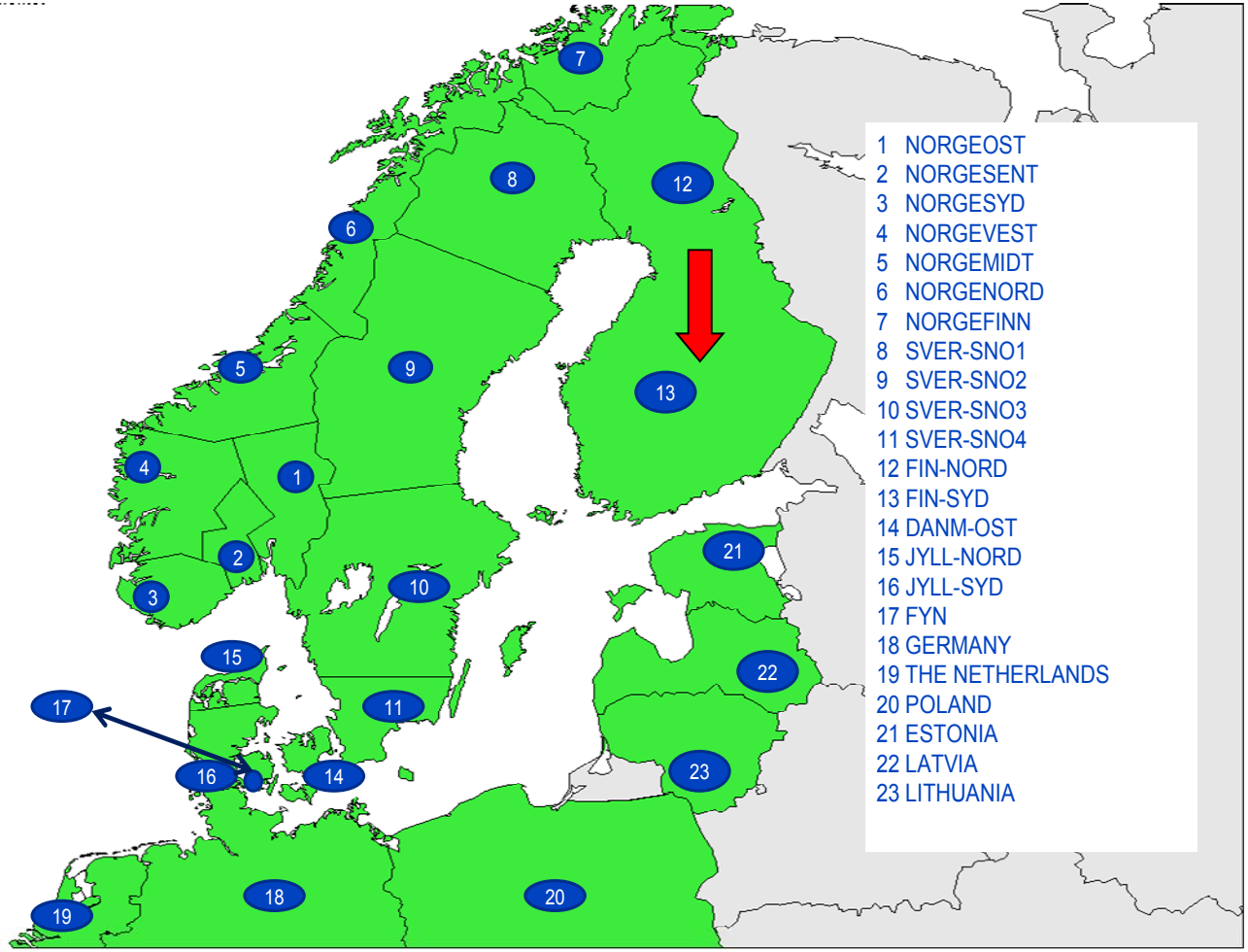
Snap shot

Highest simultaneous power flow between marked areas from market model EU2020 scenario with investment portfolio included

Country balances in neighbour areas (MW):

	Gen.	Load
SE	23500	21700
NO	18200	20500
FI	12200	13000
DK	6400	6100
DE	69000	62200

Grid analysis – Finland



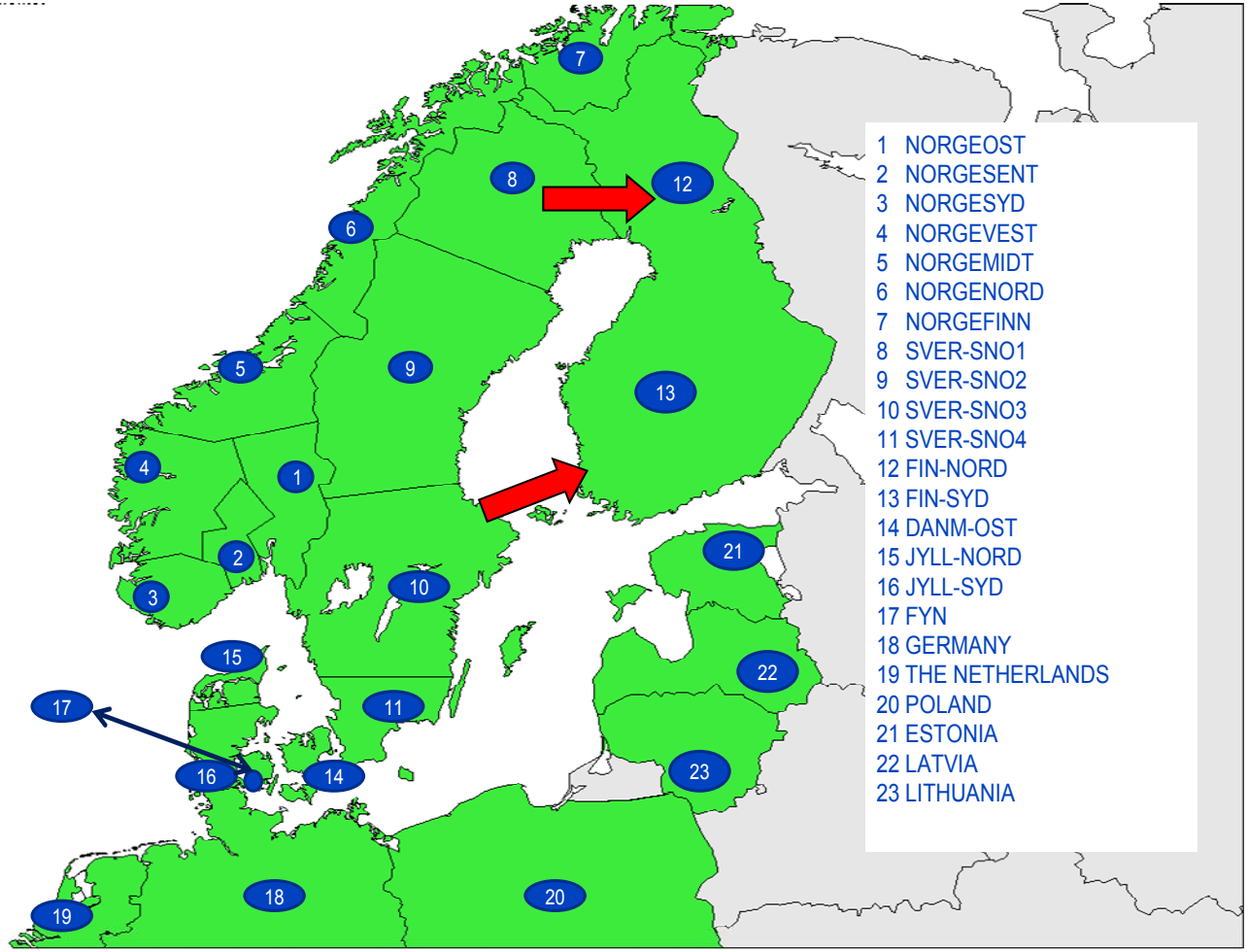
Snap shot
Highest simultaneous power flow between marked areas from market model

EU2020 scenario with investment portfolio included

Country balances in neighbour areas (MW):

	Gen.	Load
SE	18900	16600
NO	21700	14700
FI	10600	10800
EE	500	1100

Grid analysis – Finland and Sweden 1



Snap shot

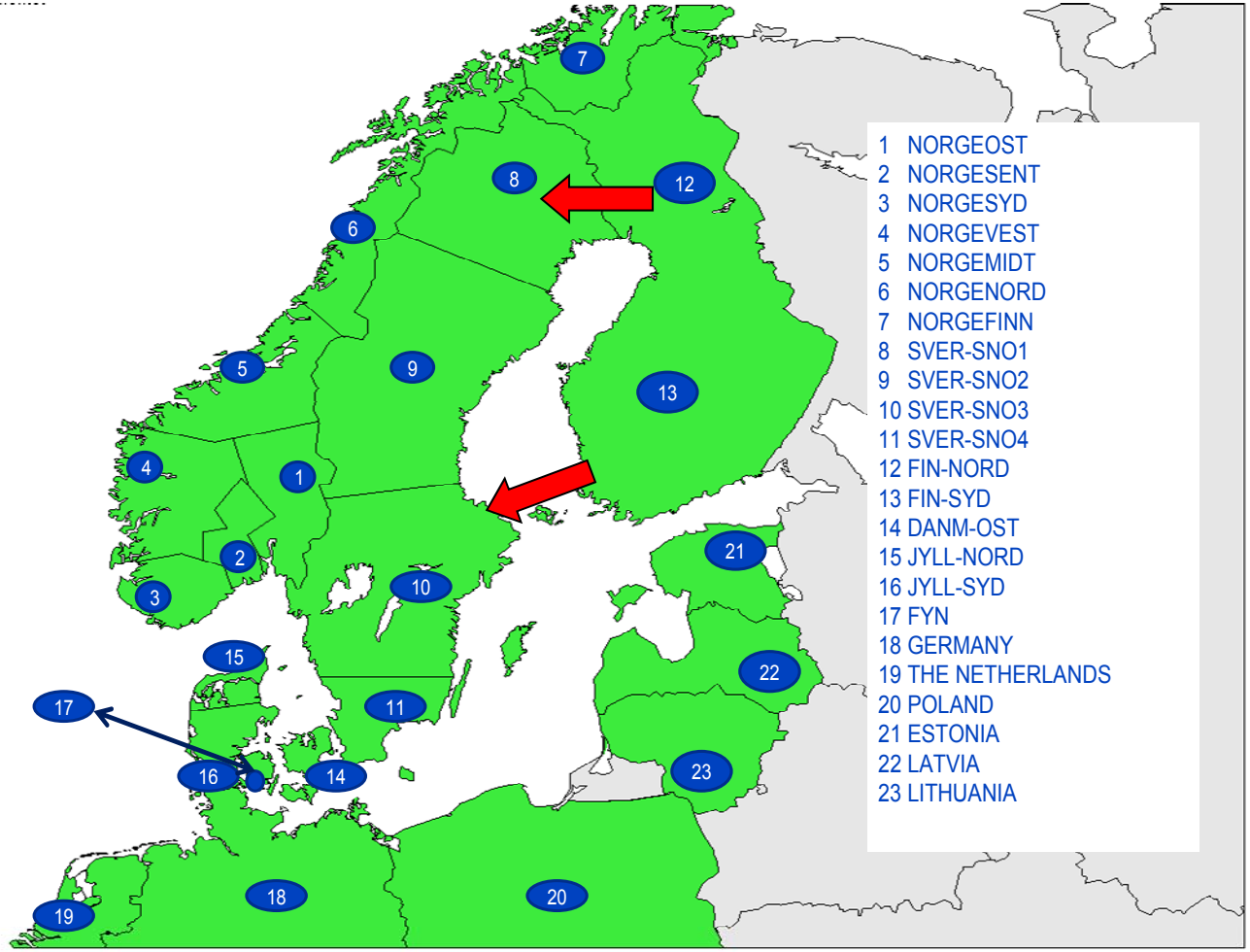
Highest simultaneous power flow between marked areas from market model

EU2020 scenario with investment portfolio included

Country balances in neighbour areas (MW):

	Gen.	Load
SE	25000	21900
NO	19900	14700
FI	12300	13300
DK	6300	6300
EE	1000	1500
LT	1300	1800
PL	17800	21300
DE	71400	73000

Grid analysis – Finland and Sweden 2



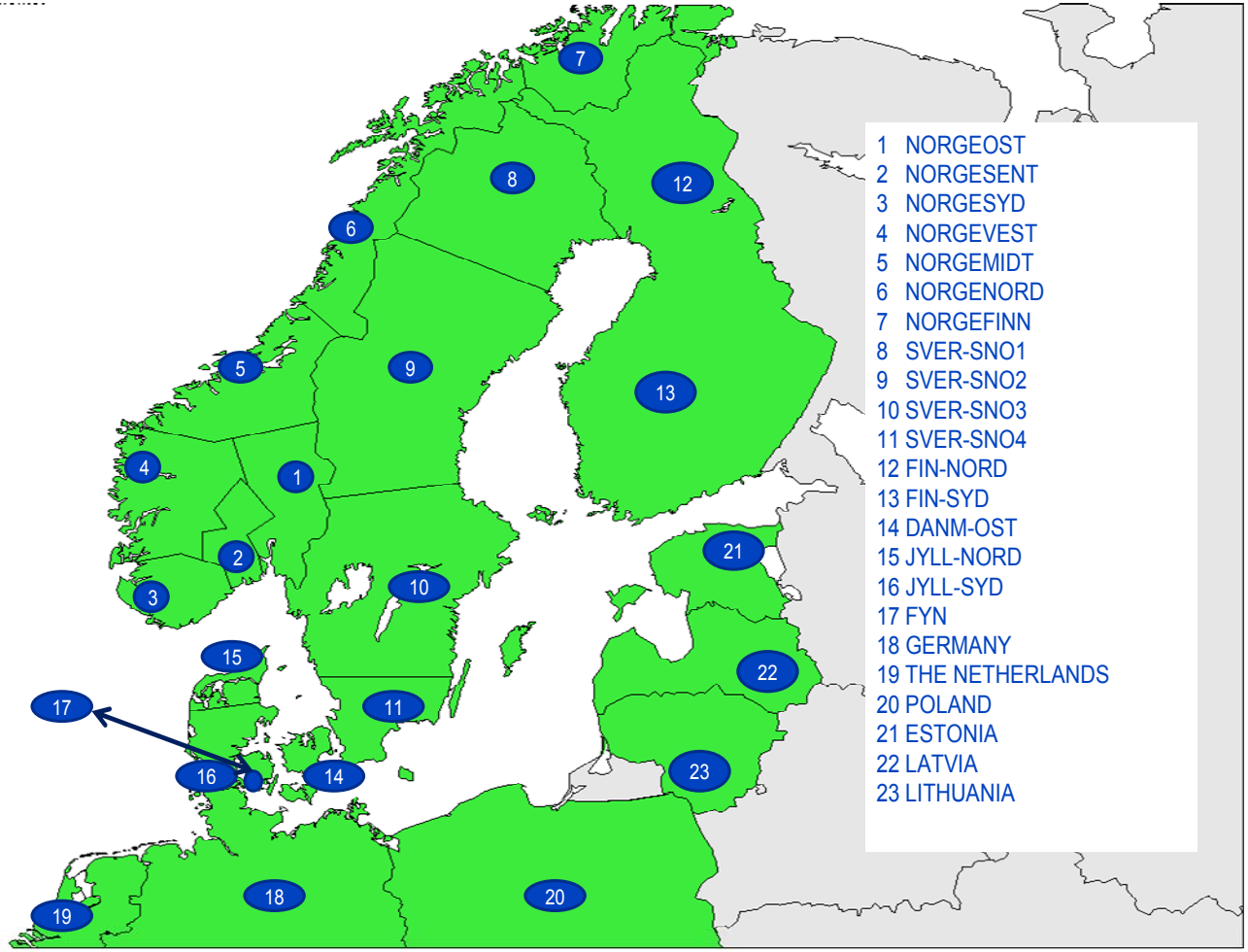
Snap shot
Highest simultaneous power flow between marked areas from market model

EU2020 scenario with investment portfolio included

Country balances in neighbour areas (MW):

	Gen.	Load
SE	19200	20300
NO	9000	16400
FI	11700	9700
DK	5900	4200
EE	900	1300
LT	900	1600
PL	14500	16400
DE	51300	46400

Grid analysis – Baltic countries



Snap shots

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

Preliminary conclusions from grid studies

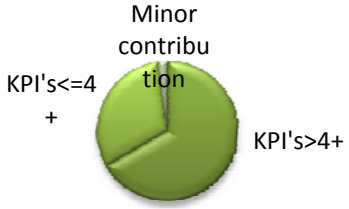
Security of operation and supply guaranteed

- Proposed investment portfolio is robust and resilient in the studied snap shots
- NTC increase between market areas in 2020 with the investment portfolio verified
- Needed grid upgrades in the Norwegian AC grid are more comprehensive than earlier identified, and also that system operations in southern Norway have become more stressed over the last years

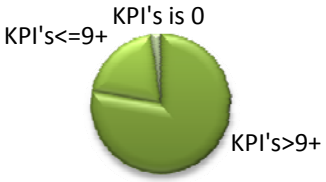
New technologies applied

- Use of VSC HVDC technology in a number of projects

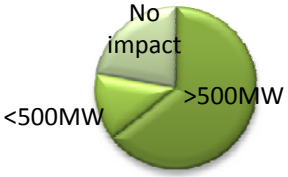
Technical Resilience :



Flexibility:



RES :



Screening process with market modelling

Aim of the screening process is to

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

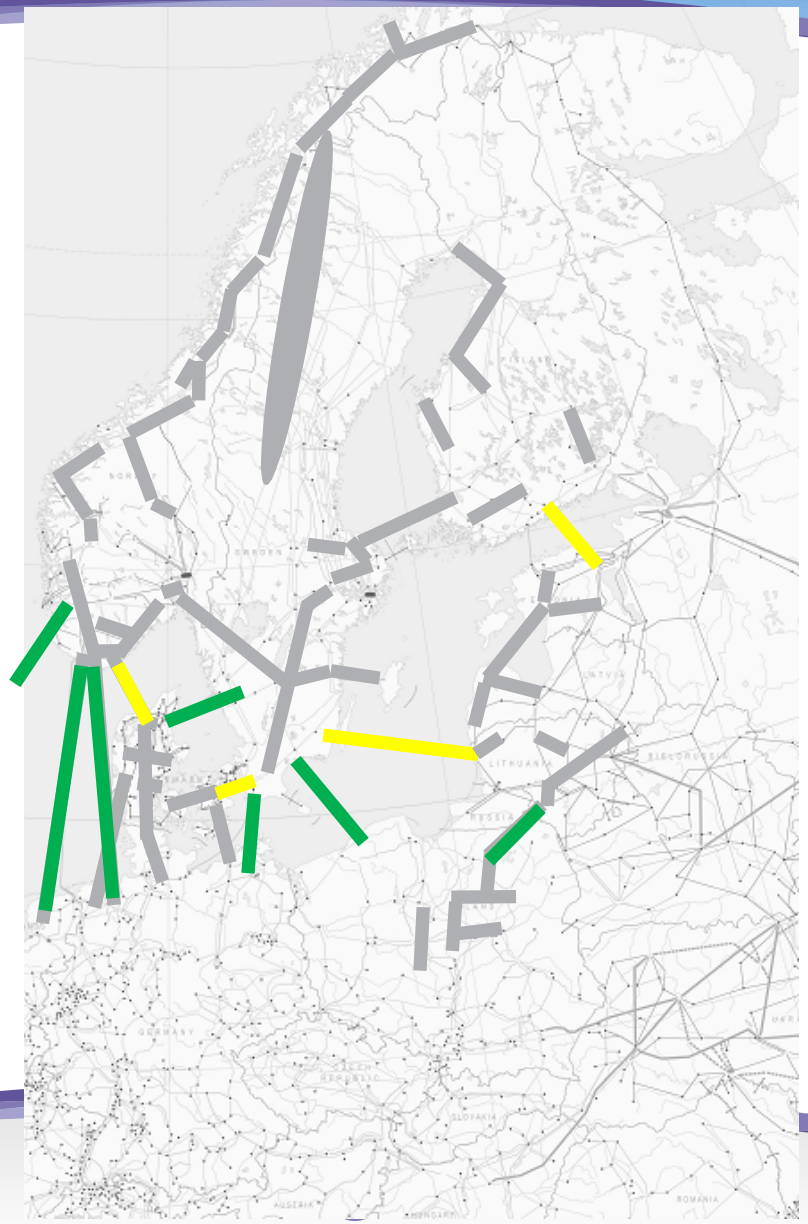
Data:

- Scenarios: EU2020 & B
- NTC's for 2020 (Reference + expected projects 2015-2020)

Parameters used in screening proces

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

Screening process results



Lines with highest marginal benefits, congestions hours and rents:

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

Highest investment needs in north-south direction (Scandinavia-Continent)

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

Some of the lines already in the package