

ENTSO-E's Ten Year Network Development Plan

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Long term development stakeholder group
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TYNDP outcomes

- Aim is to discuss outcomes of the studies and a meaningful way to present it to external stakeholders
- First some examples from the previous TYNDP 2012 and Regional plans 2012

Various maps – needs and projects



What drives the investments?

Where are they located?



Various maps - bottlenecks and adequacy



Various analysis
presented by colourcode



Examples of scenario description

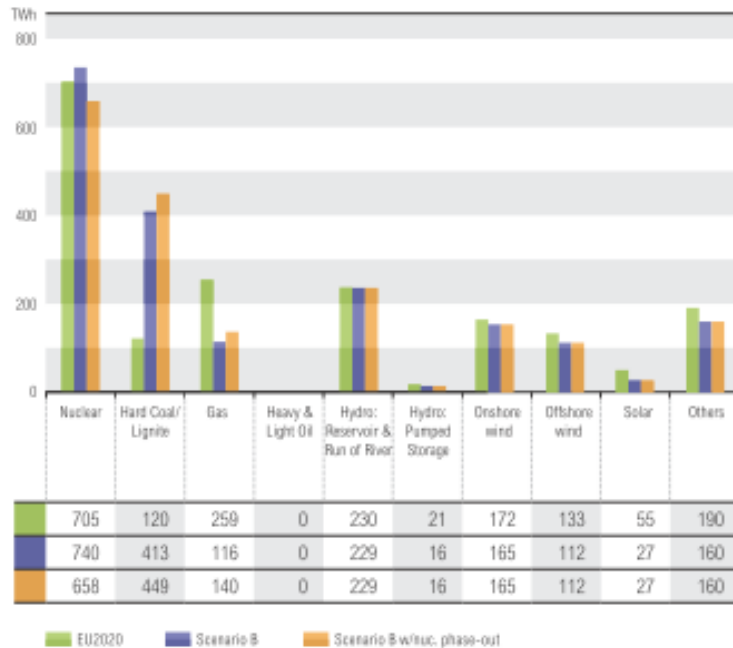


Figure 11:
Aggregated Fuel Mix Grid 2020

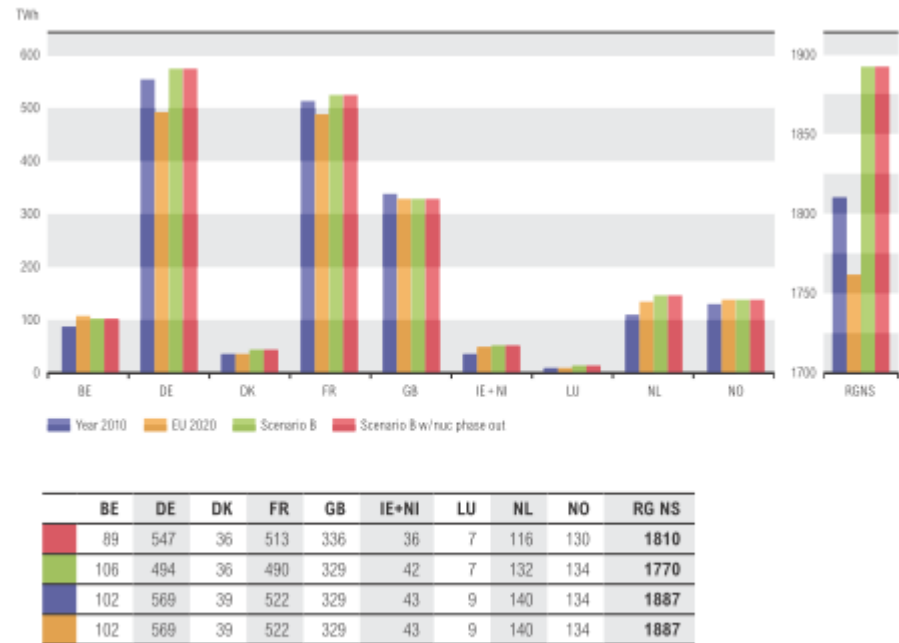
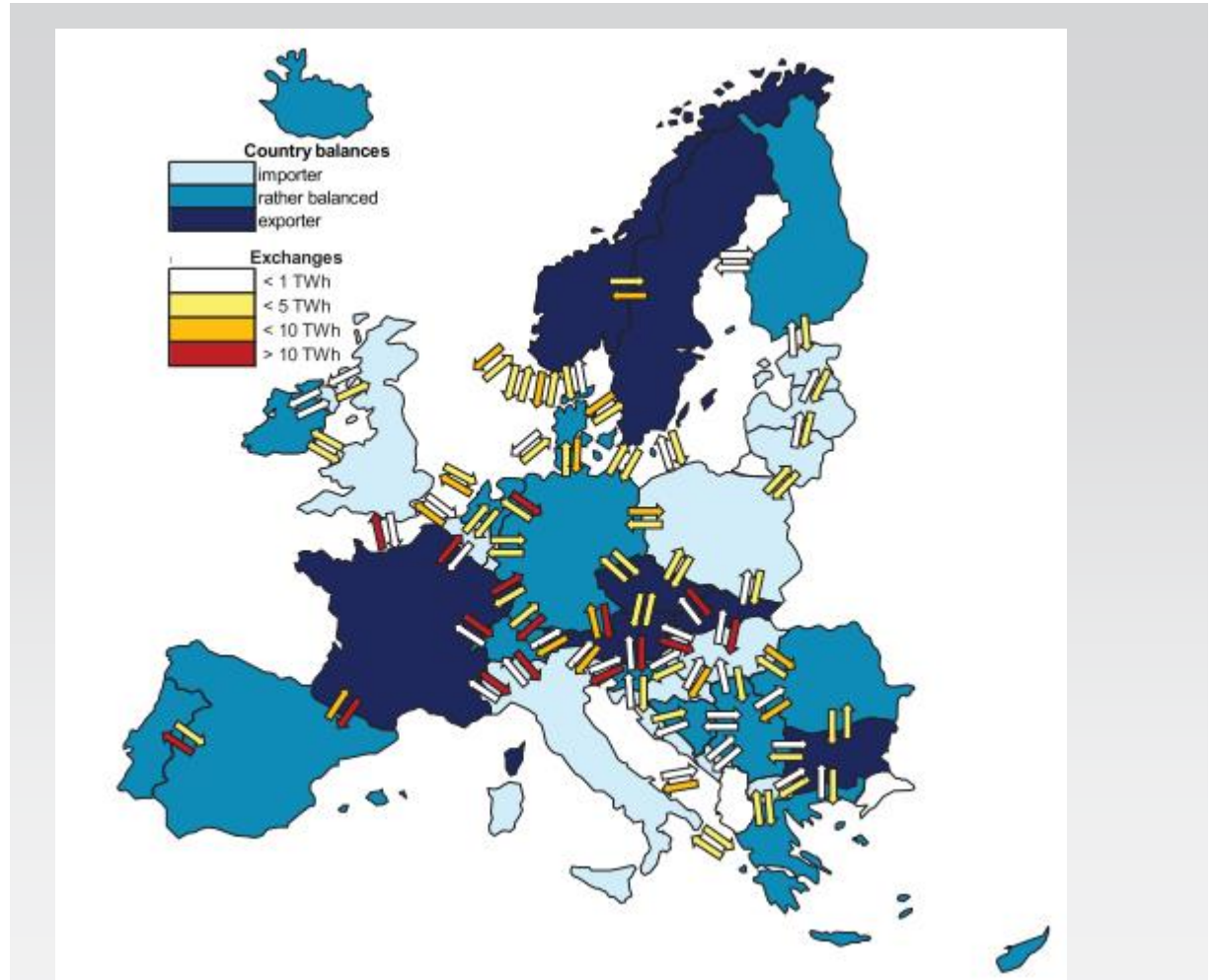


Figure 8:
Annual demand for 2010 (Reference: Statistical Yearbook 2010) and in 2020

Demand by countries, by region, existing situation and the scenarios in 2020
Generation mix by countries, capacities/energy provided in the scenarios 2020

Examples market –study results

Power exchange patterns



Examples of market study –Power exchange and congestions

Between Continental Europe and Great Britain

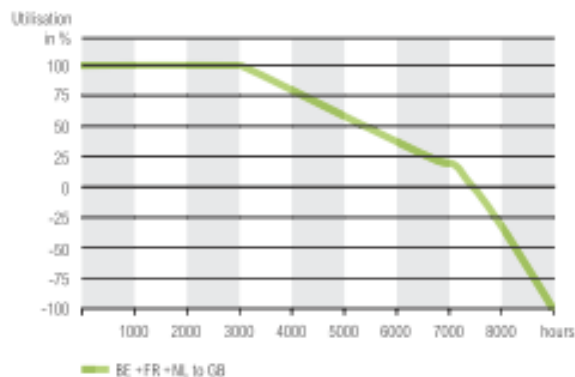


Figure 32:
Duration curves of market flows
Scenario EU 2020 / Grid 2020

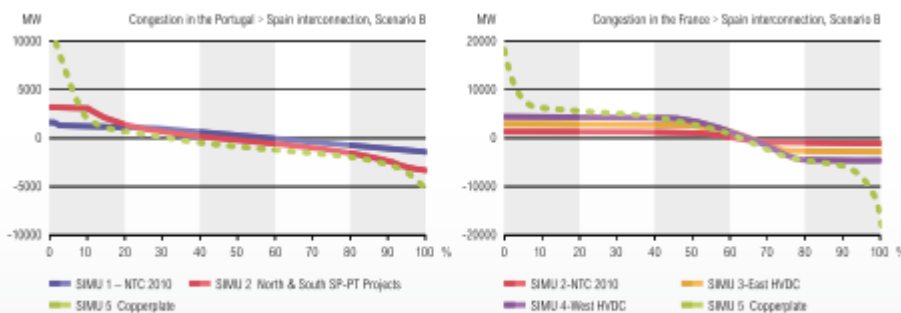


Figure 14:
Congestion time in the Portugal-Spain (left) and the France-Spain (right) interconnections. Scenario B

Annual exchange in maps or curves by boundaries/cross-borders

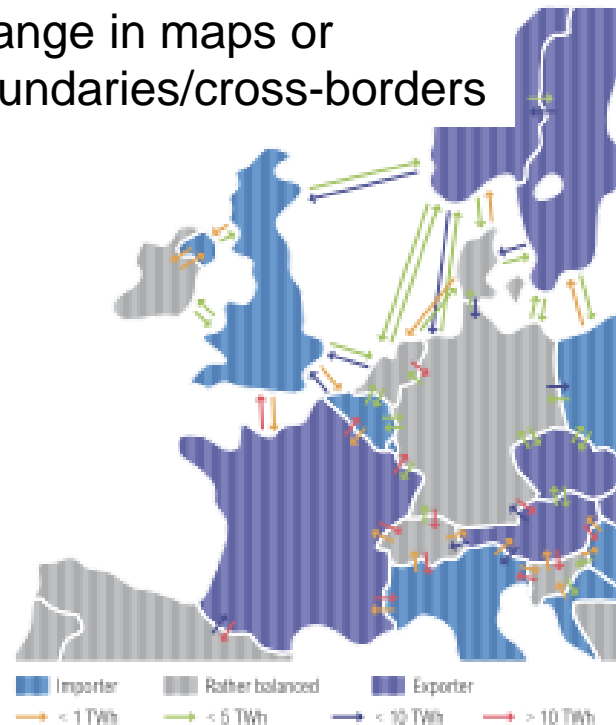


Figure 12:
Power Exchange Patterns in 2020

Examples Market study results – Flows and balances

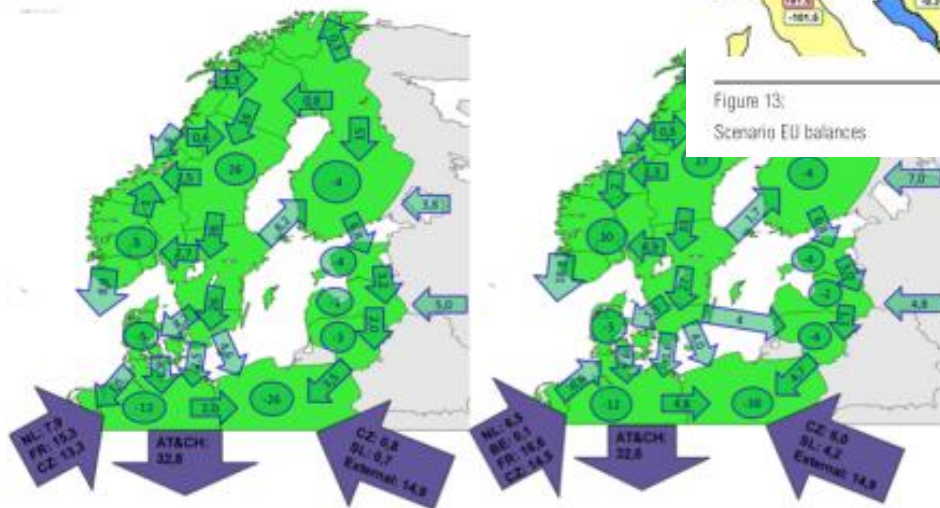


Figure 10:
Net flows and balances in Scenario EU 2020 with 2015 grid (left) and 2020 grid (right) (TWh/a)

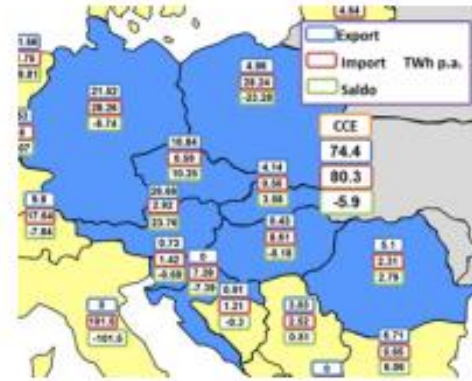


Figure 13:
Scenario EU balances



Figure 14:
Scenario EU market exchanges

Examples from Grid studies

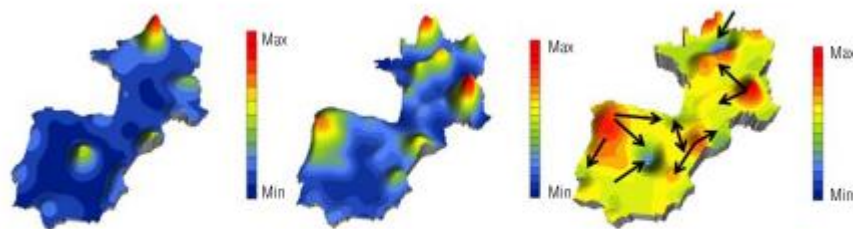


Figure 8:
Power Flow Mountains in the region, for demand, generation and generation minus demand

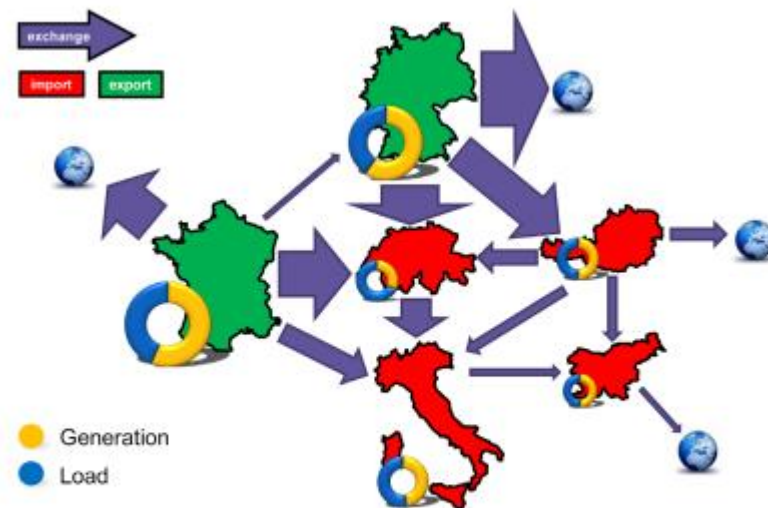


Figure 5:
High RES case

Examples - Environmental issues

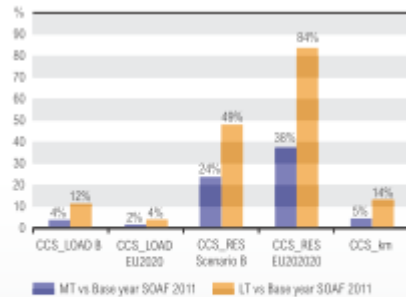


Figure 28:
Increasing in Load, RES and grid expansion [%]

CO2

comparison on length/RES/Demand development
Environmental impact

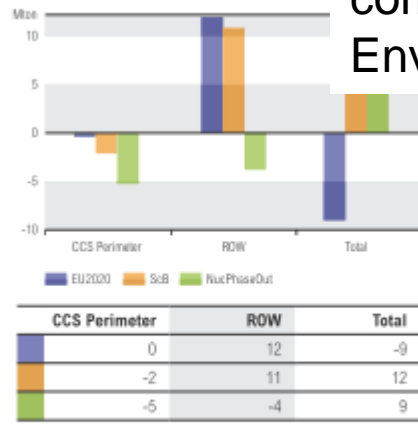
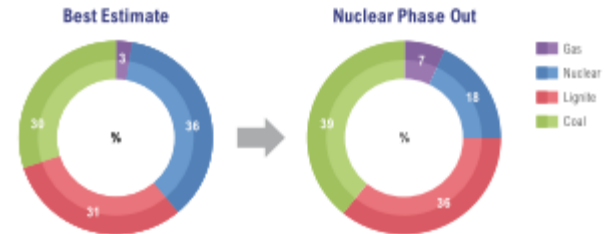


Figure 13:
Delta Co2 Emissions (Grid Capacities as Expected in 2020 – Grid Capacities as Expected in 2015) – Mton



The Nuclear Phase Out in Germany determines a more intensive use of fossil fuel generation (Coal, Lignite and Gas) > + 20 Mtons CO₂/year

Figure 27:
Impact of the Nuclear Phase Out in Germany on CO₂ emissions

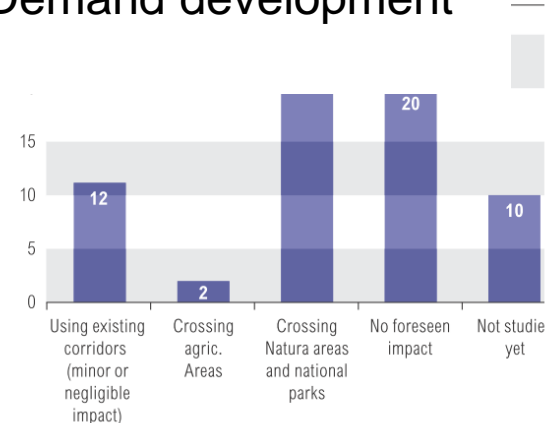


Figure 27:
Assessment of the environmental impact for investments part of the projects of pan-European Significance

Examples – hourly values



Hourly values on certain time points

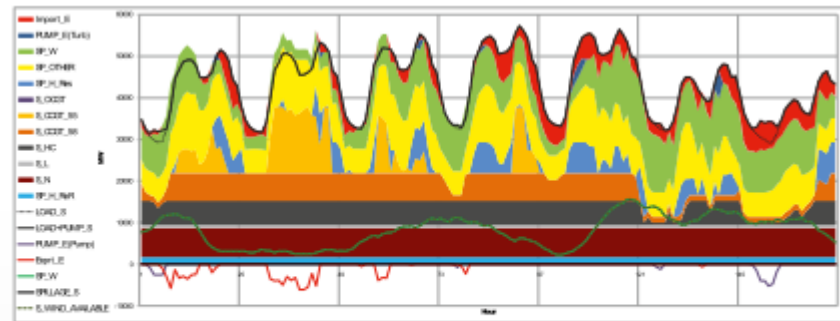


Figure 45:
Hourly results of simulation models. France, Portugal and Spain. 1st week of January, Scenario B.

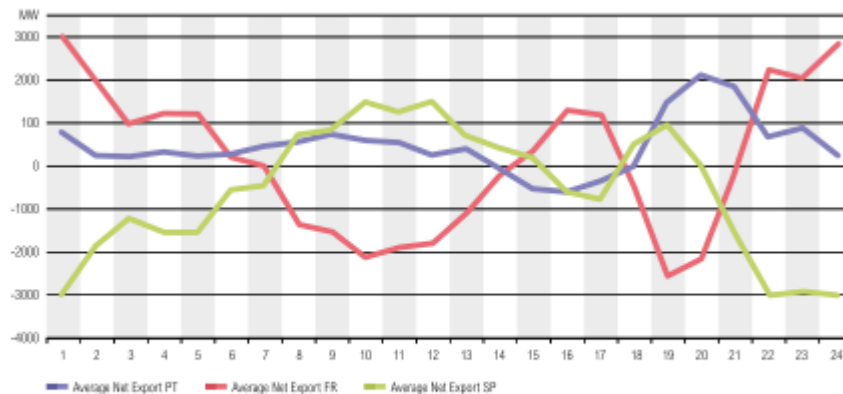


Figure 16:
Average hourly exchanges in the Portugal-Spain and France-Spain borders. Workdays in Jan-Feb-Dec. Scenario B. Simu 4

Legend for Area Bubble Diagram:
 Study Transfers: RO, DE, RO_EXP to RE, RI, OR, INO
 Sublines:
 1: TRF
 2: Load
 3: Unoperation
 Connections: Final Flow



Figure 38:

Examples - maps

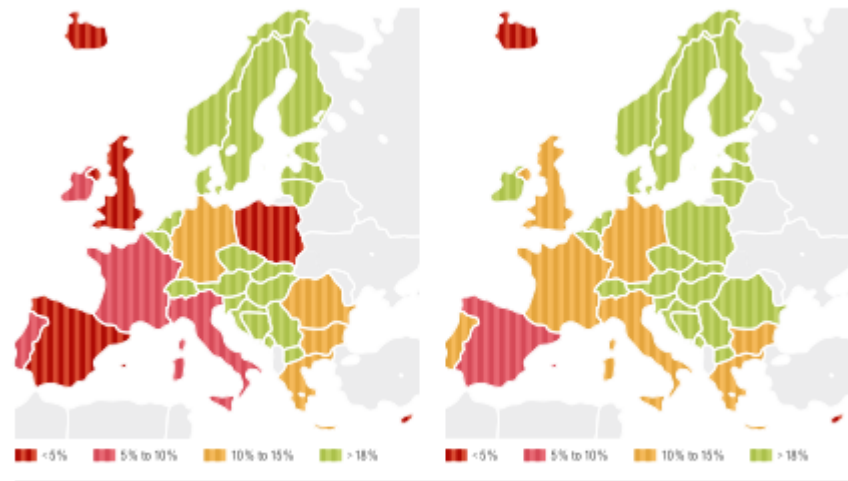
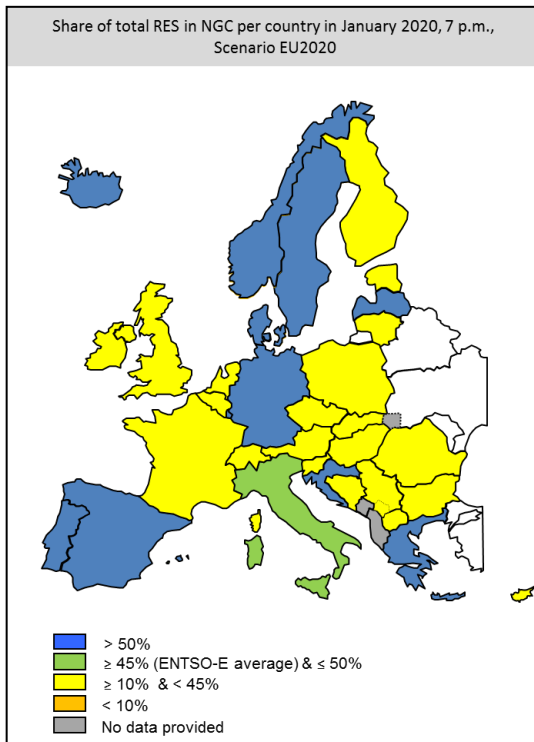
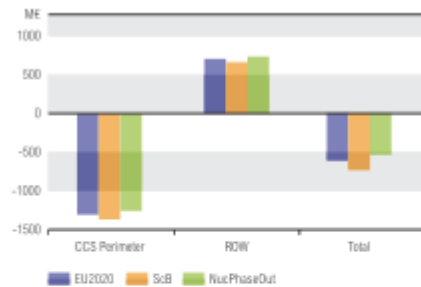
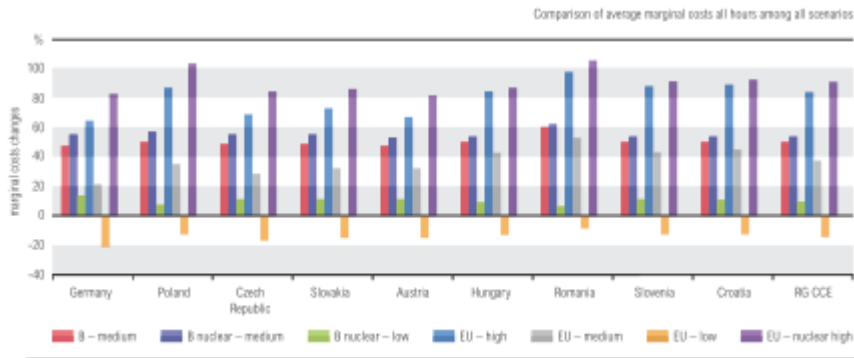


Figure 26:
Interconnection ratio (import capacity / net generation capacity) in 2011 (left) and 2020 (right)

Examples – marginal price/price differences/benefits



	CCS Perimeter	ROW	Total
EU2020	-1319	704	-615
ScB	-1373	642	-731
NucPhaseOut	-1275	731	-544

Figure 12:
Variable Generation Cost Savings (Grid Capacities as Expected in 2020 – Grid Capacities as Expected in 2015) – ME

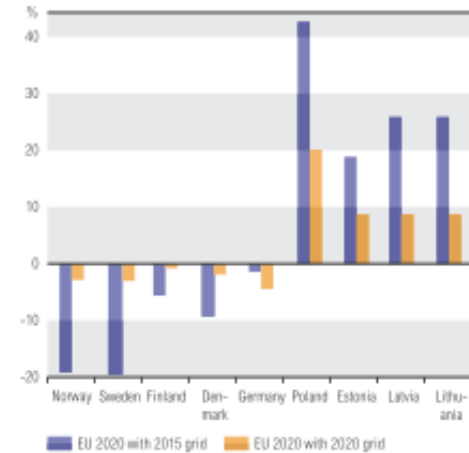


Figure 13:
Average price differences from the consumption weighted average prices in RGBS region in scenario EU2020

	EU2020	Scenario B	EU2020	Scenario B
			with nuclear shutdown	
Electricity market benefit	750	265	530	350
Savings in generation costs	1,960	-210	1,870	-150

Table 1:
Electricity market benefits and savings in generation costs in RGBS due to the investment portfolio; difference between the situation with the investment portfolio and without the investment portfolio (M€/a)

Examples - CSE

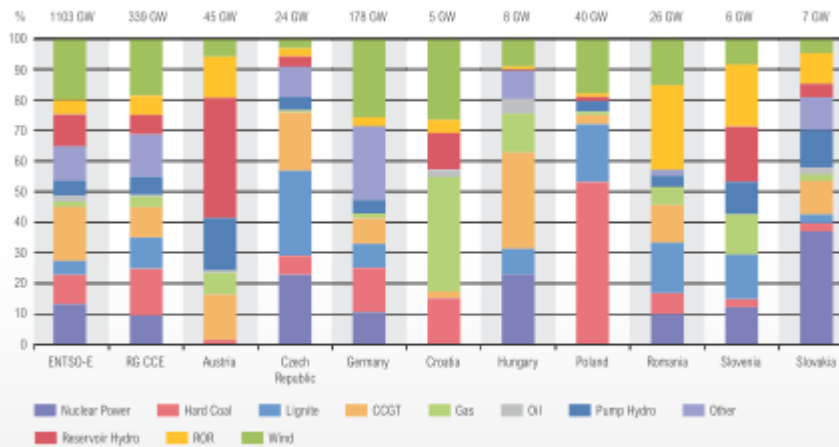


Figure 8:
Installed capacity and technology share (Scenario EU 2020)

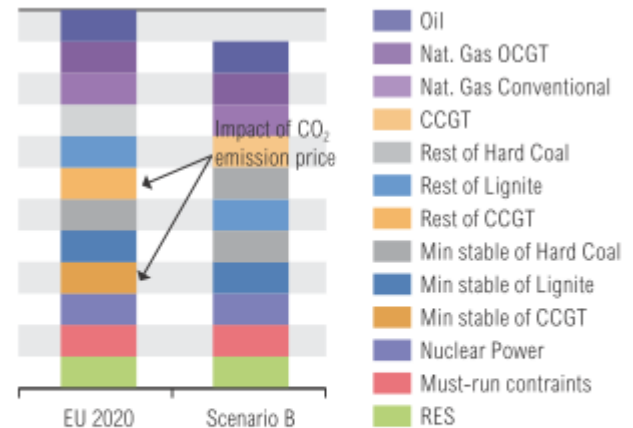


Figure 11:
Merit order for each scenario

Examples – Losses, LOLE, view beyond 2020

12.5.2.5 Adequacy indicators

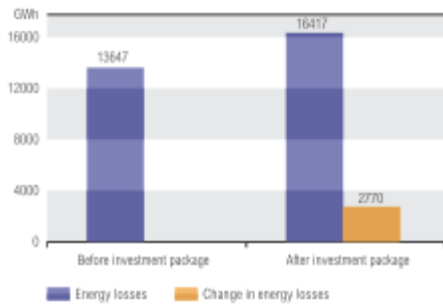


Figure 43:
Estimate annual transmission grid losses in Sweden, Norway, Finland and Denmark before and after the investment portfolio.

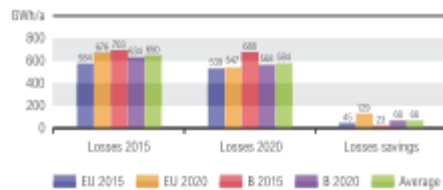


Figure 44:
Estimated Sum Of Annual Transmission Grid Losses In Estonia, Latvia And Lithuania In Years 2015 And 2020.

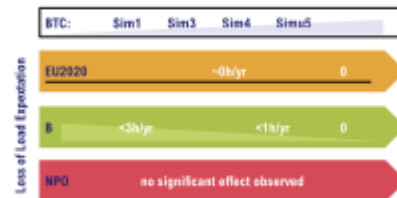


Figure 51:
LOLE indicators in the CSW region



Figure A:
Showing EUE in GWh for EU2020/
B2020 without investment portfolio, half import and severe load

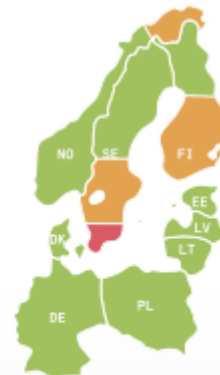
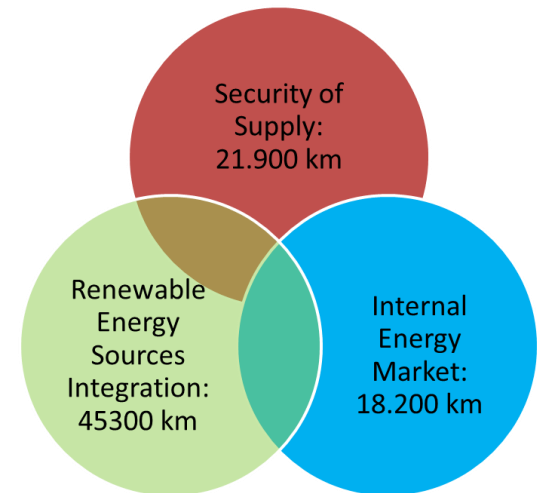
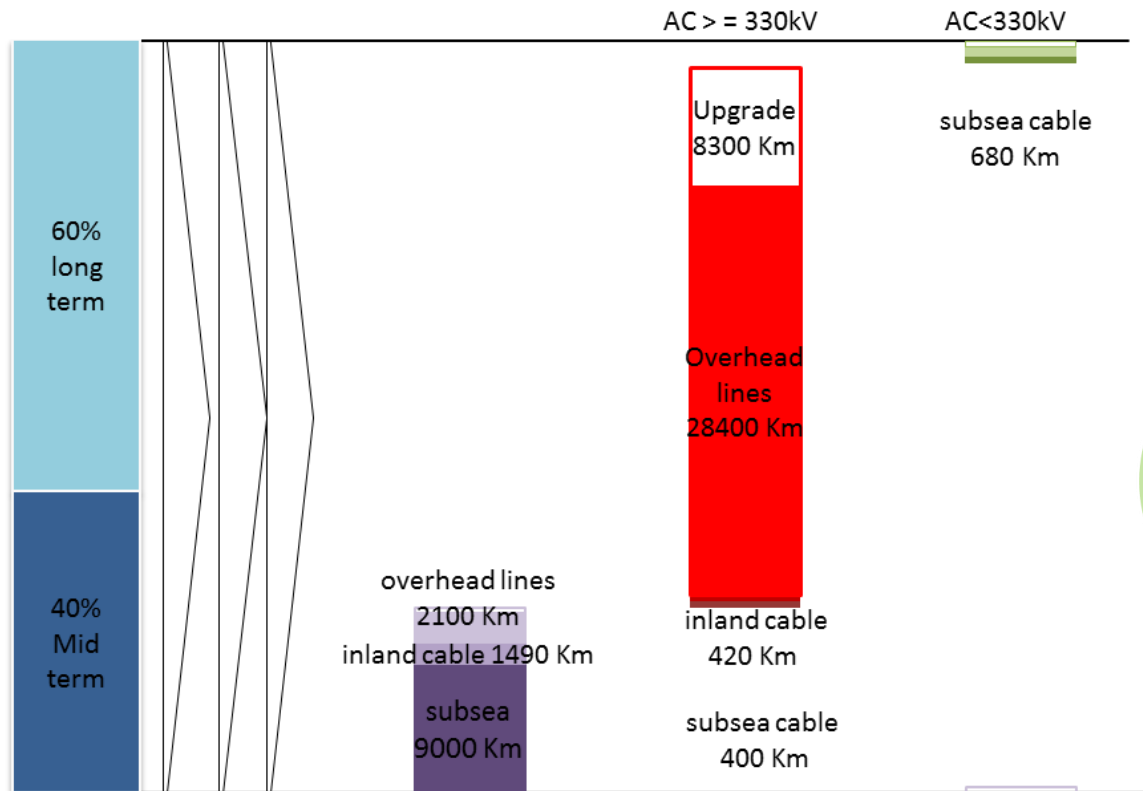


Figure B:
Showing EUE in GWh for EU2020,
nuclear BWR-reactor shutdown without investment portfolio, half import and normal load



Figure 26:
Results from the screening process – Map of possible new inter-connections in the Baltic Sea Region beyond 2020 to be further analyzed.



Costs



	billion €		billion €
Austria	1.1	Ireland	3.9
Belgium	1.9	Latvia	0.4
Bosnia-Herzegovina	0.0	Lithuania	0.7
Bulgaria	0.2	Luxembourg	0.3
Croatia	0.2	Montenegro	0.4
Czech Republic	1.7	Netherlands	3.3
Cyprus	0.0	Norway	6.5
Denmark	1.4	Poland	2.9
Estonia	0.3	Portugal	1.5
Finland	0.8	Romania	0.7
France	8.8	Serbia	0.2
FYROM	0.1	Slovakia	0.3
Germany	30.1	Slovenia	0.3
Greece	0.3	Spain	4.8
Hungary	0.1	Sweden	2.0
Iceland	0.0	Switzerland	1.7
Italy	7.1	United Kingdom	19.0

Total ENTSOE perimeter	104
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Future development



Ideas for future development of the graphics

Statistics?

Presenting the results on maps/tables?