European Commission

17-21 JUNE 2019

EU SUSTAINABLE ENERGY WEEK

SHAPING EUROPE'S ENERGY FUTURE

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SUSTAINABLE ENERGY WEEK
entsoe

Integration of Offshore Wind in Europe-

The TSOs contribution

Laurent Schmitt, Secretary General of ENTSO-E

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Enabling the European energy transition

43 member TSOs in 36 countries

Long term **grid development** plans
Security analysis
Developing **technical and market** rules
Market and data exchange **platforms**
Regional coordination centres
Research and Innovation

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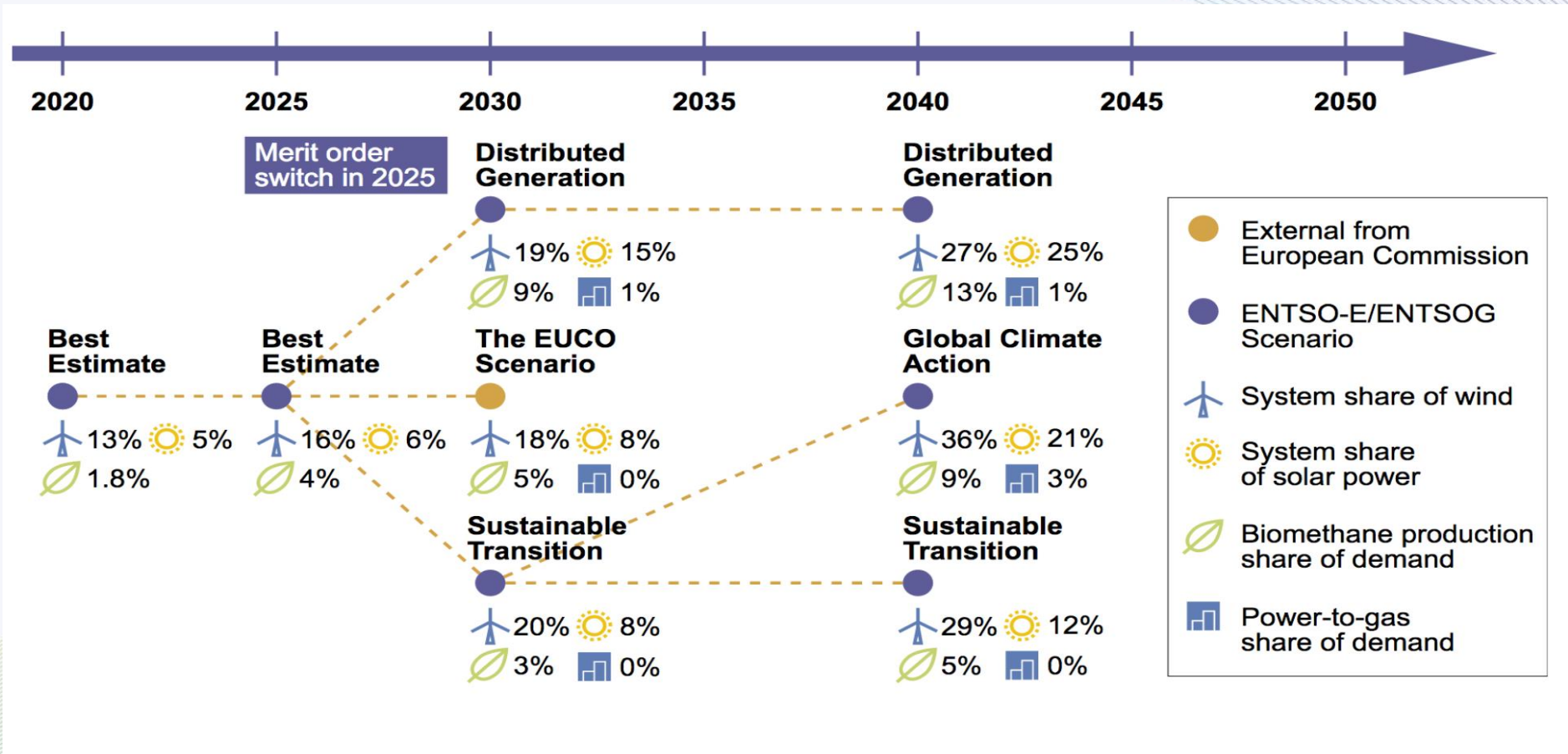
SHAPING EUROPE'S ENERGY FUTURE
#EUSEW19

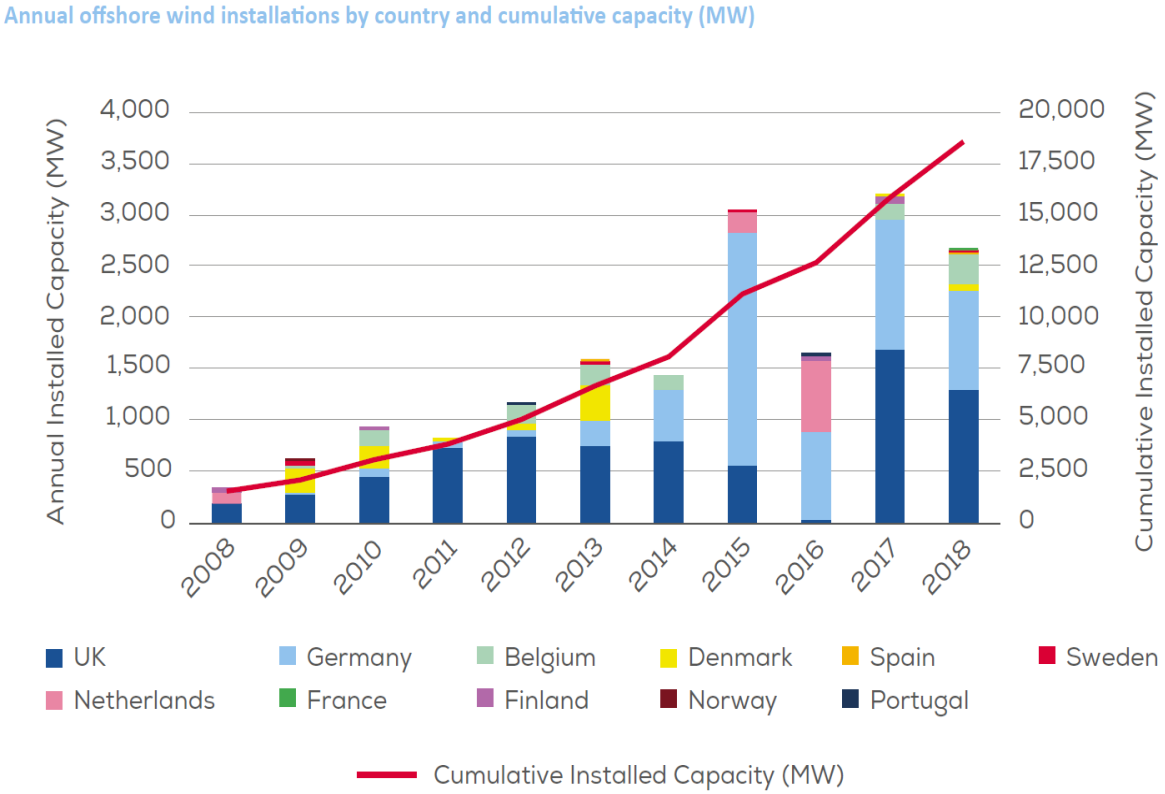
ENTSOs Scenarios: Sound and realistic pathways towards decarbonisation

entsoe POWERFACTS EUROPE 2019



Source: ENTSOs TYNDP 2018 joint scenarios

In numbers: Offshore Wind in Europe in 2018

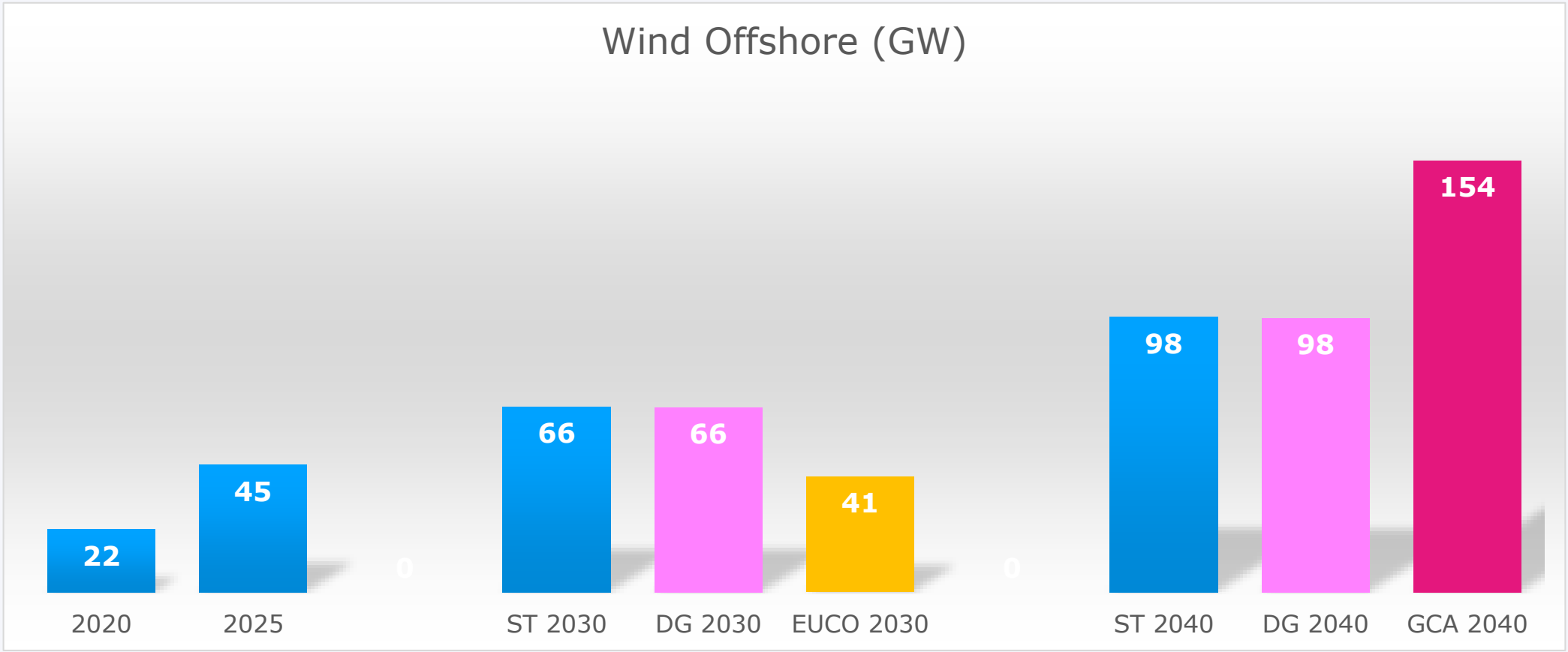


- **Offshore capacity: 18,5 GW of which 13 GW in the North Sea.** 105 offshore wind farms in 11 countries

- **Energy production by offshore wind: 53 TWh,** 37% average capacity factor, covers 2% of total EU demand

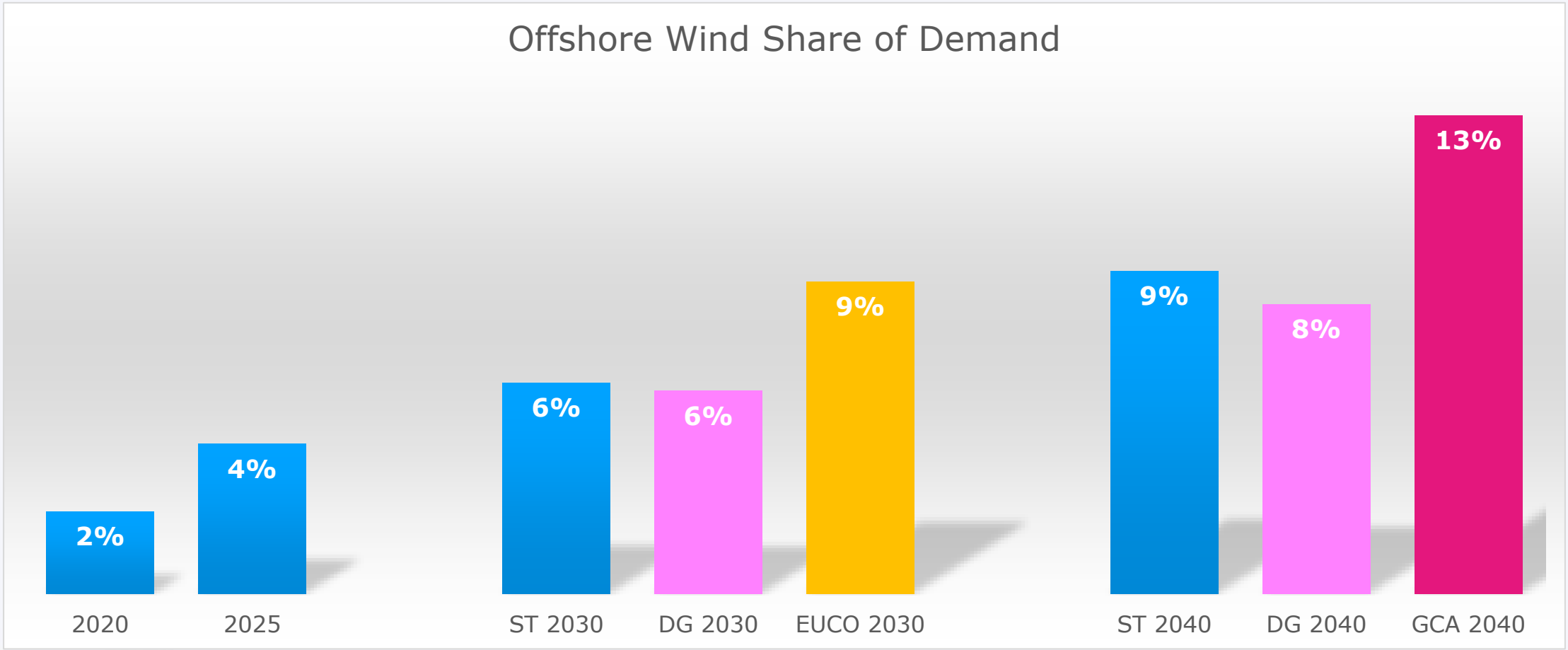
Source: WindEurope/ ENTSO-E Transparency Platform

Wind Offshore Capacity projections



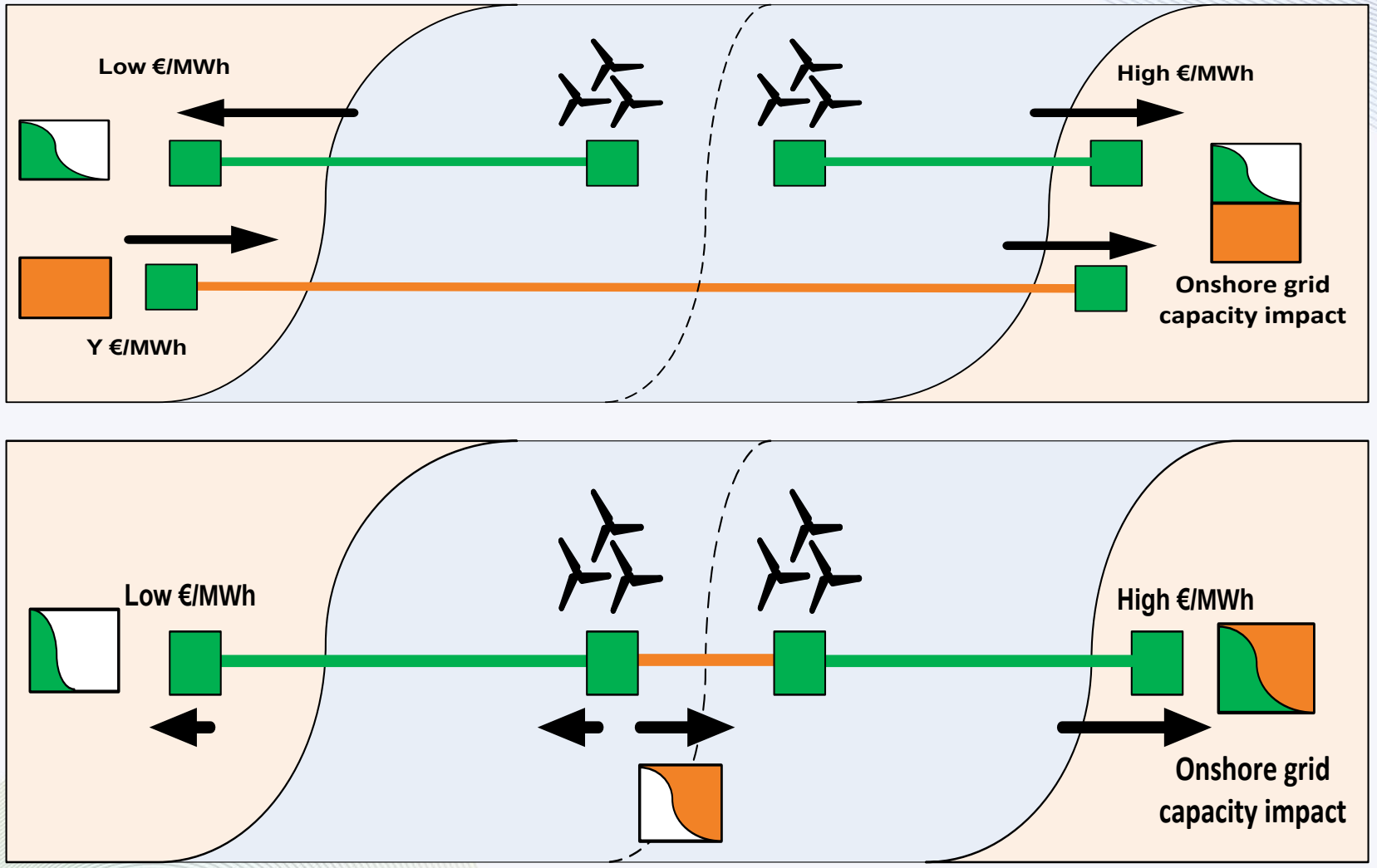
Source TYNDP 2018

Wind Offshore Share of demand

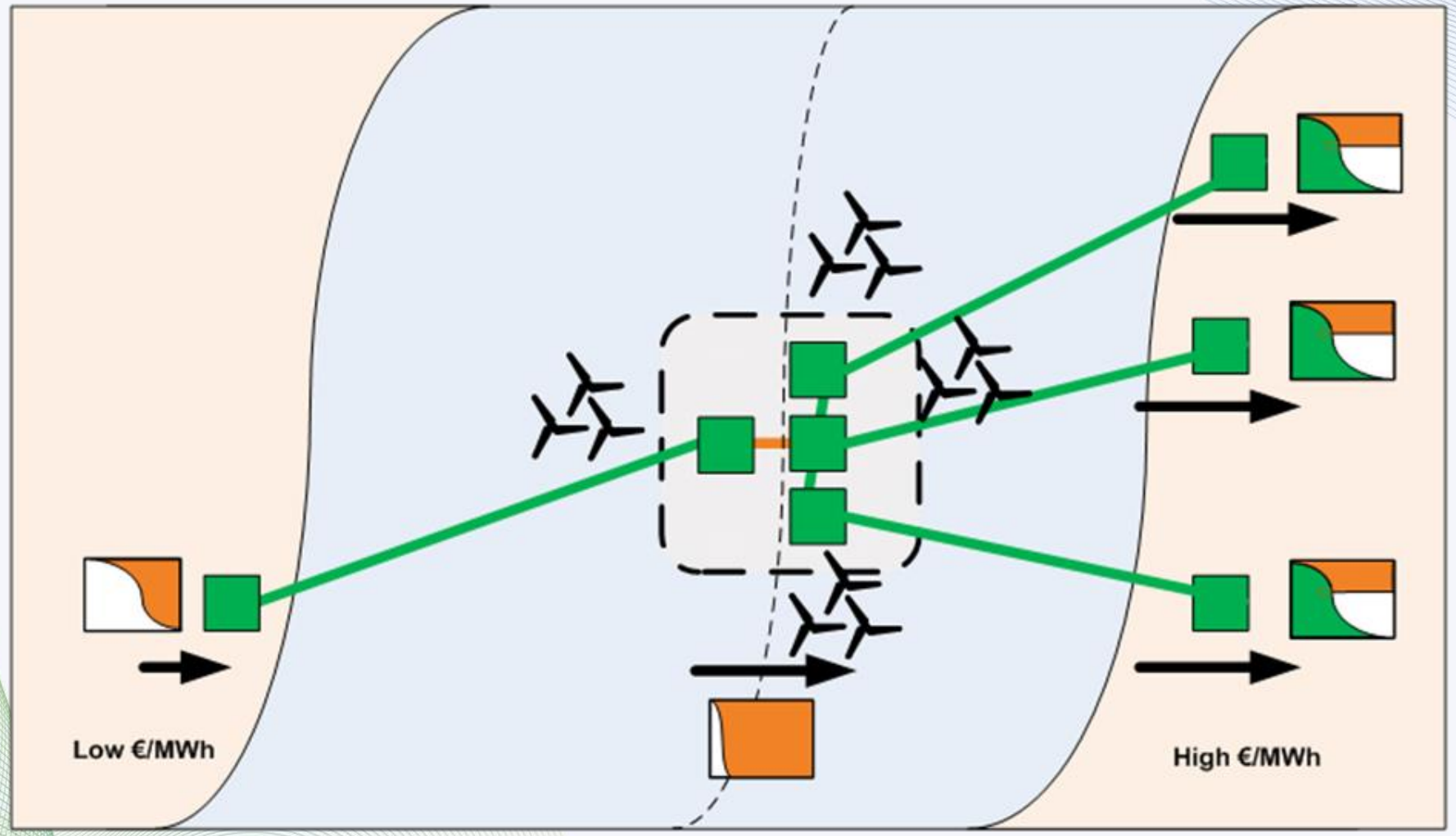


Source TYNDP 2018

Wind connector approach for Offshore infrastructure



Windconnector approach for Offshore infrastructure



Baltic Sea Wind Hub

- Connects Denmark (DK) with the Germany via two offshore windfarms
- World's first project combining grid connections to offshore wind farms with an interconnector between two countries.
- The Combined Grid Solution is scheduled to become operational in the third quarter of 2019.
- Total capacity is 936 MW

North Sea Power Hub

- Capacity of 70 – 150 GW by 2040, 1/5 EU power consumption
- Large-scale offshore wind connected to a central hub
- Conversion and storage solutions such as Power2Gas are explored
- Helps Europe meet the Paris agreement whilst reducing costs

Concept of Energy Island

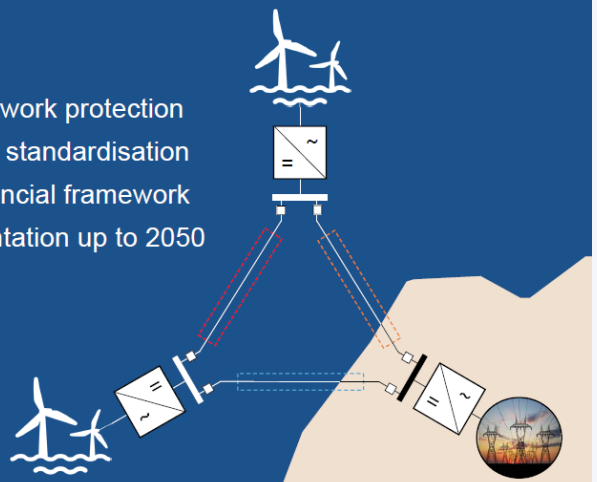
- North Sea Wind Power Hub concept with Energy Island concept (left) and the option of increased regional interconnection (right)

Promotion project – Meshed offshore HVDC in North sea

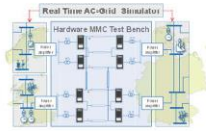
Progress on Meshed Offshore HVDC Transmission Networks

Enabling the North Sea power house

- Develop interoperable & reliable HVDC network protection
- Work towards technology interoperability & standardisation
- Recommendations for EU regulatory & financial framework
- Deployment plan & Roadmap for implementation up to 2050
- Full scale technology demonstrations of:
  - HVDC control & protection systems
  - Converter harmonic model validation
  - HVDC gas insulated switchgear
  - HVDC circuit breakers



PROMOTioN The Project
Demonstrators



HVDC network control

MMC test bench
RWTH Aachen
Aachen, Germany

HVDC circuit breakers

KEMA High Power Lab
DNV GL
Arnhem, Netherlands

HVDC network protection

Multi-Terminal Test Centre
SHE Transmission
Glasgow, UK

HVDC gas insulated systems

KEMA High Voltage Lab
DNV GL
Arnhem, Netherlands

- Offshore windfarms are often more accepted socially
- Even these are larger infrastructures as their onshore counterparts
- But need of comprehensive dialogue with maritime sector and other actors

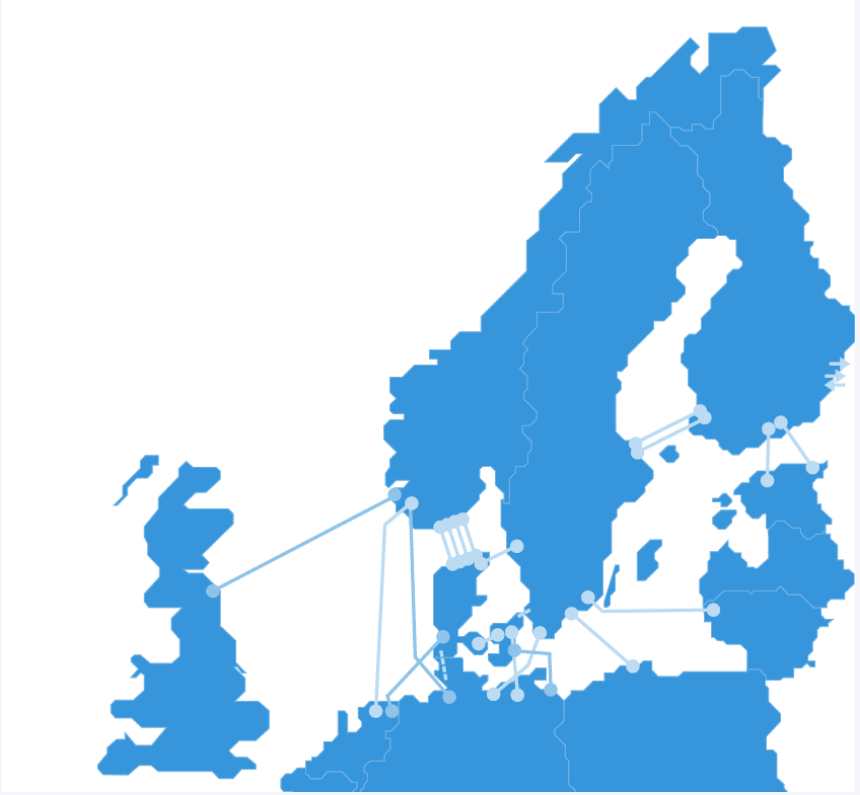
INVESTING IN POWER NETWORKS

INCREASE CROSS BORDER TRADE

60% increase in interconnector capacity by 2025 between the continent and the Nordic

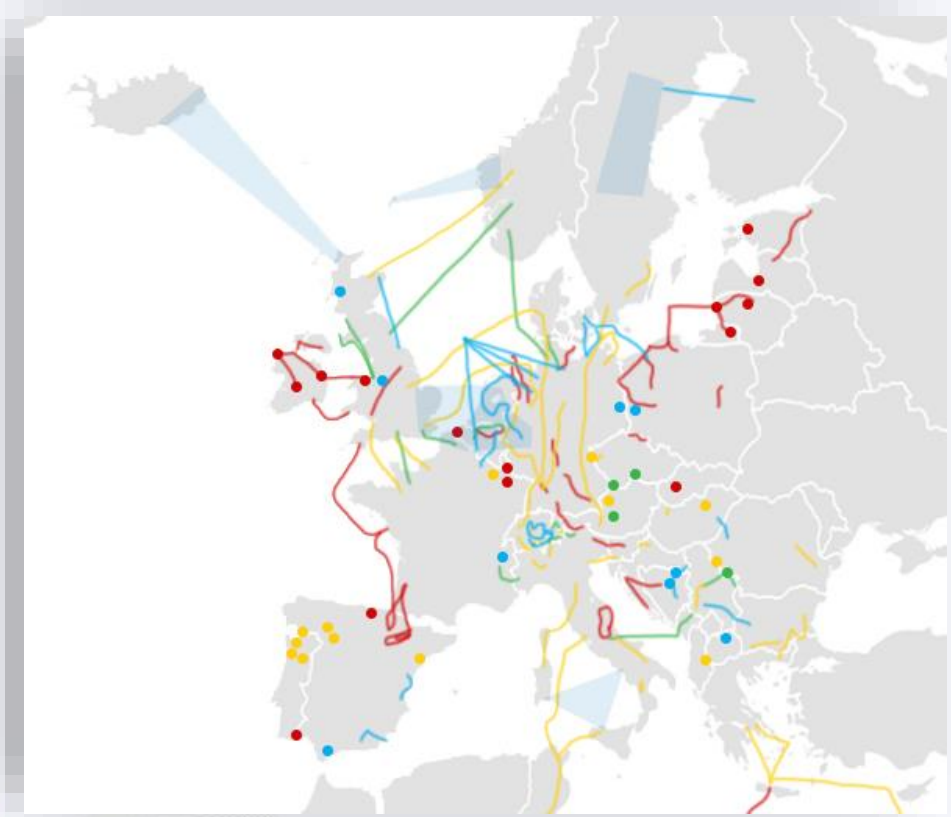
Cobra	700 MW
Kriegers Flak	400 MW
Nord Link	1400 MW
North Sea Link	1400 MW
Viking Cable	1400 MW
Hansa Power Bridge	700 MW
Jutland-Germany	1000 MW
Total	**7000 MW**

Source: ENTSO-E TYNDP 2018



INVESTING IN POWER NETWORKS

CUTTING DOWN EMISSIONS



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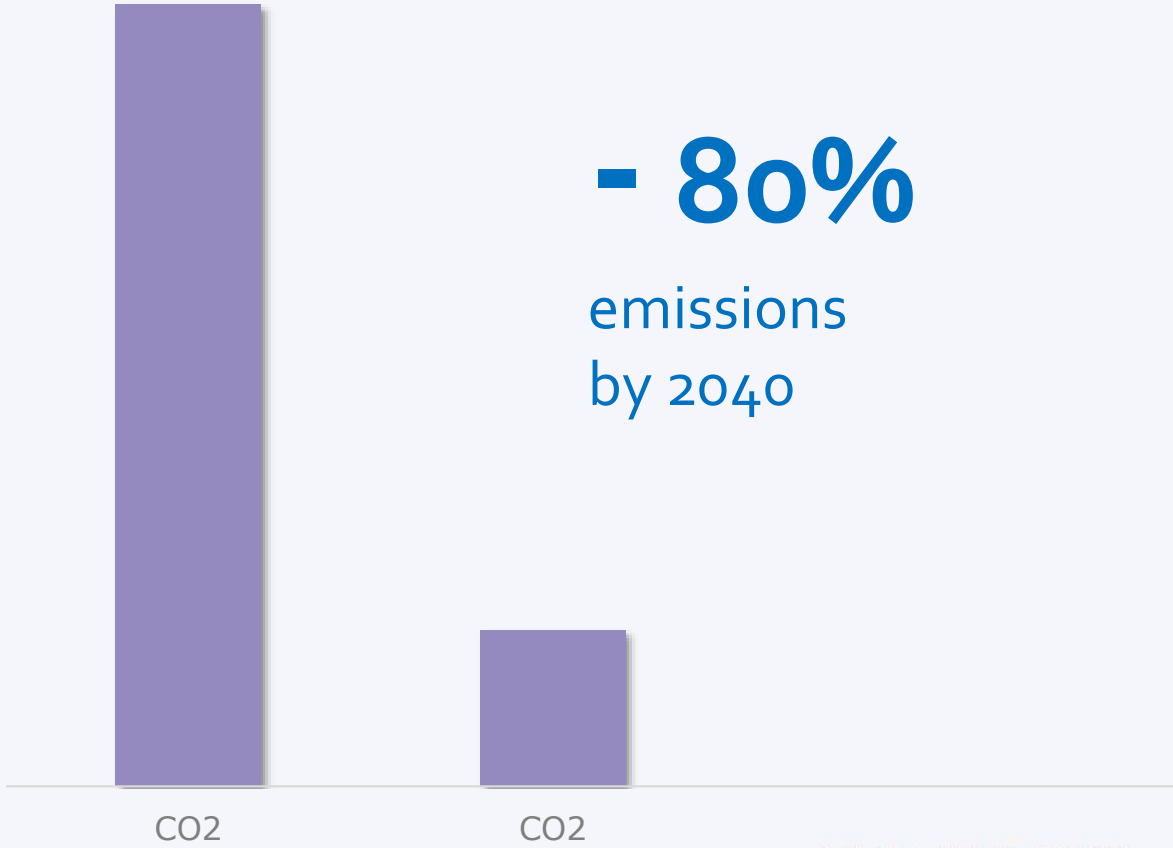

- 80%

emissions
by 2040

HOW TO INCENTIVISE NECESSARY GRID INVESTMENTS?

- **“No-extra grid option” is NOT compatible with the European emissions targets.**
- **Improved national regulatory & financial arrangements** needed to cover large investment needs and ensure public acceptance,
- Some **output-based regulation** might help,
- Enhance **innovation** through agile regulation incentivising new technologies & digitalisation
- Need to **better communicate to the public the environmental benefits of grid investments**, as shown in the European CBA.

THANK YOU FOR YOUR ATTENTION

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SUSTAINABLE ENERGY WEEK

An initiative of the European Commission

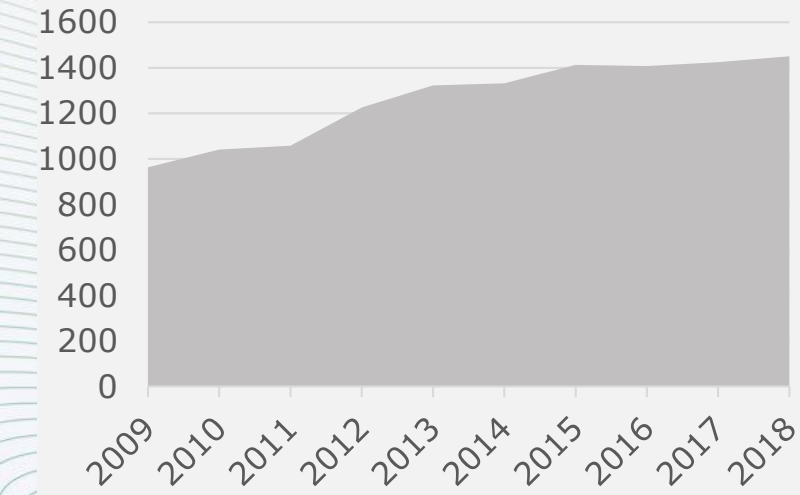
ANNEXES

Better Markets

Expand existing markets

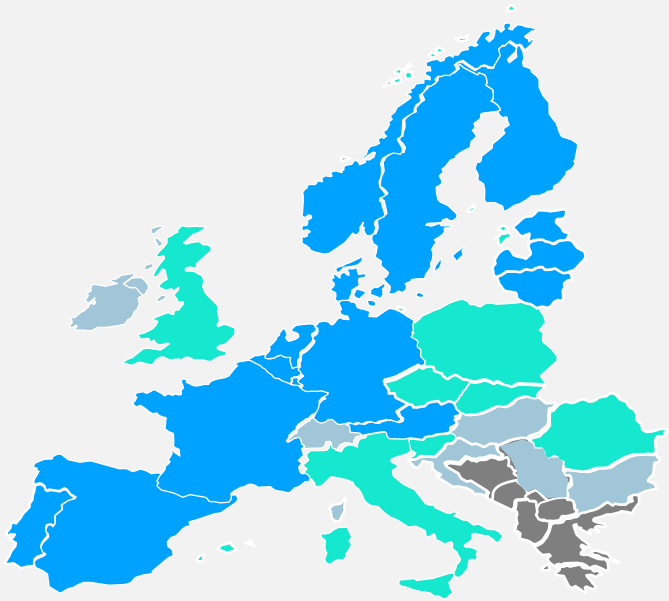
DAY-AHEAD MARKETS

- **~ 1400 TWh**(**~50%** of consumption) traded on exchanges



INTRADAY MARKETS

- **~155 TWh** traded on main power exchanges in 2018



BALANCING MARKETS

- European platforms 2022

<3 min
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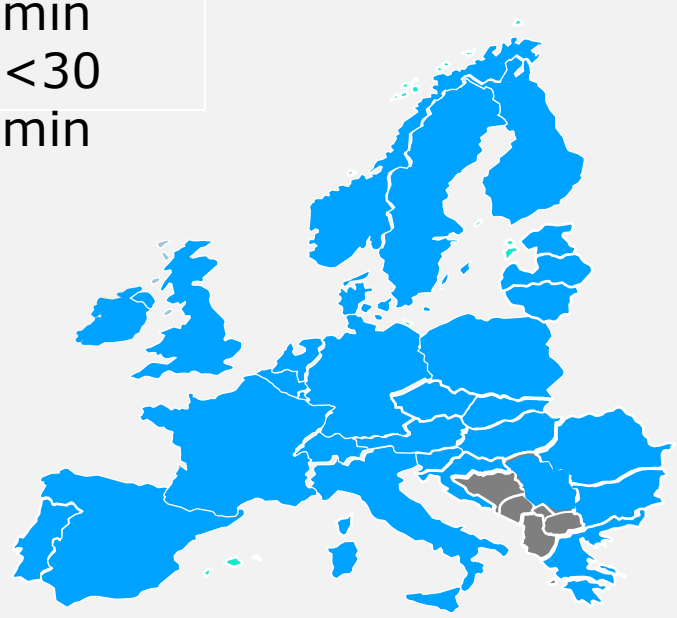
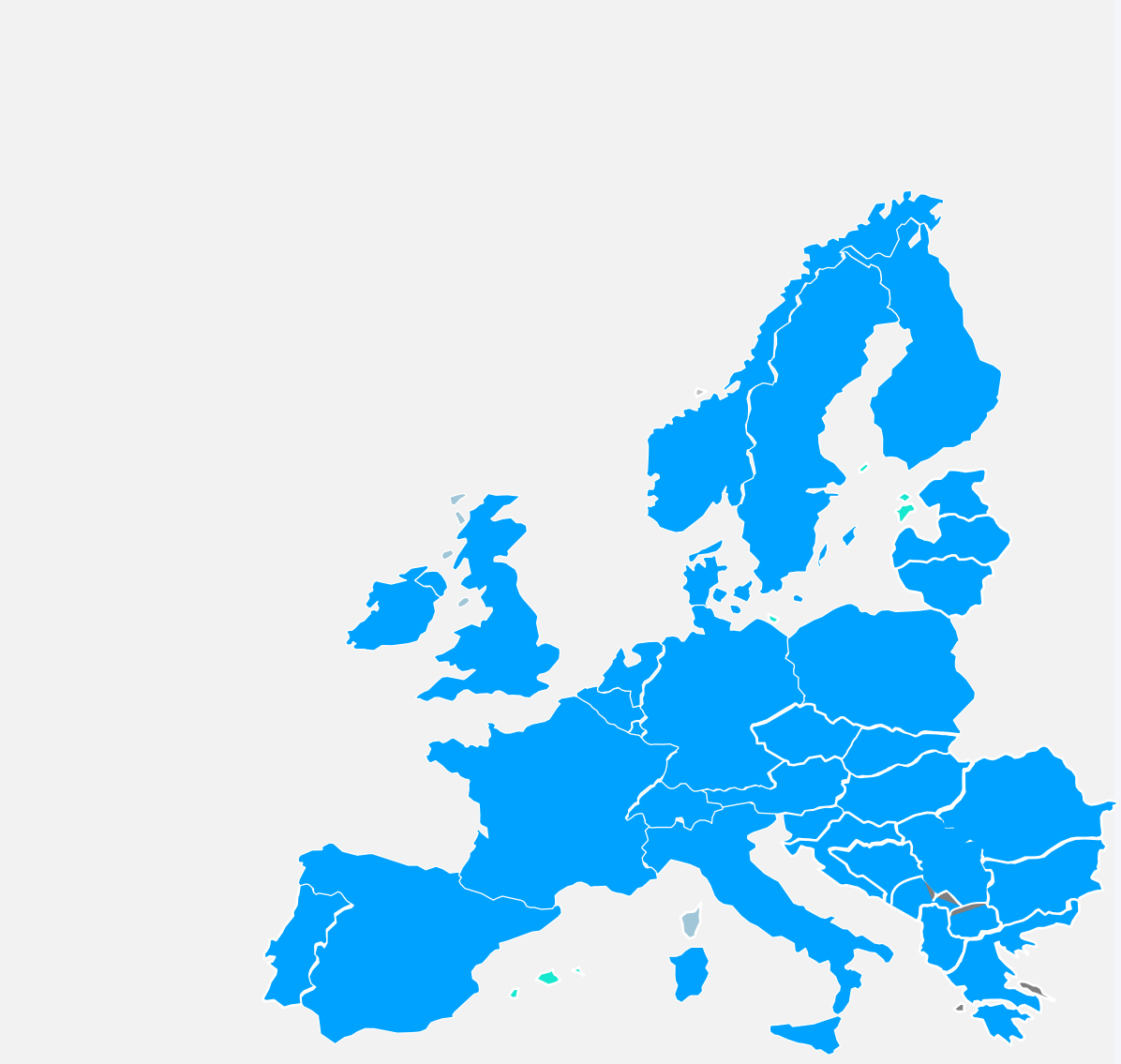


Source: Nordpool, EpexSpot, OMIE, GME

Better Markets



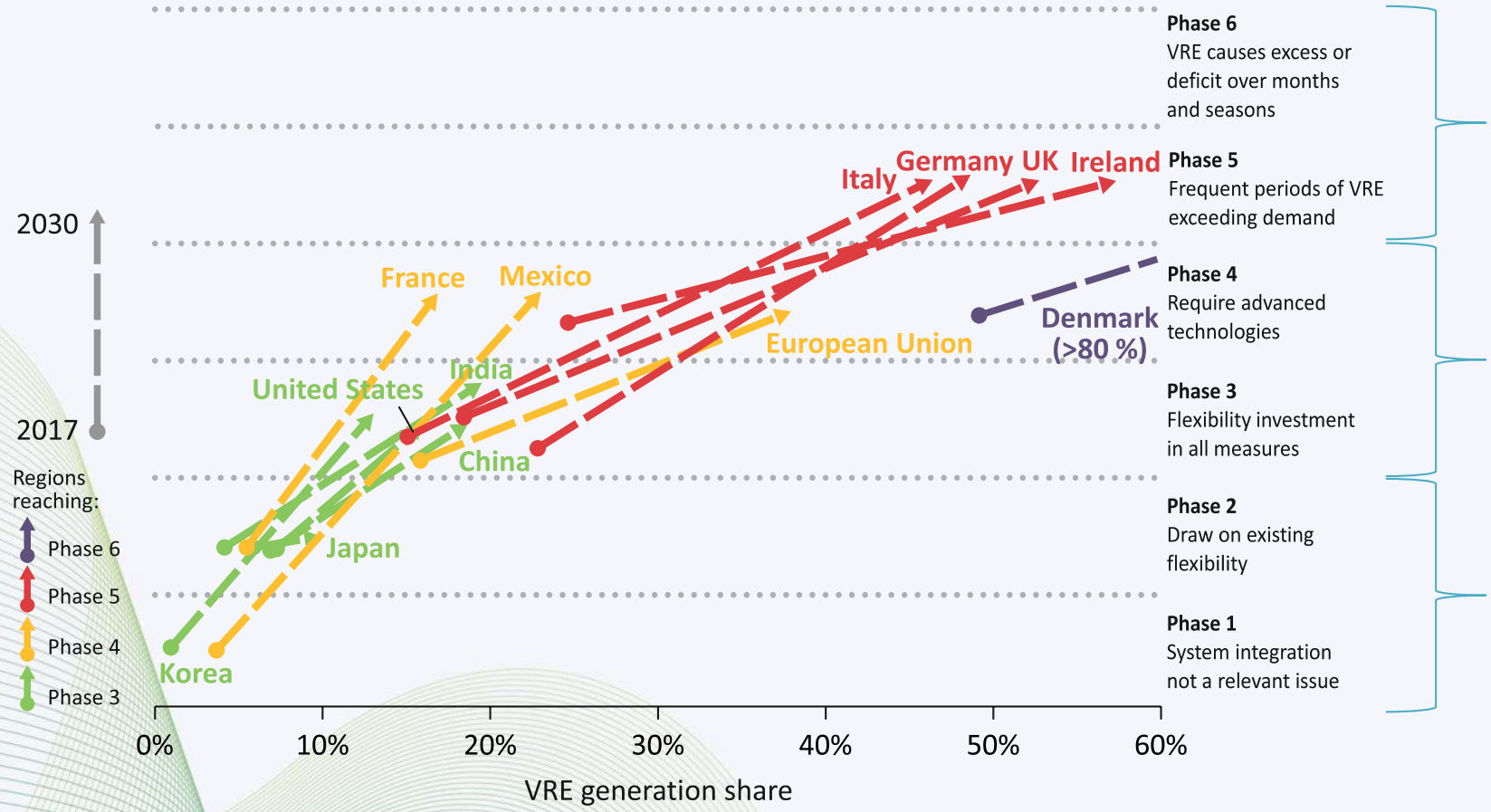
We need real time markets

We need capacity markets

We need better locational signals

… as well as system flexibility

Phases of integration with variable renewables share, 2030



All sources of flexibility needed

Targeted investment in flexibility needed

Mobilise existing power system flexibility

The size of the power system, flexibility of thermal generation, shape of demand profile, imply different needs for additional flexibility even at the same levels of VRE

SUSTAINABLE ENERGY WEEK

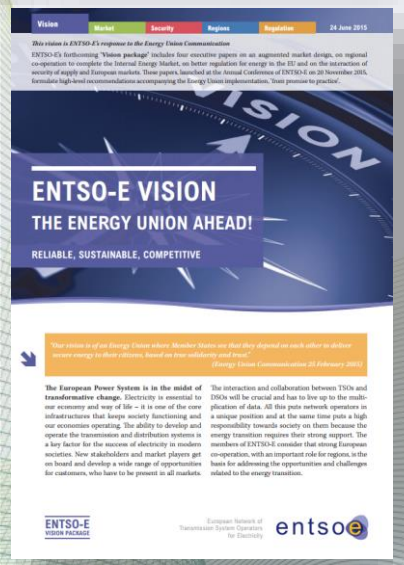
#DigitalGrids, enablers of future system of systems

- Power to Gas / Green Gas & Hydrogen / Combined Heat & Power
- Electromobility
- TSO-DSO coupling
- Microgrid coupling at Gridedge through #Blockchain

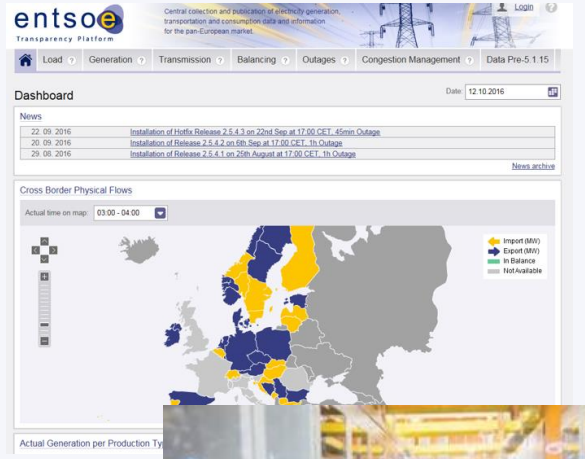
What does ENTSO-E do?

Contributes to the design and implementation of the Internal Energy Market

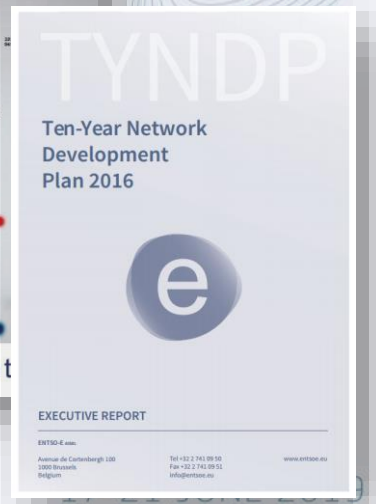
network codes



Develops the necessary IT tools for enabling the implementation



Provides regular reporting and recommendations for the development of the network



ENTSO-E supports EU Climate targets

2030

- **32 %** share in RES
- **40 %** reduction in greenhouse gas
- **32,5 %** increase in energy efficiency

2050

- **80 – 90 %** reduction in greenhouse gas