European University Institute

ROBERT SCHUMAN CENTRE FOR ADVANCED STUDIES

FSR ENERGY

Florence School of Regulation

EU Electricity Regulation - Present & Future

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What a mess? Or what a chess?

Balancing market

Day-ahead market

Bilateral / OTC

Market coupling

Intraday markets

Reserves/ ancillary services markets

Peak load product

Flexibility market

Market splitting

Explicit auctions for transmission capacity

Base load product

Congestion management

Capacity markets

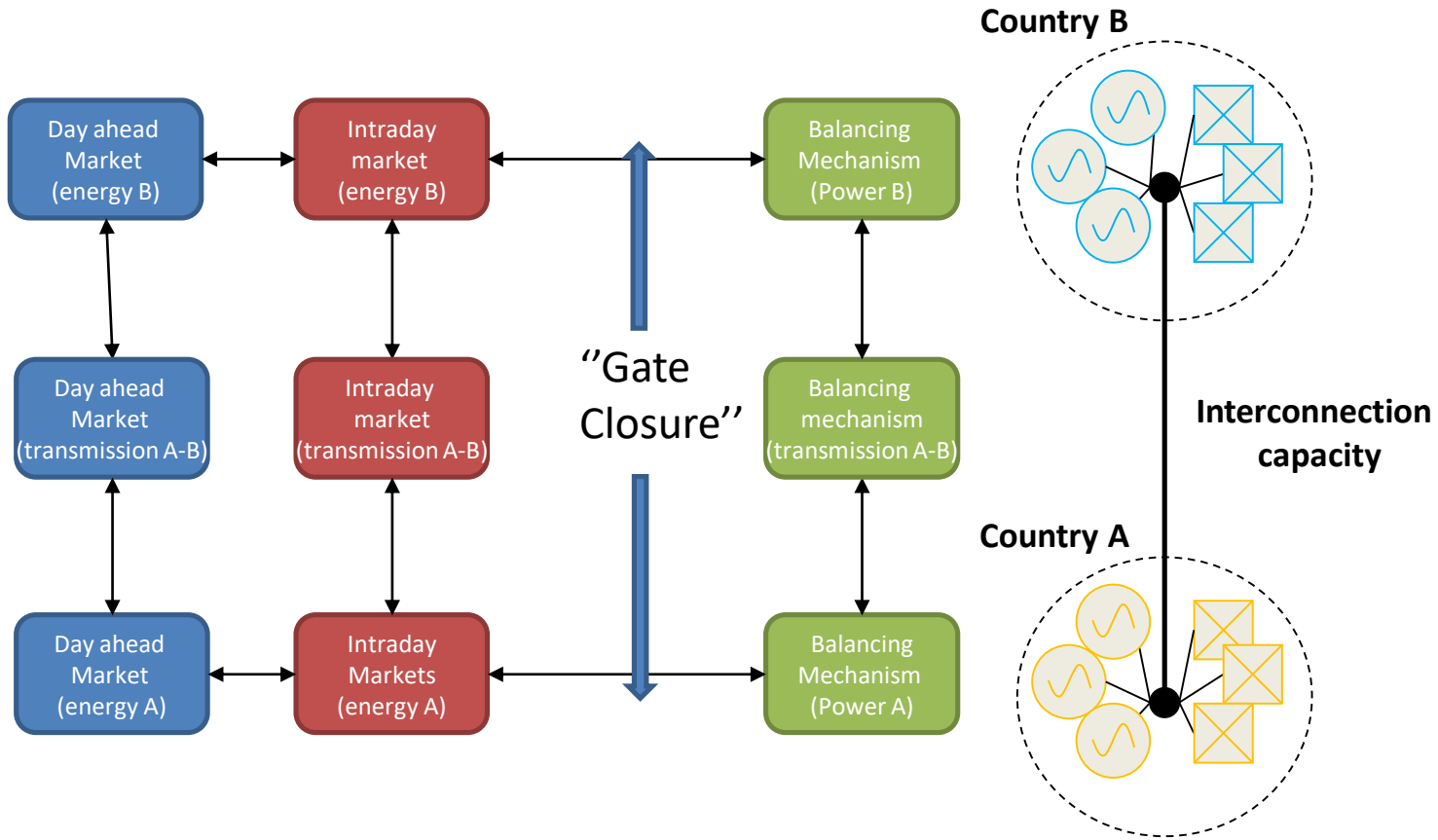
Implicit auctions

Long term contracts

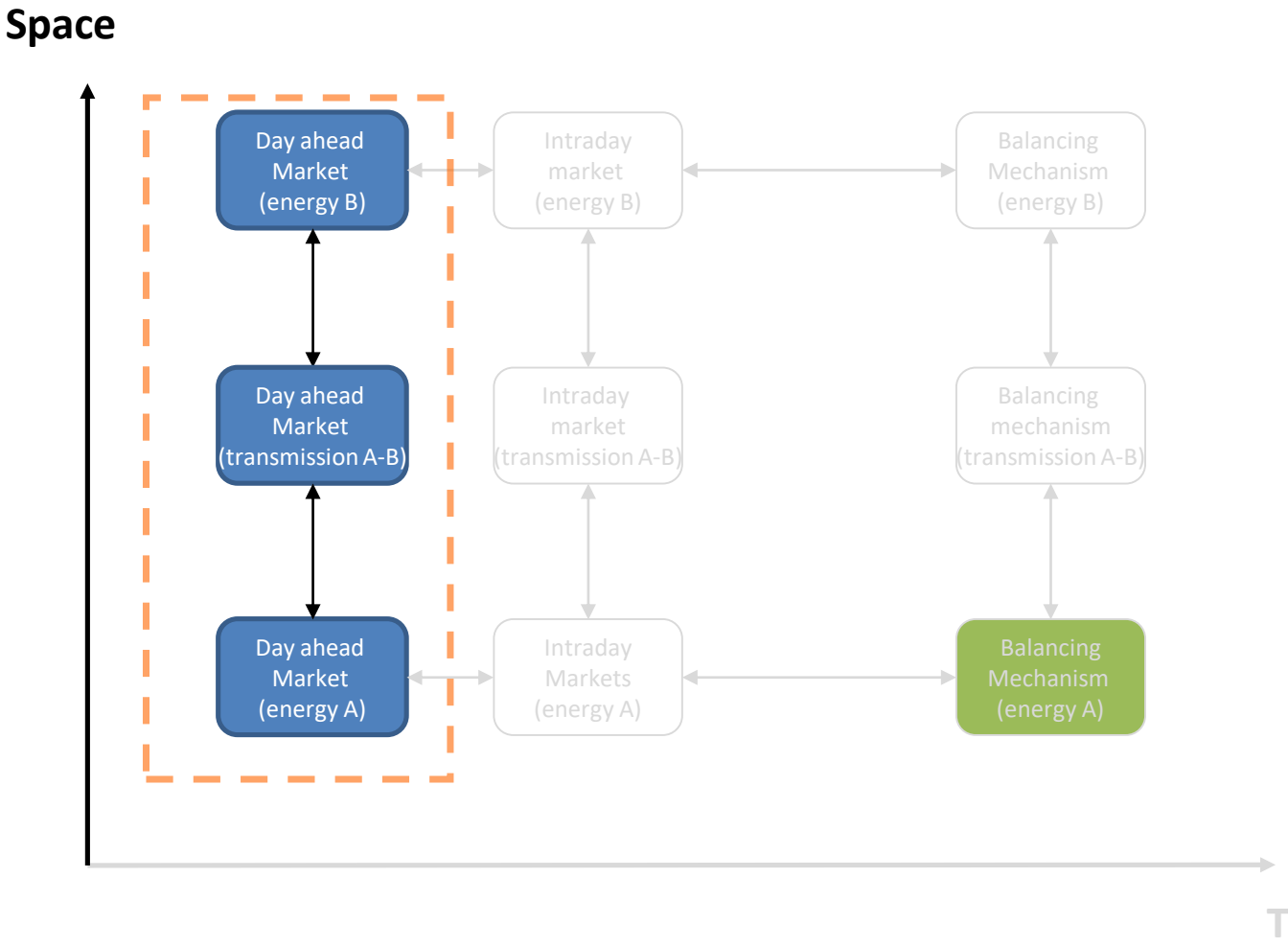
[1]
El. Day-Ahead Energy Markets & European Coupling

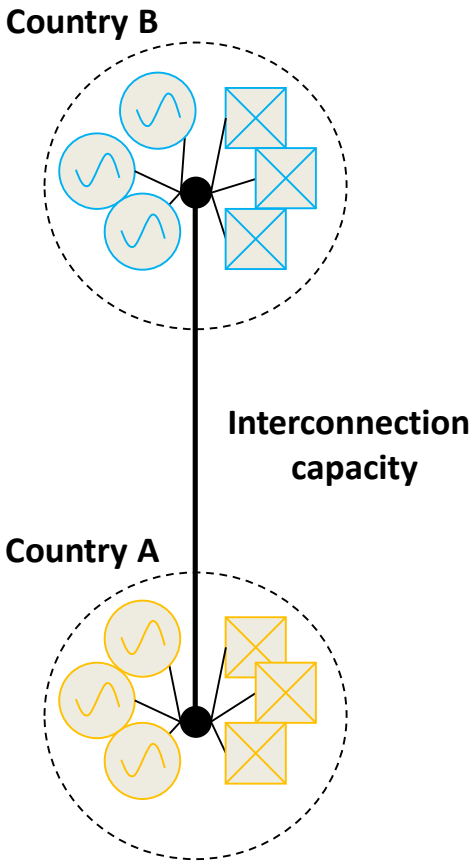
The case of Europe

Are the European markets coupled or national?



What El. Wholesale markets to integrate? How EU does it ?



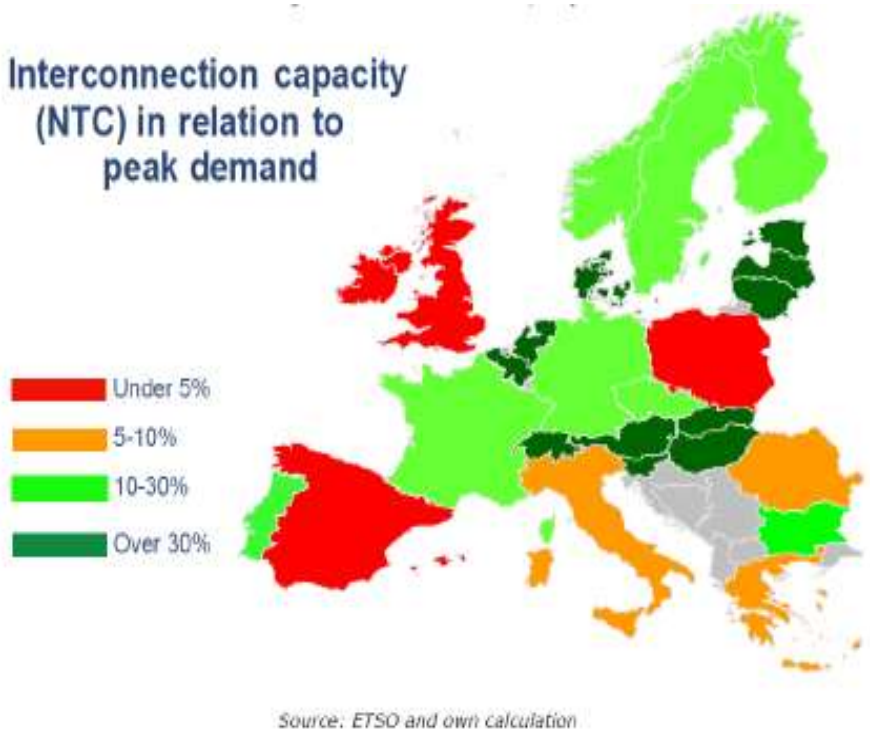


Given transmission limited capacity, national energy markets cannot be perfectly coupled 8760h every year

- Why to split EU D-A energy market?

  EU market is split when transmission capacity is constrained (i.e., when there is a congestion)

- Cross-border congestion management calls for coordination (coupling/decoupling) of D-A energy markets



Source: ETSO and own calculation

2 options to coupling/decoupling D-A EU el. energy markets?

- ***Explicit*** auctions
  - Cross-border transmission capacity is a separate market
  - Cross-border integration of energy markets is left to the ability of arbitrageurs

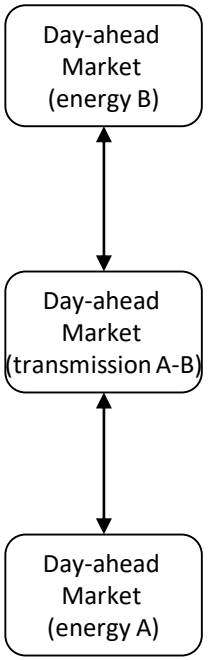
- ***Implicit*** auctions (market coupling or market splitting)
  - Algorithm common to Power Exchanges & TSOs allocates cross-border capacity according to energy bids' merit order

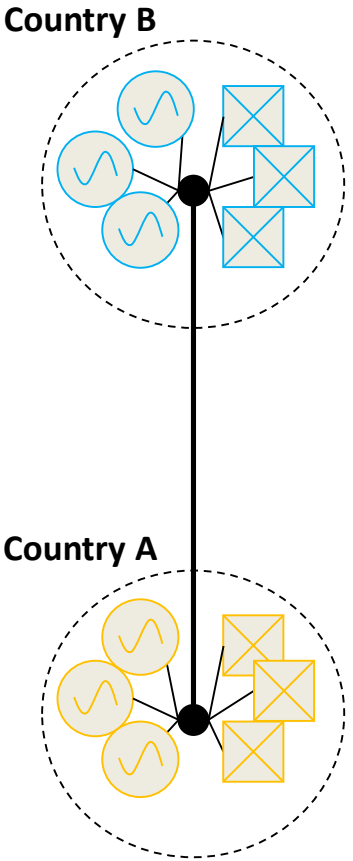
Implicit auctions

Day-ahead Markets of both countries (energy A + B)

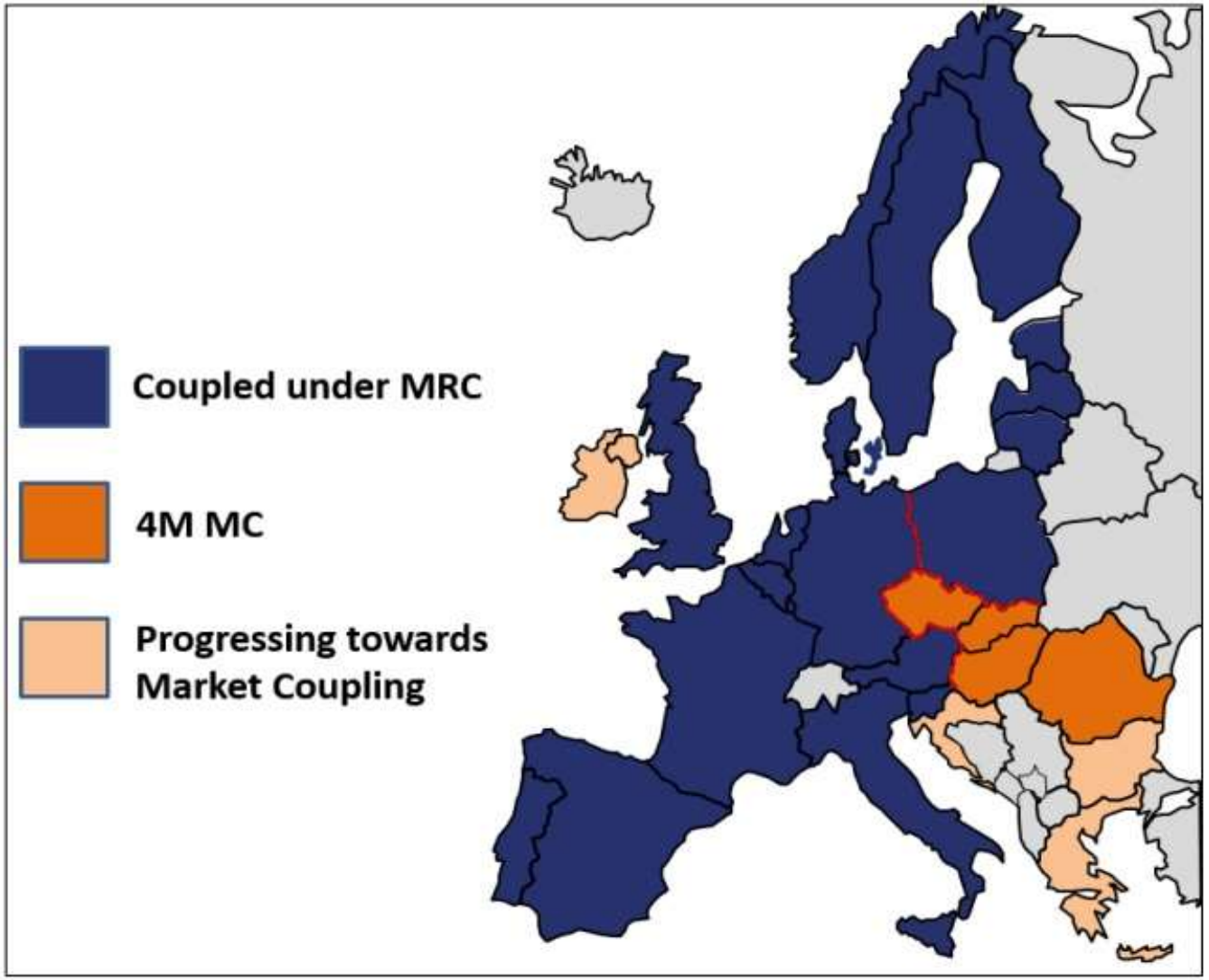
Matching Algorithm Allocates transmission capacity A to B to best A+B energy bids

Explicit auctions





A landmark: EU Day-ahead market coupling

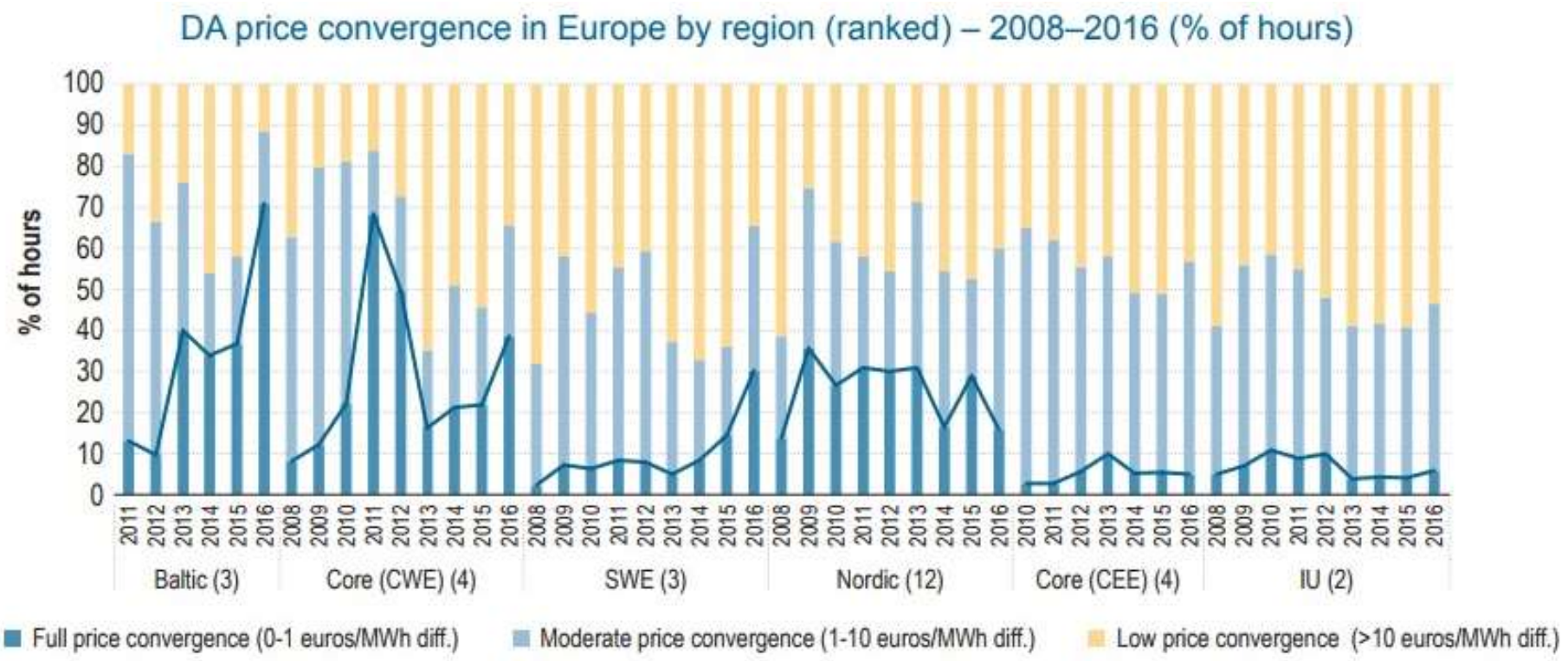


MRC= Multi regional coupling

MC= Market coupling

Coupled DA-markets in the EU (ENTSO-E, 2017)

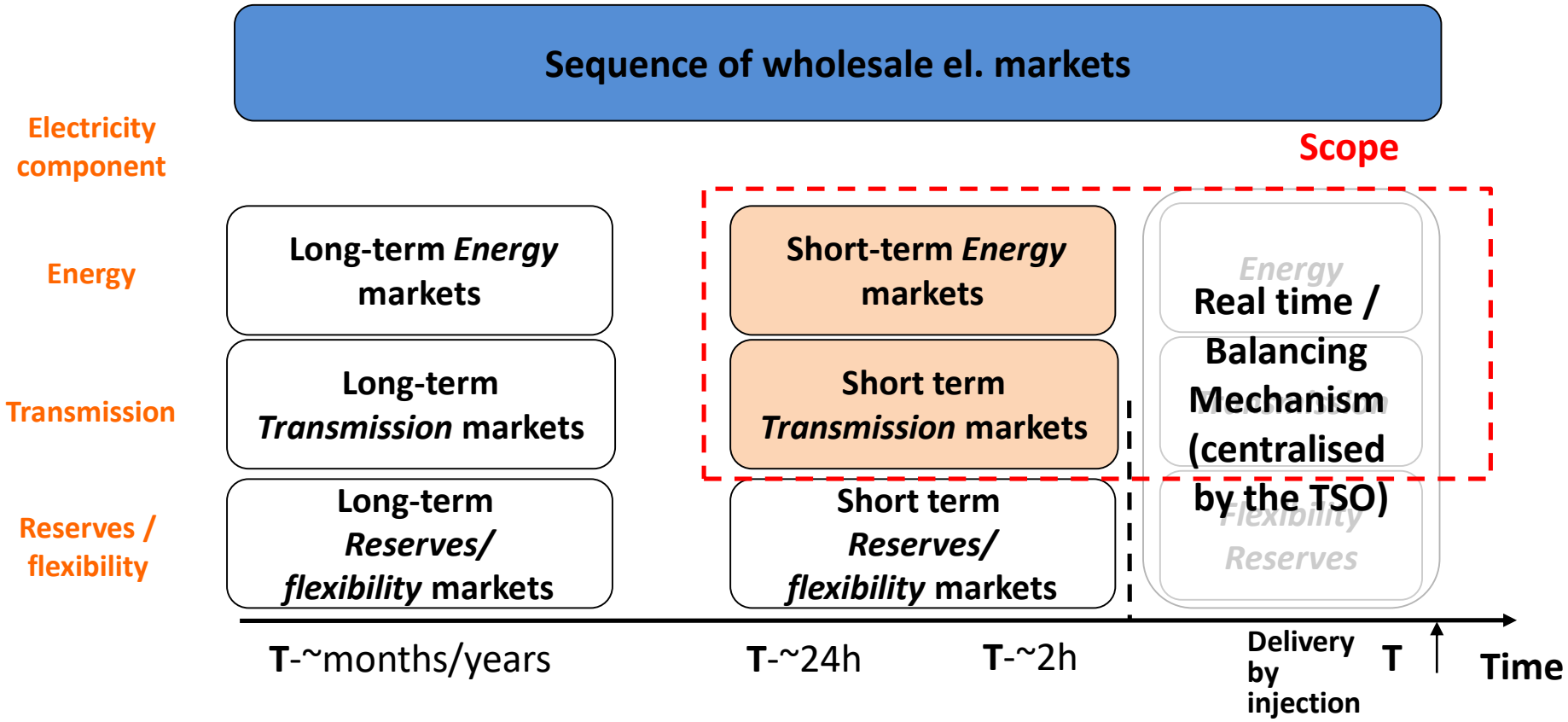
How integrated are EU Day-Ahead energy markets within Market Coupling?



Source: ENTSO-E, Platts (2017) and ACER calculations.

Note: The numbers in brackets refer to the number of bidding zones included in the calculations per region.

The complete set of EU wholesale el. markets



NB: markets for flexibility are often called "reserves" because the TSO reserves some flexible capacity (power station or demand response) to ensure enough flexibility in real time

[2]
Network Codes
as EU Market Design

What is a EU network (code or guideline)?

1. A set of practical rules applied to cross-border & market integration issue

2. Developed by gathering of NRAs into ACER, of TSOs into ENTSO-E + Control by the European Commission (under Art. 8 of Electricity Directive 2009)

3. Going through a EU law-making process called ‘Comitology’

4. Adoption transforms network codes & guidelines proposals into binding “EU laws” as “Regulations” to be implemented in all EU countries by all NRAs & TSOs

Which EU electricity network codes?

How to integrate power markets?

Market codes

- Forward Capacity Allocation (FCA GL)
- Capacity Allocation and Congestion Management (CACM GL)
- Electricity Balancing (EB GL)

How to harmonize grid connection rules?

Grid connection codes

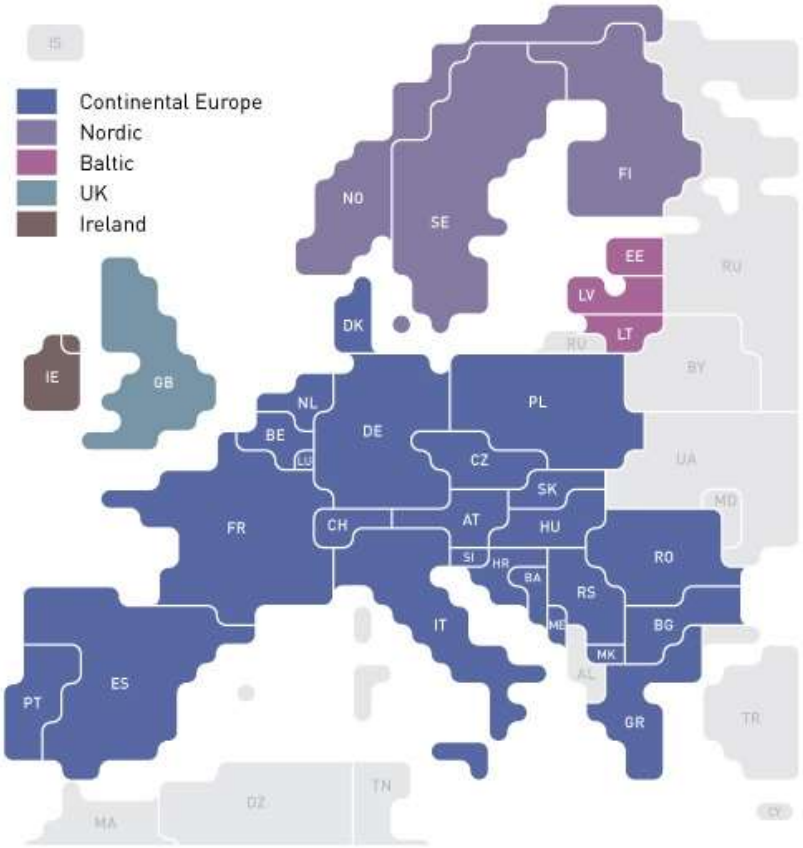
- Demand Connection Code (DCC NC)
- Requirements for Generators (RfG NC)
- HVDC Connections (HVDC NC)

How to seamlessly operate a power system?

System operation codes

- System Operations (SO GL)
- Emergency and Restoration (ER NC)

Operations codes: e.g. towards regional operation?



Synchronous zones in the EU (ENTSO-E, 2017)

Regional Security Centres (ENTSO-E, 2017)

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FLORENCE SCHOOL OF REGULATION

1st Edition
ONLINE COURSE
EU Electricity Network Codes

In collaboration with

entsoe
Reliable Sustainable Connected

European Commission

ACER
Agency for the Cooperation of Energy Regulators

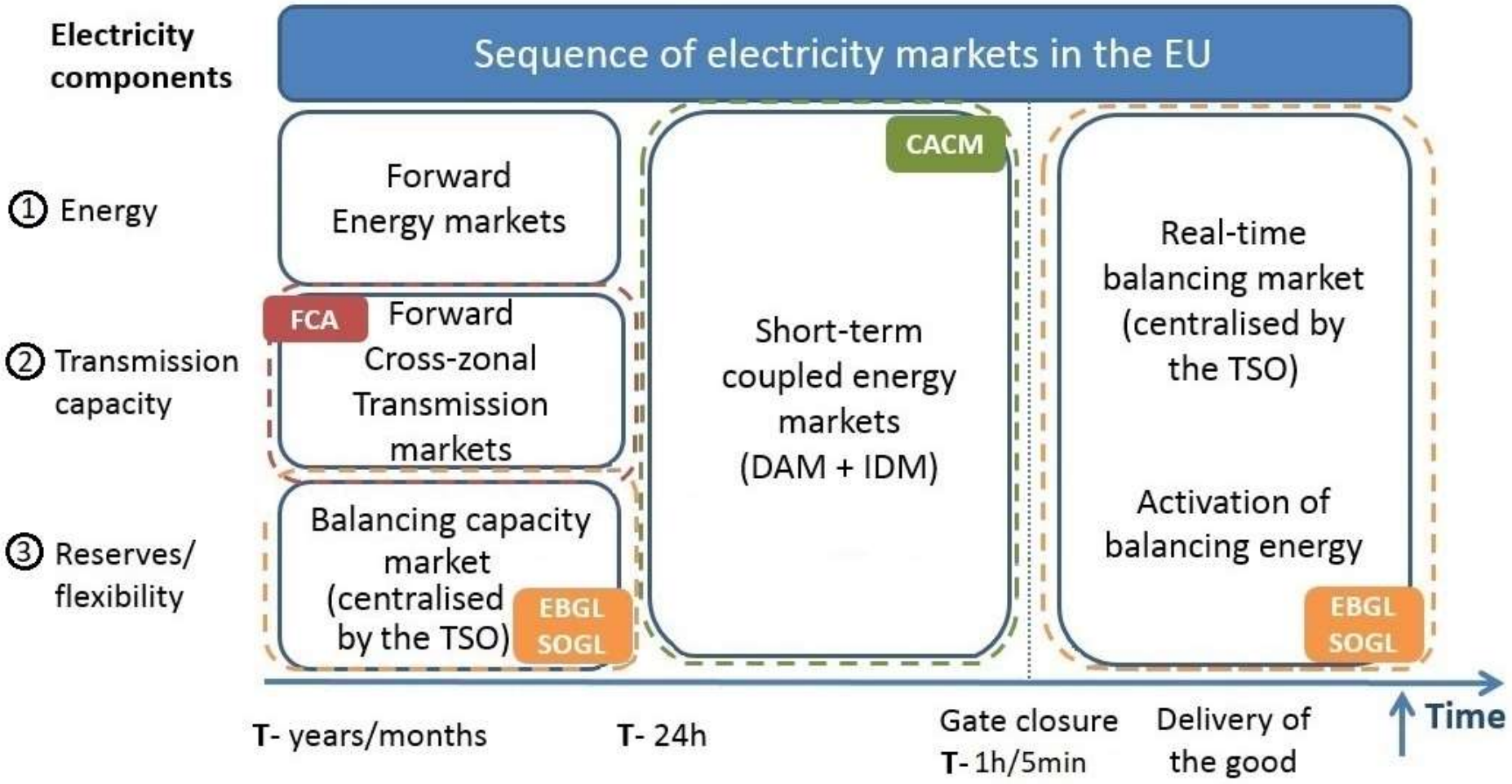
140
PARTICIPANTS

65%
SENIOR PROFESSIONALS

25
COUNTRIES

56% Energy Companies
40% Regulatory & Public Bodies
4% Universities

Network codes course at Florence School (Content)



[3]
Mid term EU generation adequacy forecast 2017

2020 Loss of load expectations (LOLE) – base case

Loss Of Load Expectation (h/y) LOLE is the number of hours in a given period (year) in which the available generation plus import cannot cover the load in an area

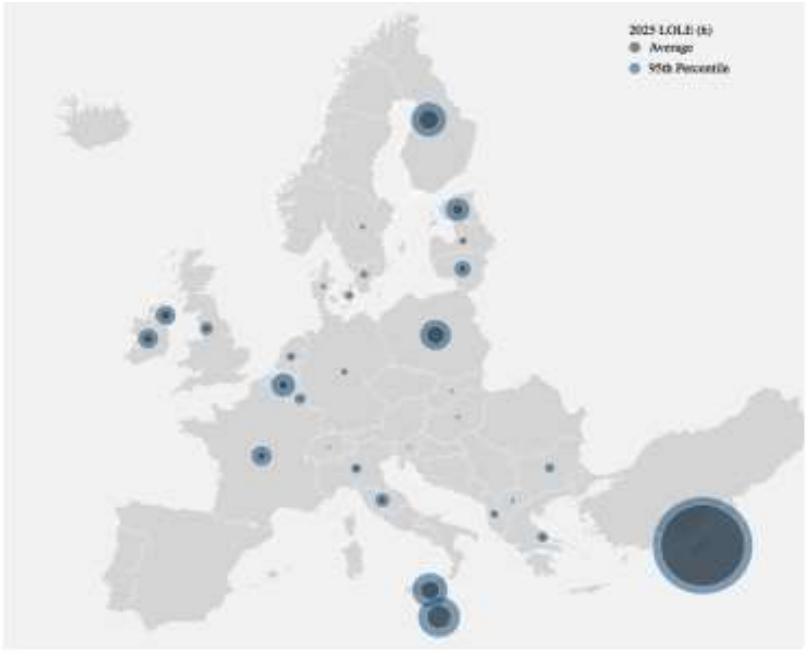
Main risk of resource scarcity:

- Islands
(e.g. Cyprus, Malta, Ireland and Northern Ireland)

- periphery*
(e.g. Albania, Bulgaria, Greece and Finland)

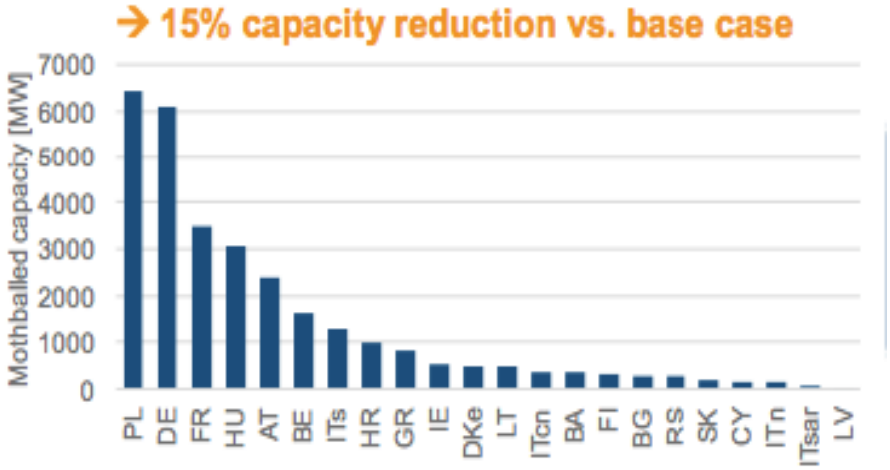
* Periphery to simulated countries of continental Europe

2025 Loss of load expectations (LOLE) – base case



- Island/ periphery risk confirmed
- Belgium and Baltics risk appear

Mothballing sensitivity leads to large uncertainty and thereby strong interdependency



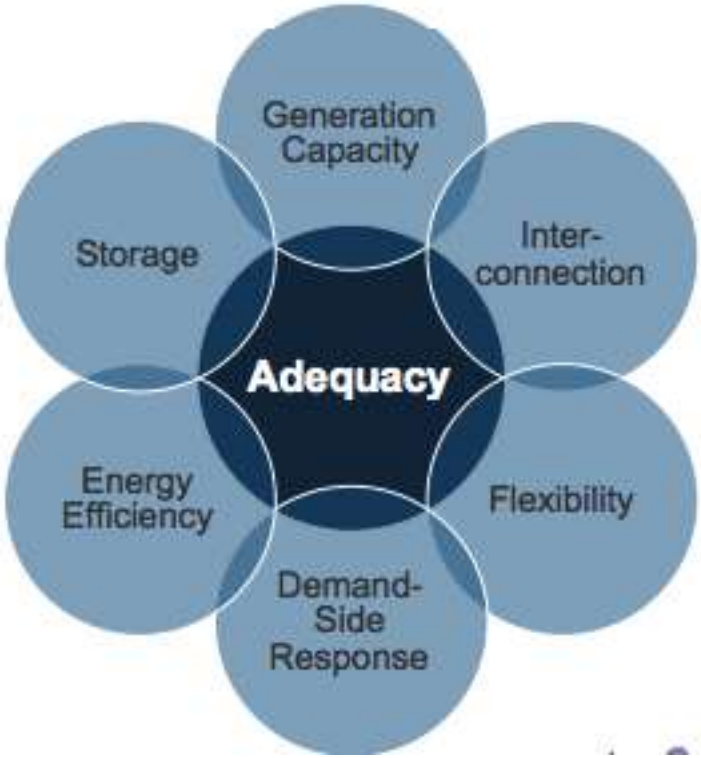
- Mothballing in 45% of the countries significantly impacts adequacy in 82% of the countries
- Importance to have reliable generation plan from utility (min 3-5 years)
- Crucial to get a clear picture

- Significant impact on adequacy in a larger region
- Coordinated studies needed

Proposal new EU energy law ("Package")

Clean Energy Package:
"Where the European resource adequacy assessment identifies a resource adequacy concern; Member States shall identify any regulatory distortions that caused or contributed to the emergence of the concern"

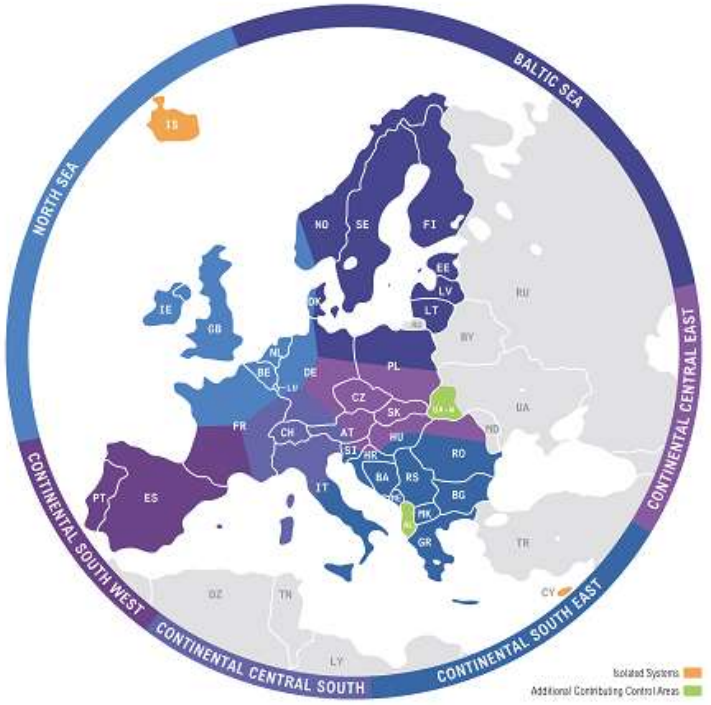
- Strong Pan-European and technological interdependencies.
- Need to coordinate and align activities



[4]
Ten Year Network Development Plan

Ten Year Network Development Plan (TYNDP)

- Long-term network development plan is one of the core missions of any transmission system operator (TSO).
- It allows them to tailor grids to the evolution of demand and generation, securing an affordable supply of energy for customers in the next decades.
- Having a European approach to grid planning ensures consistency and cost-efficiency.
- The TYNDP is thus key to many of Europe's economic, climate and energy objectives.

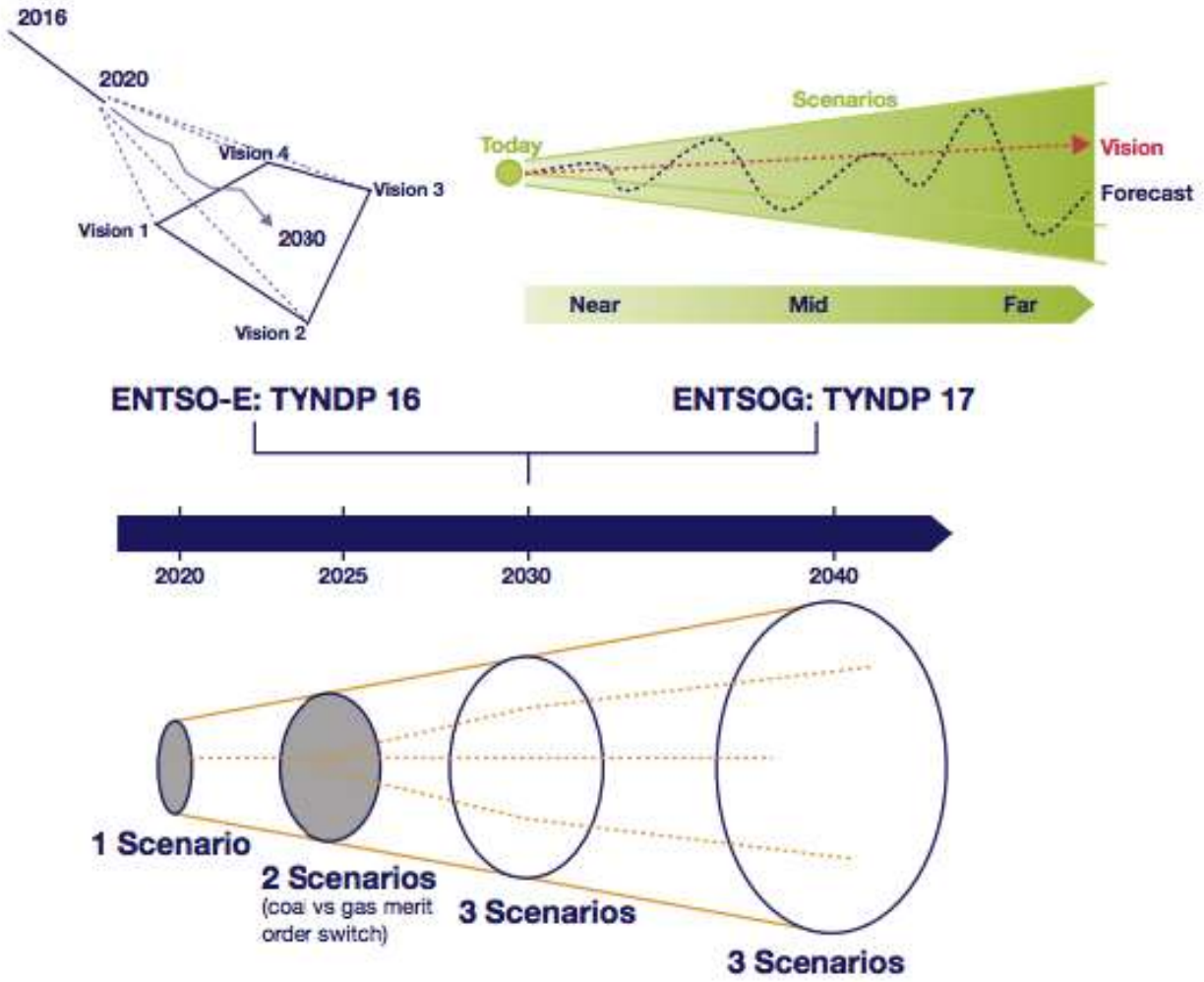


Ten year network development plan

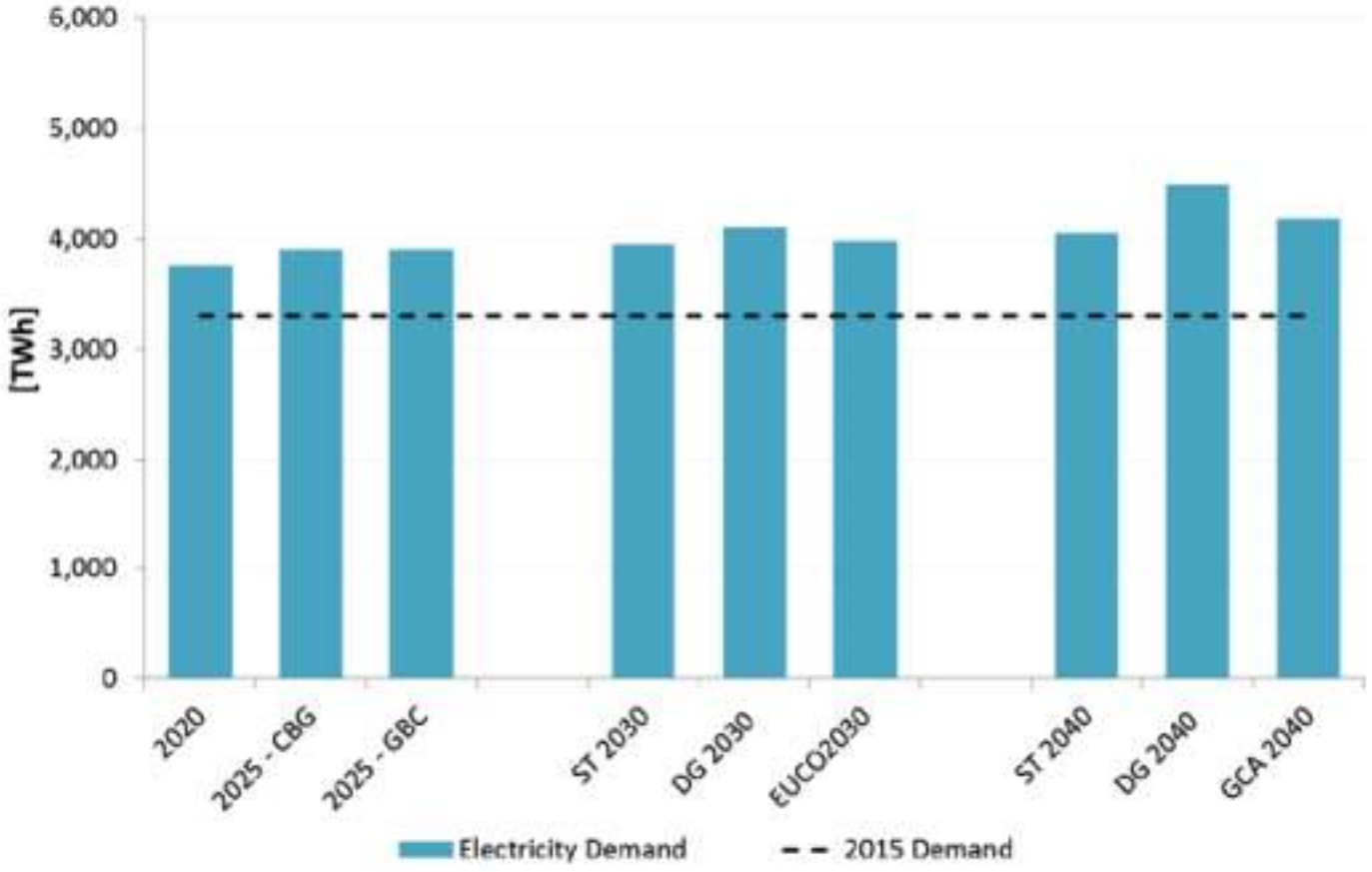
- ENTSOs for electricity & gas pooled their efforts and expertise to provide a joint set of scenarios, allowing for assessments of future investment decisions in Europe to be based on comparable analysis between the sectors. Together, we described three markedly different and ambitious paths towards delivering the future European emission targets
- **Scenarios**
- Short term and medium term
  - ***2020***
  - ***2025 Coal Before Gas*** (CBG) and ***2025 Gas Before Coal*** (GBC).
- Long terms :
  - ***Sustainable Transition*** (ST) Targets reached through national regulation, emission trading schemes and subsidies, maximising the use of existing infrastructure.
  - ***Distributed Generation*** (DG) Prosumers at the centre – small-scale generation, batteries and fuel switching society engaged and empowered.
  - ***Global Climate Action*** (GCA) Full speed global decarbonisation, large-scale renewables development in both electricity and gas sectors.
  - ***External Scenario***: Based On EUCO 30 EUCO 30 is a core policy scenario produced by the European Commission. The scenario models the achievement of the 2030 climate and energy targets as agreed by the European Council in 2014, but including an energy efficiency target of 30%. The ENTSOs both welcome this new collaboration with the European Commission and welcome further cooperation.

Ten year network development plan

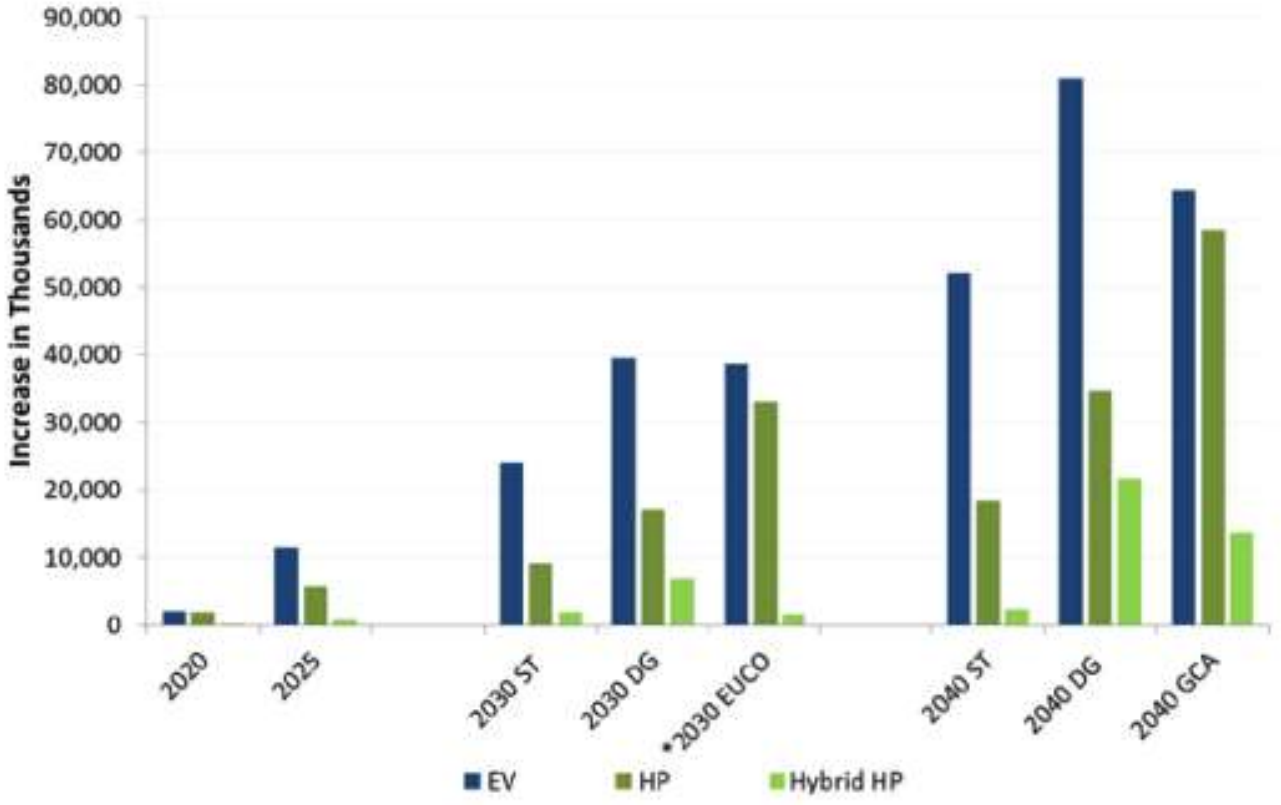
Ten year network development plan



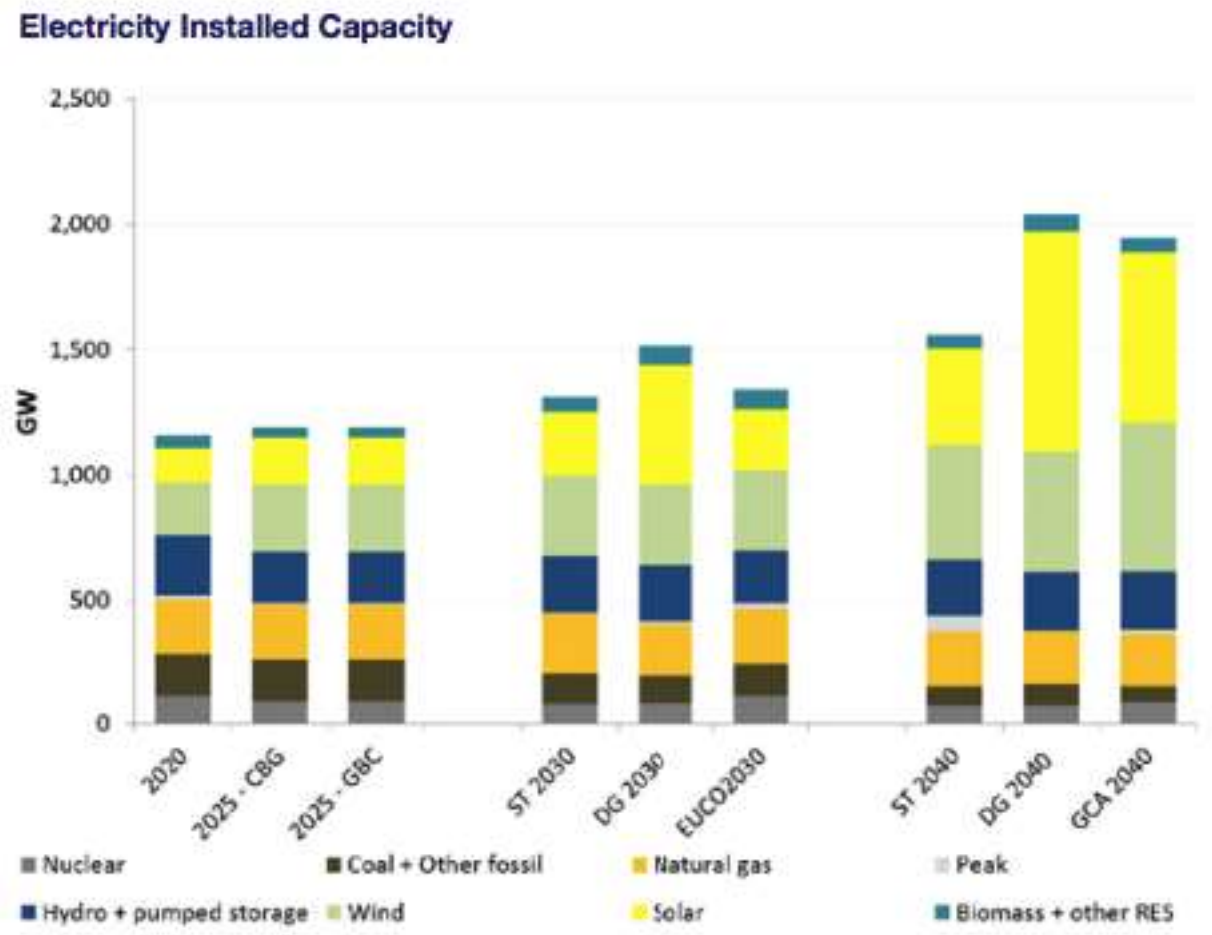
TYNDP 2018– Scenario results- electricity demand



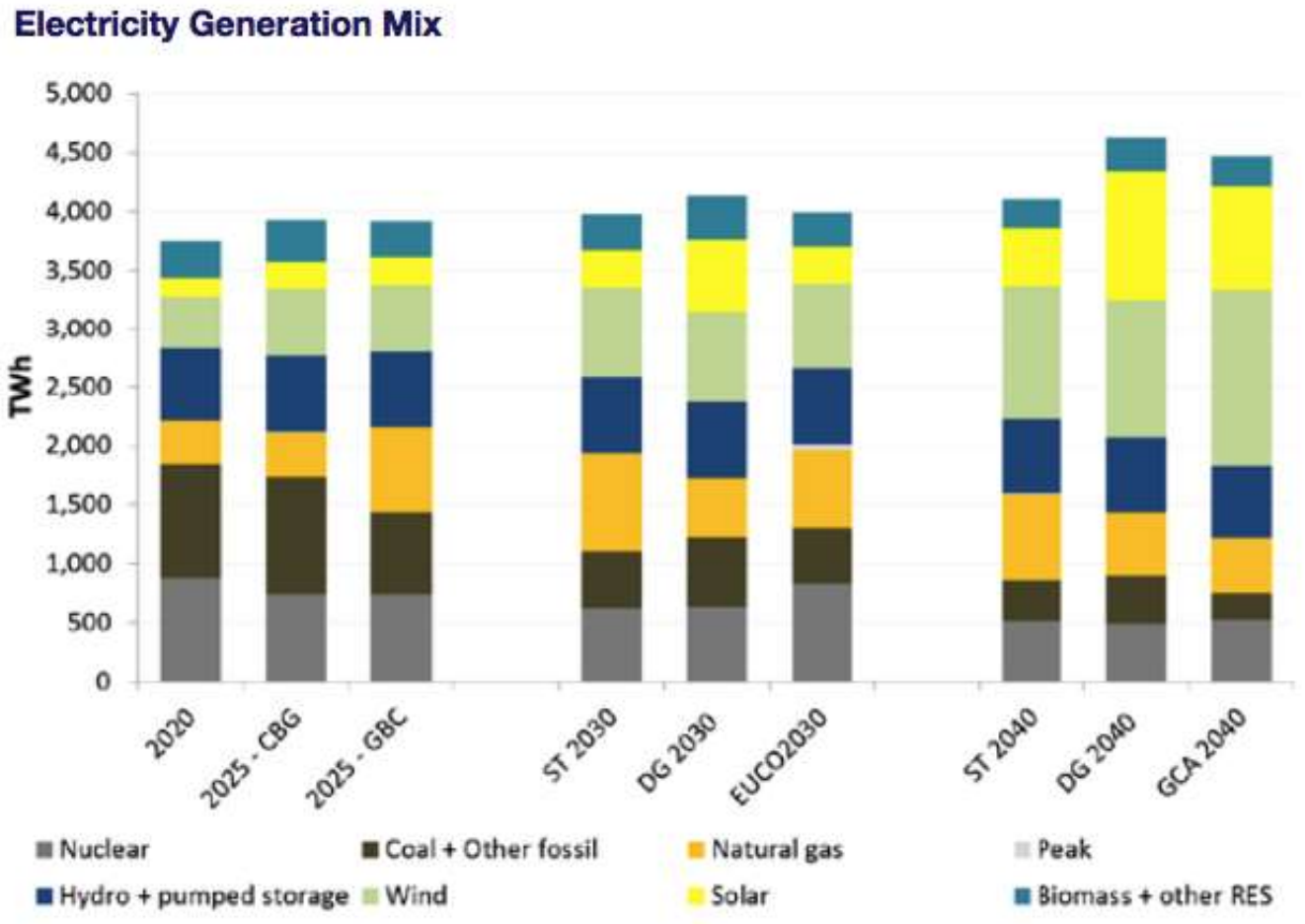
TYNDP 2018– Scenario results- electricity demand



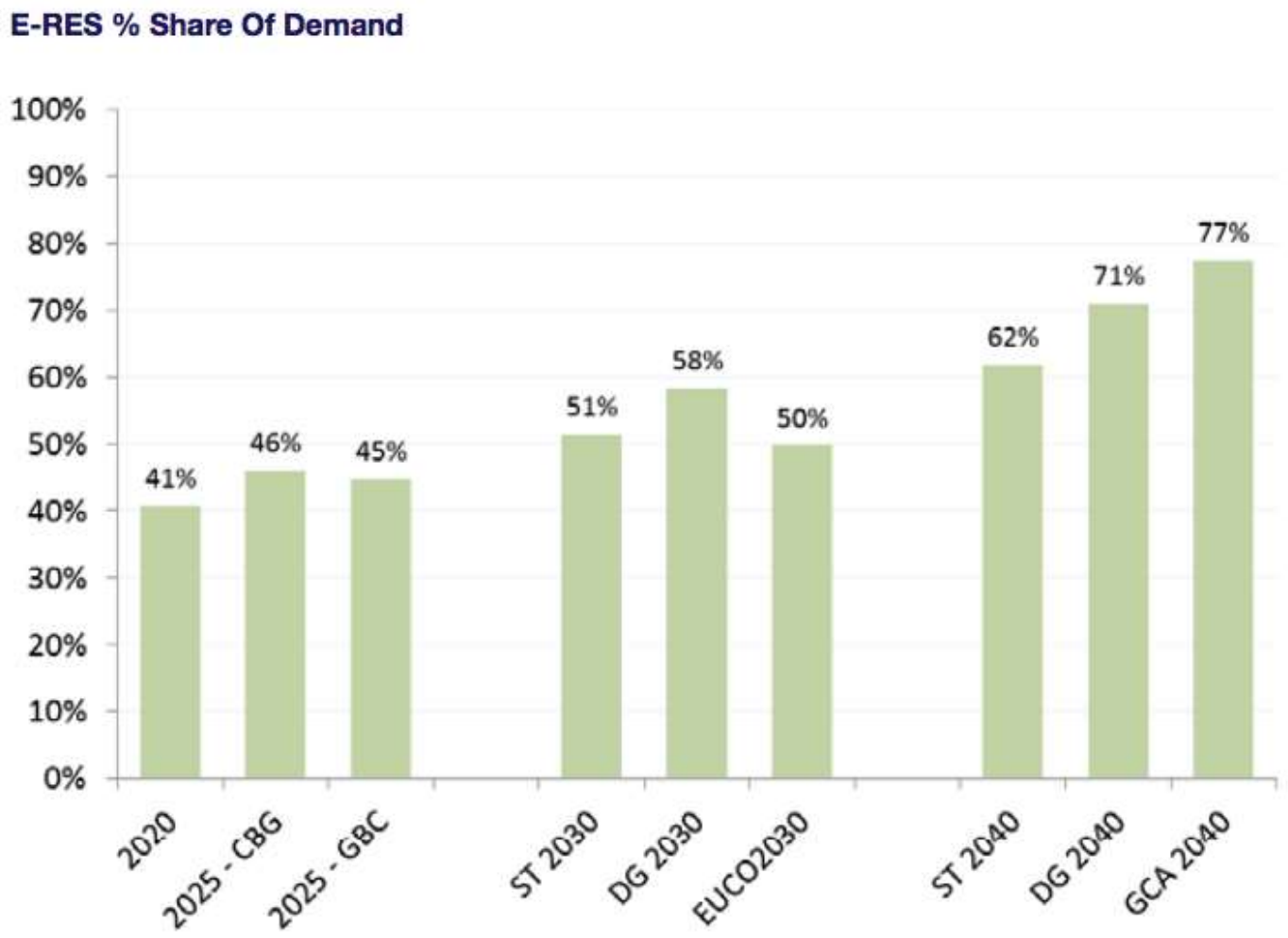
TYNDP 2018– Scenario results- electricity supply



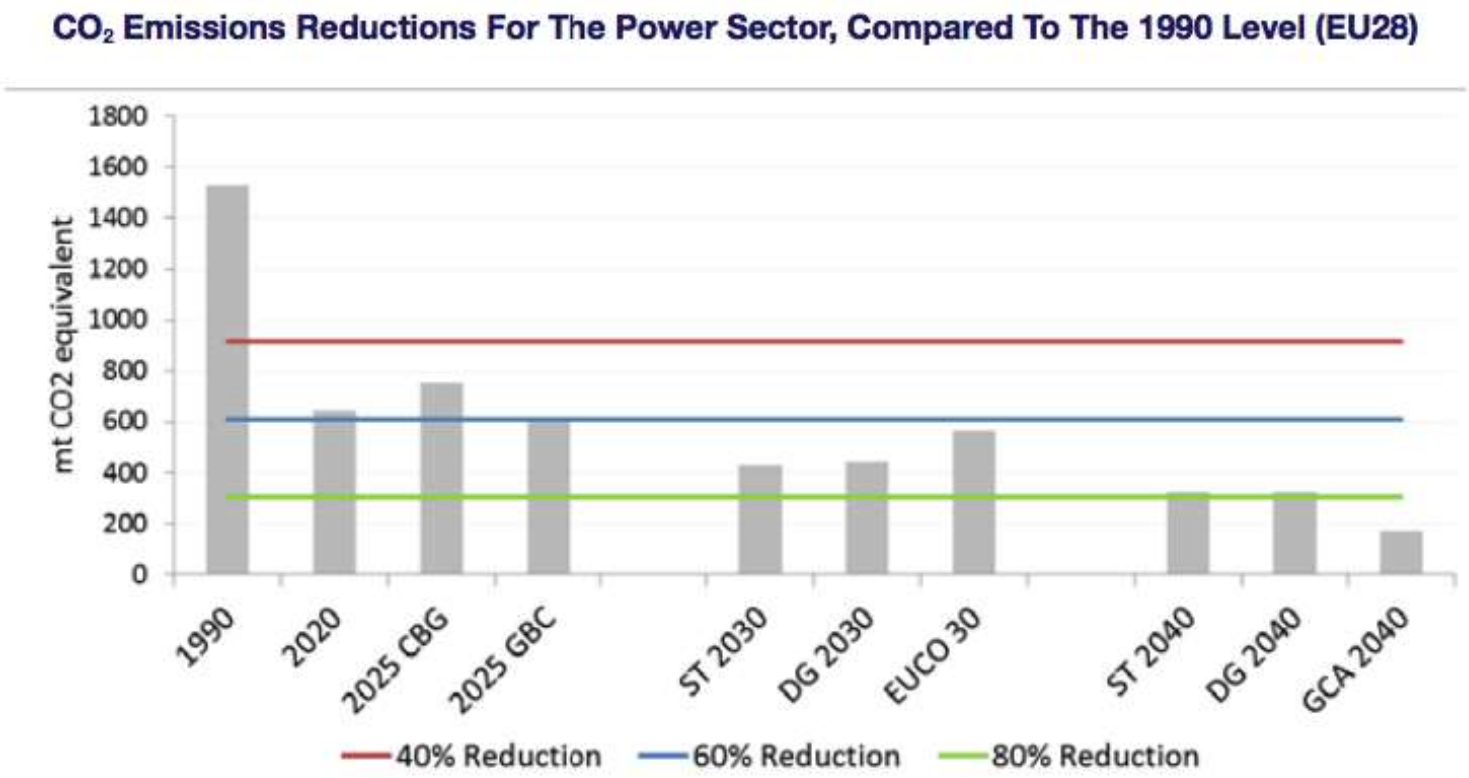
TYNDP 2018– Scenario results- electricity supply



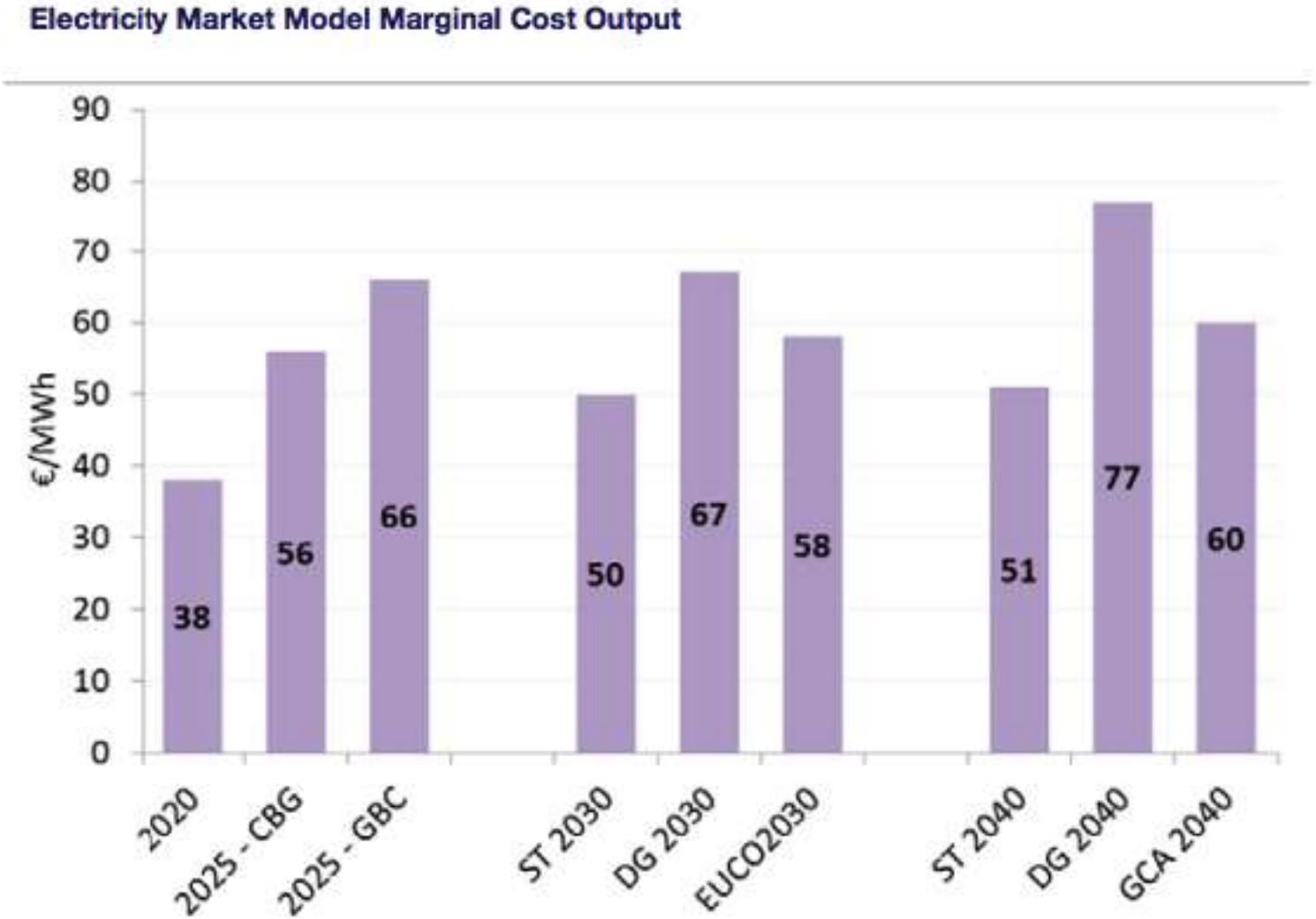
TYNDP 2018– Scenario results- Increase in RES



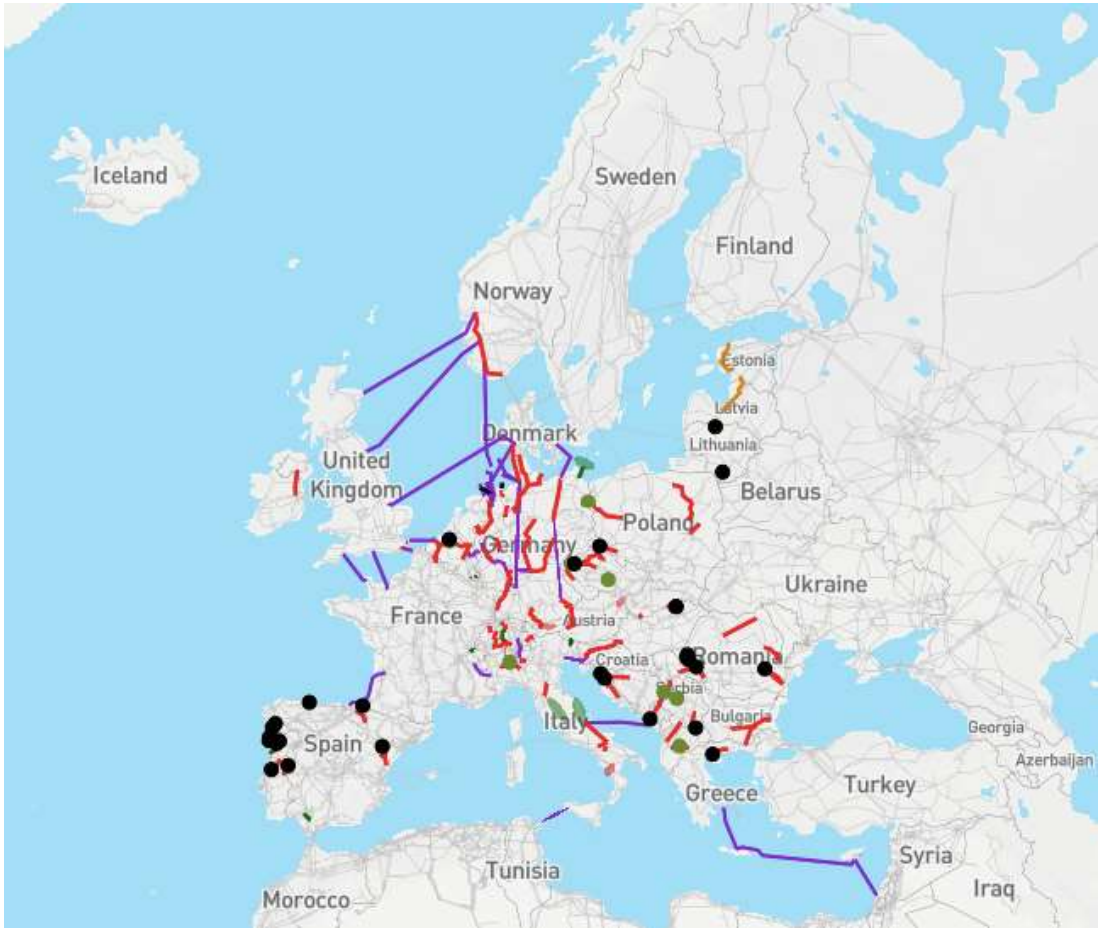
TYNDP 2018– Scenario results- emission reductions



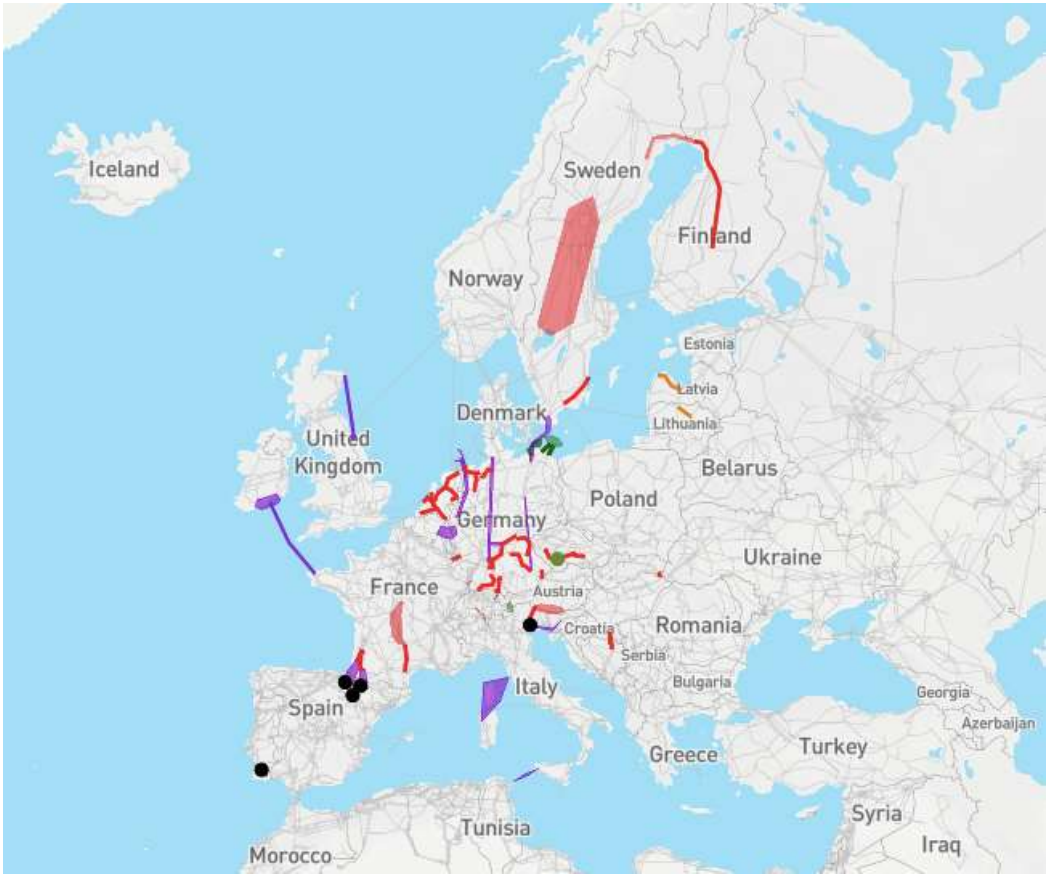
TYNDP 2018– Scenario results- marginal cost



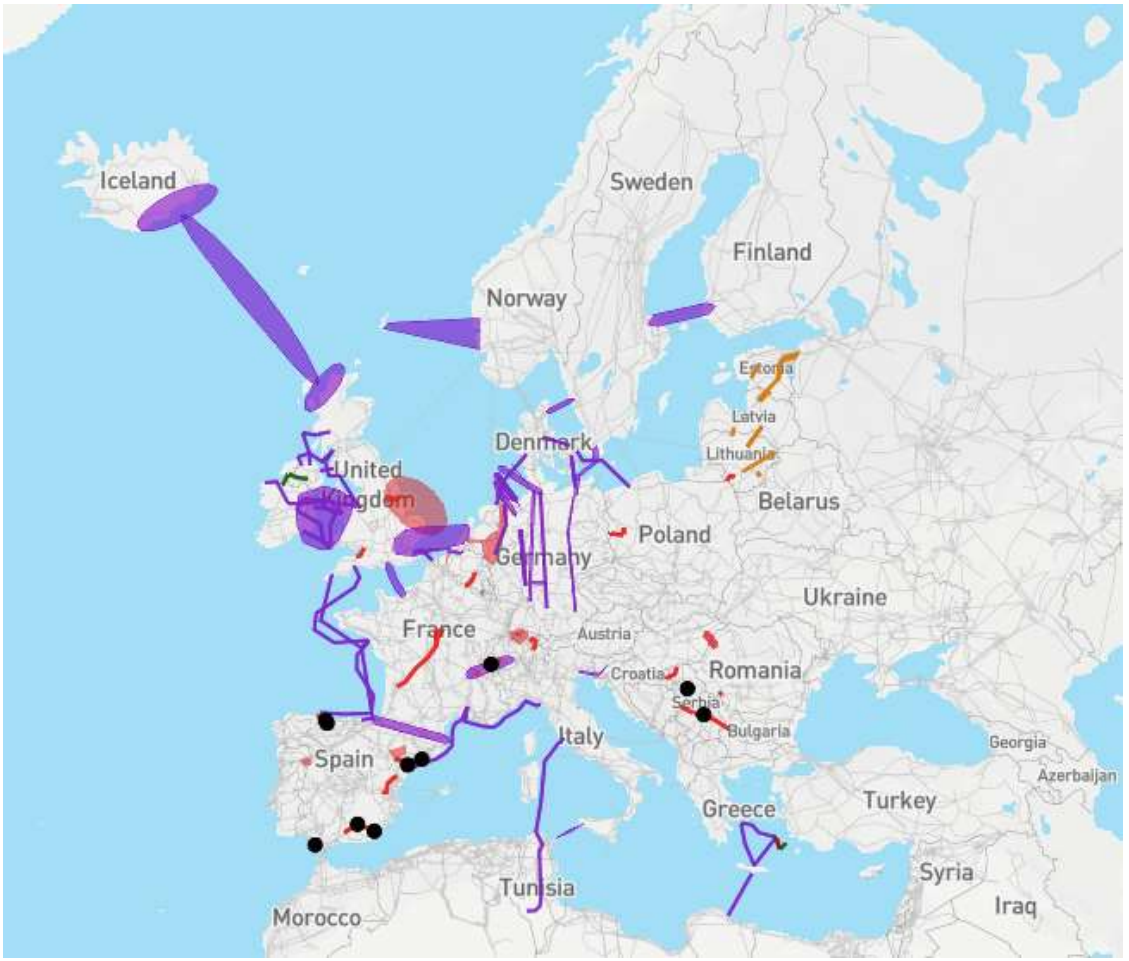
TYNDP 2018– Projects – Mid term



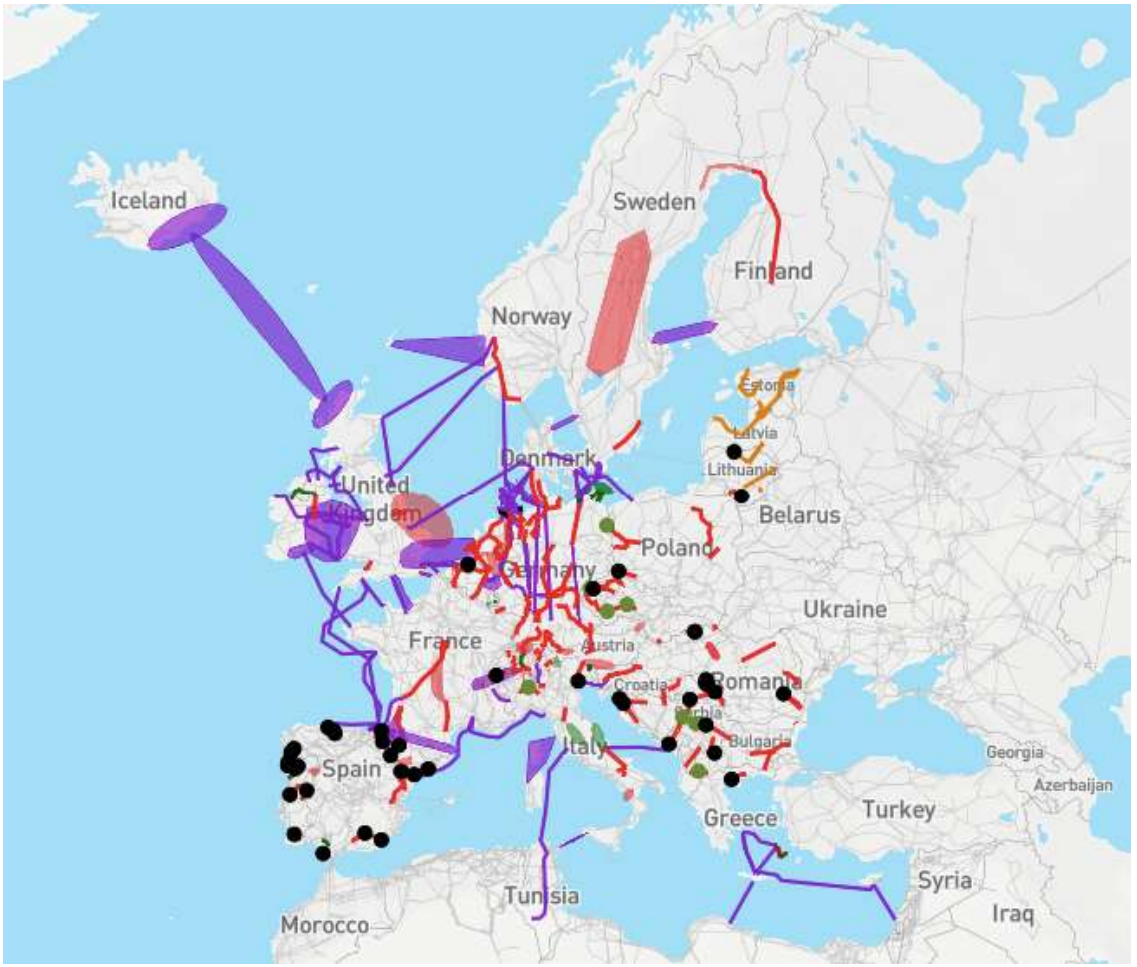
TYNDP 2018– Projects – Long term



TYNDP 2018– Projects – Future



TYNDP 2018– Projects – All projects



[5]
Other Changes are coming:
Tomorrow ☺

Many thanks for your patience!

EUI

Dhanyavad!

Email : jean-michel.glachant@eui.eu

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