



NORTH SEA OFFSHORE VISION - TIPS FOR THE BEMIP REGION

MAY 16, 2017

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A GLANCE: ECOFYS. A NAVIGANT COMPANY.



Global consulting company founded in 1984 with the mission to enable sustainable energy for everyone – since 2016, Ecofys is part of Navigant’s global Energy practice



Ecofys has five offices in four countries: Utrecht, the Netherlands; Cologne & Berlin, Germany; Brussels, Belgium; London, United Kingdom – as part of Navigant, our experts are based in more than 20 offices in the US, Hong Kong and the Middle East



Over 600 experts skilled in energy, climate, environment, economy, communication, legal, and psychology – in 2007, eleven of our experts supported the IPCC, being awarded with the Nobel Prize together with Al Gore



More than 30 years of experience in developing and evaluating policies, sustainability strategies, and scenarios for companies and sectors provides us with deep knowledge of markets and consumer behaviour



Our strength lies in our strategic understanding of complex energy and climate transition issues: Ecofys connects the dots within the triangle between governments, energy players, and (energy-intensive) end-users

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1. Current offshore developments
 - BEMIP region
 - North Seas
2. Ecofys North Sea vision
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BEMIP OFFSHORE DEVELOPMENTS

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BEMIP – POLICY CONTEXT

➤ **17th June 2009: Baltic Energy Market Interconnection Plan Memorandum of Understanding**

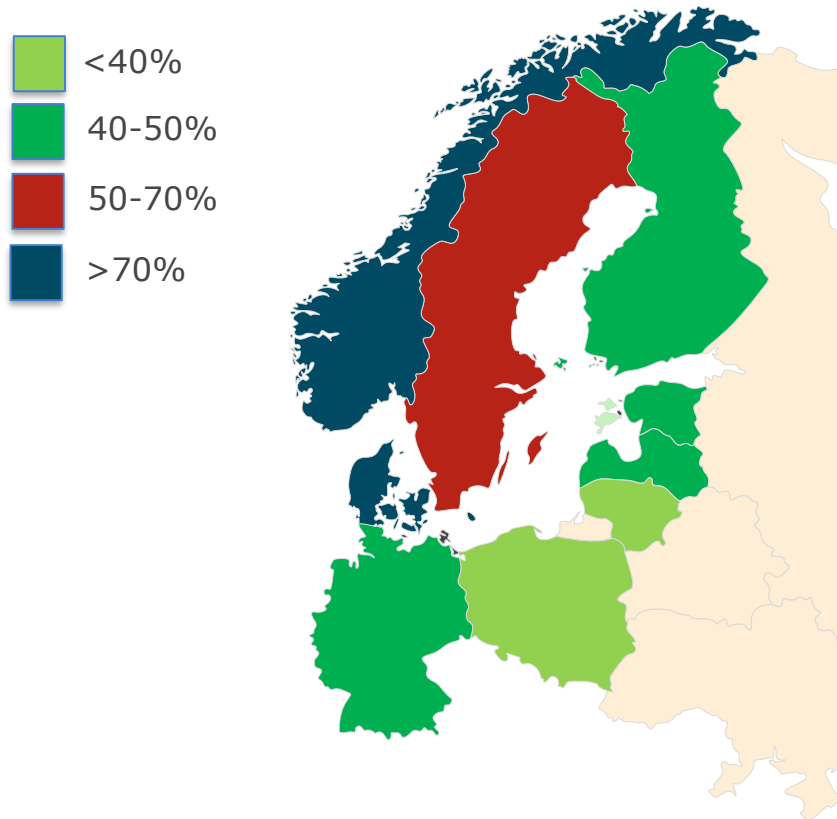
- Establishment of an open and integrated energy market between the EU Member states in the Baltic Sea region in electricity and gas
- Fully integrated with the rest of the EU market
- Connecting the Baltics and Finland to the EU gas market and diversification of supplies

➤ **8th June 2015- BEMIP 2 Memorandum of Understanding** on establishment of the integrated regional energy market to fully integrate the Baltic States into the European power market

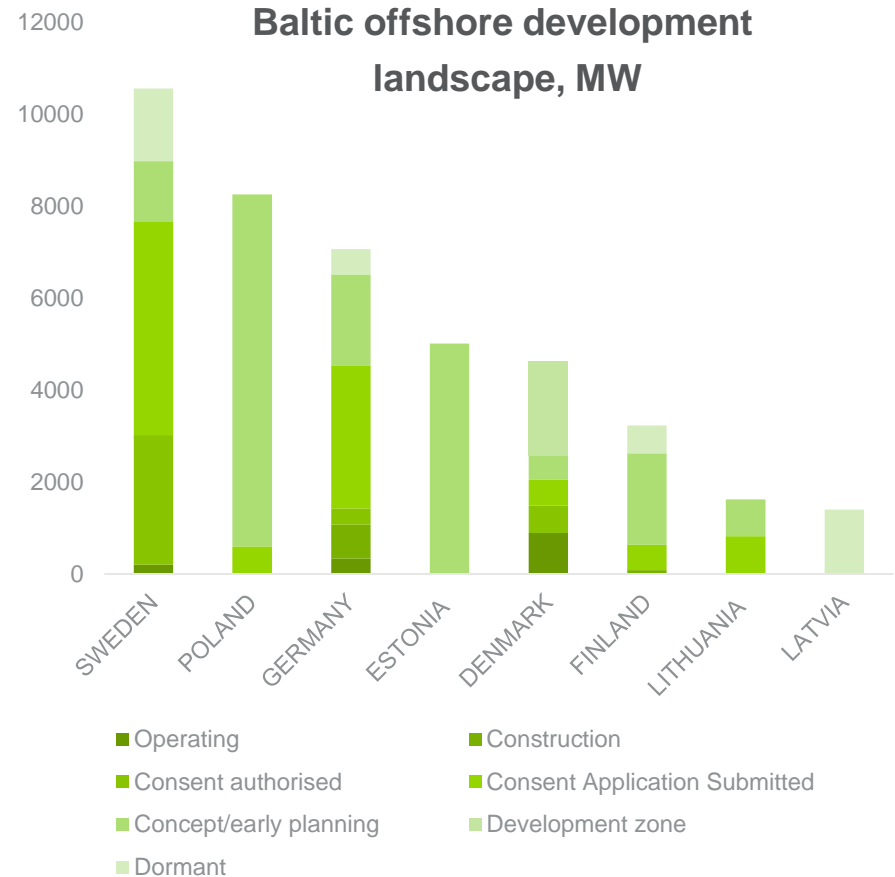
- Adding operational structure
- Coordinates cooperation in all aspects of the Energy Union, incl. development of renewable energies, security of supplies
- Facilitating integration of RES
- Possibility of designing a macro-regional map for contributing to 2020- and 2030 targets
- Intention to improve cooperation through use of cooperation mechanisms to harness the full potential of RES
- Voluntary cross-border opening of support schemes and joint support schemes

FORECAST WIND OFFSHORE DEVELOPMENTS

Forecast RES-E share by country in the Baltic sea region in 2030



Source: ENSTO-E, IHS CERA



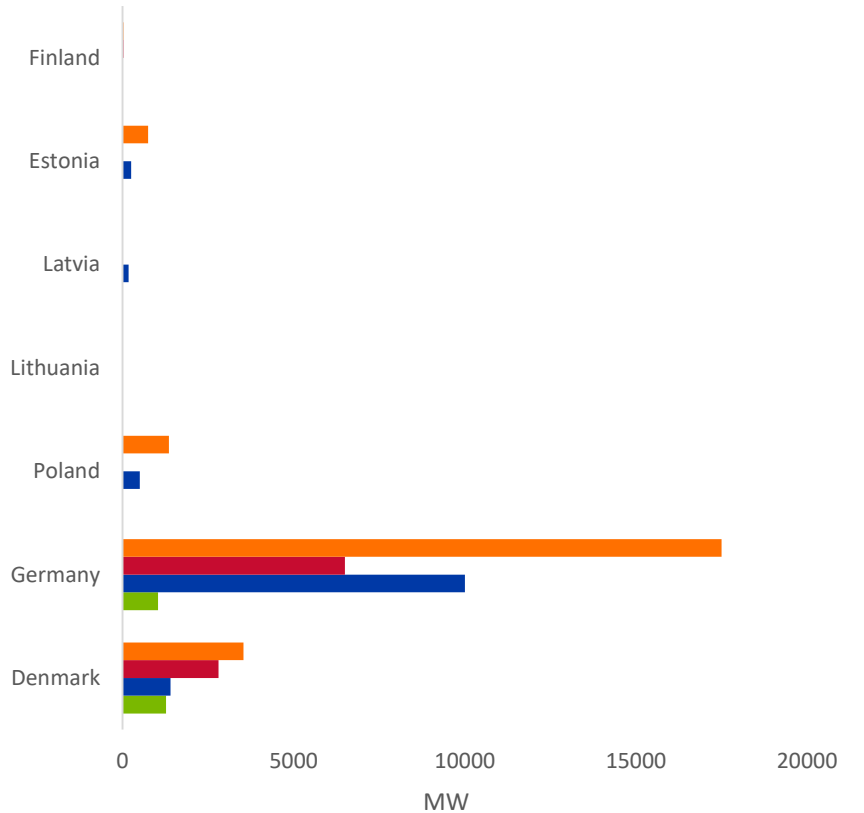
Source: www.4coffshore.com/offshorewind,

Benefits of the Meshed Grid, European Commission

DWEA, Västra Götalandsregionen

CURRENT POLICIES: TARGETS AND SUPPORT

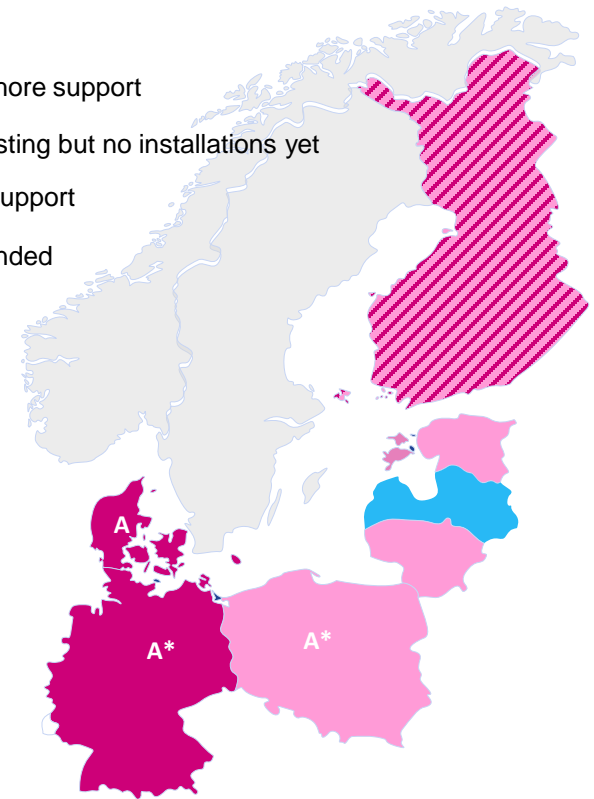
Targets (2020/2030)



■ 2030 Wind Europe (Central Scenario)
 ■ 2020 Wind Europe (Central Scenario)
 ■ 2020 NREAP
 ■ 2015 Progress Report Status

Support schemes

- Dedicated offshore support
- In planning/existing but no installations yet
- No dedicated support
- Support suspended
- A Auctions



NORTH SEA LANDSCAPE

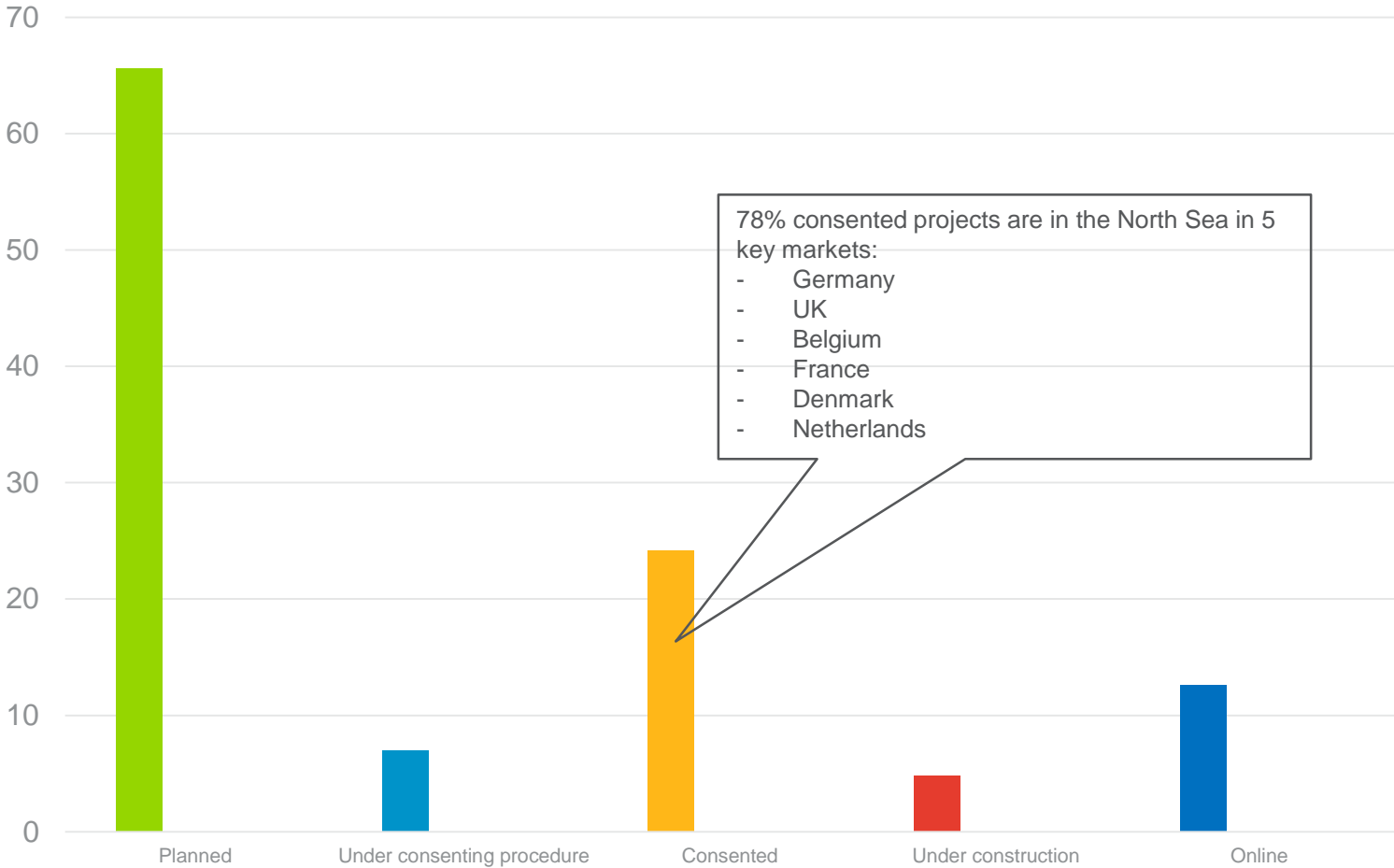
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- 03.10.2010: **Memorandum of Understanding on North Seas Countries Offshore Grid** Initiative to evaluate and facilitate coordinated development of a possible offshore grid that maximizes the efficient and economic use of those renewable sources and infrastructure investments

- 2016: **Political Declaration on energy cooperation between the North Seas Countries**
 - facilitating the cost-effective deployment of offshore renewable energy, in particular wind
 - promoting interconnection between the countries in the region
 - Voluntary basis

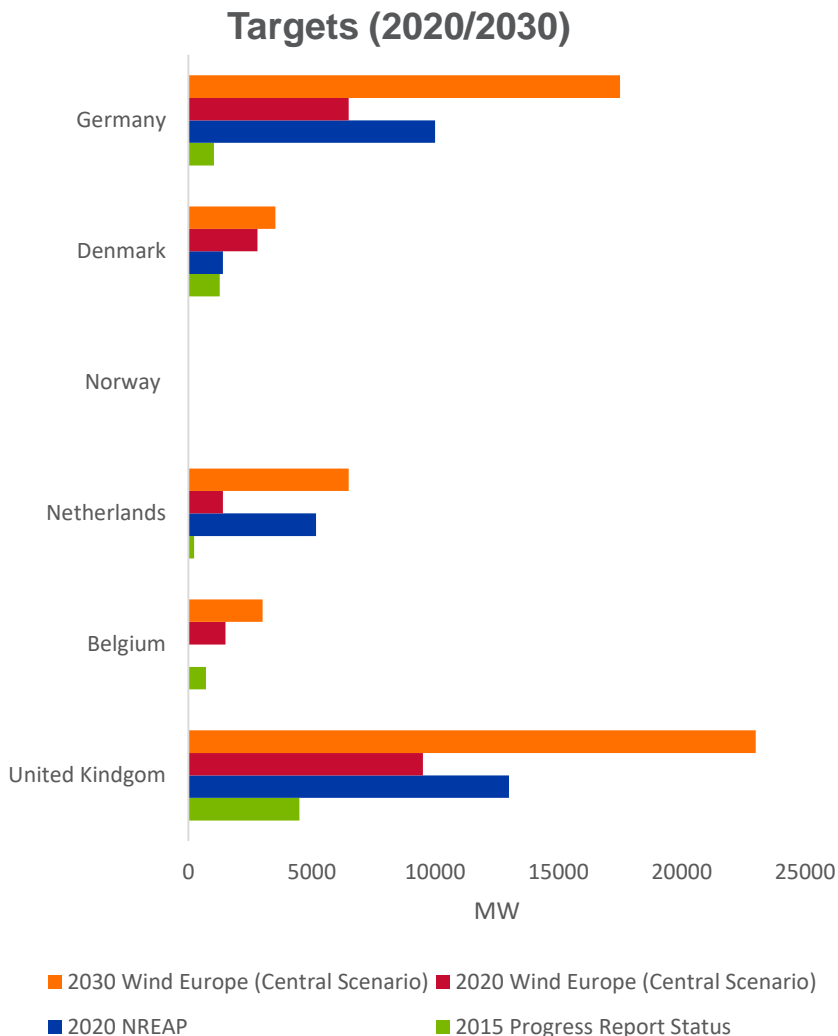
- 23.03.2017: **Cooperation European Transmission System Operators to develop North Sea Wind Power Hub**

FORECAST WIND OFFSHORE DEVELOPMENTS



Source: Wind Europe

CURRENT POLICY TARGETS AND SUPPORT



- All countries in the region offer allocation of support via auction
- Additionally, pre-development support is offered to the sector, f.ex.
 - Zone identification
 - Site selection
 - Site investigation
 - Sometimes permitting.

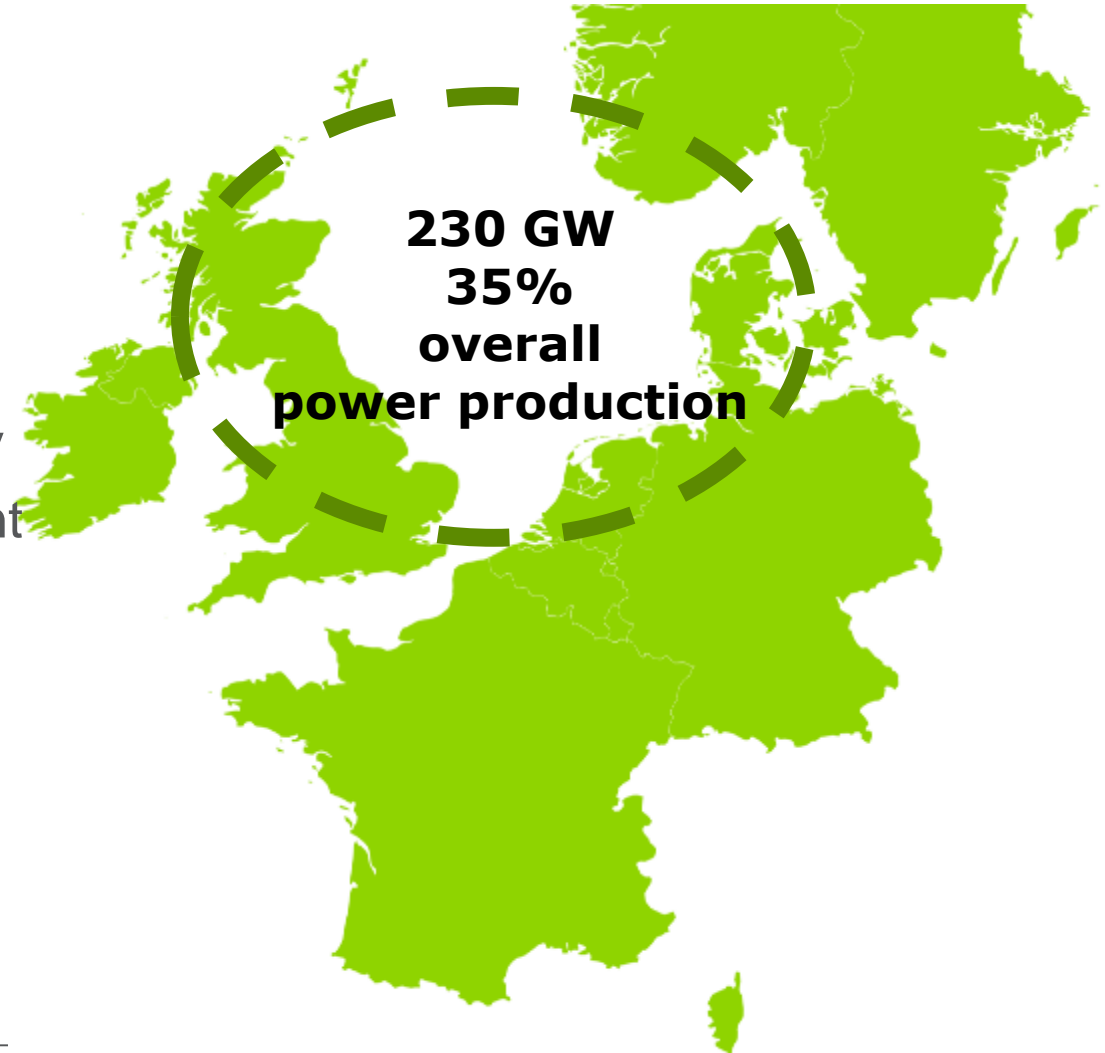
NORTH SEA VISION

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NORTH SEA

A POTENTIAL POWERHOUSE FOR NORTH-WEST EUROPE

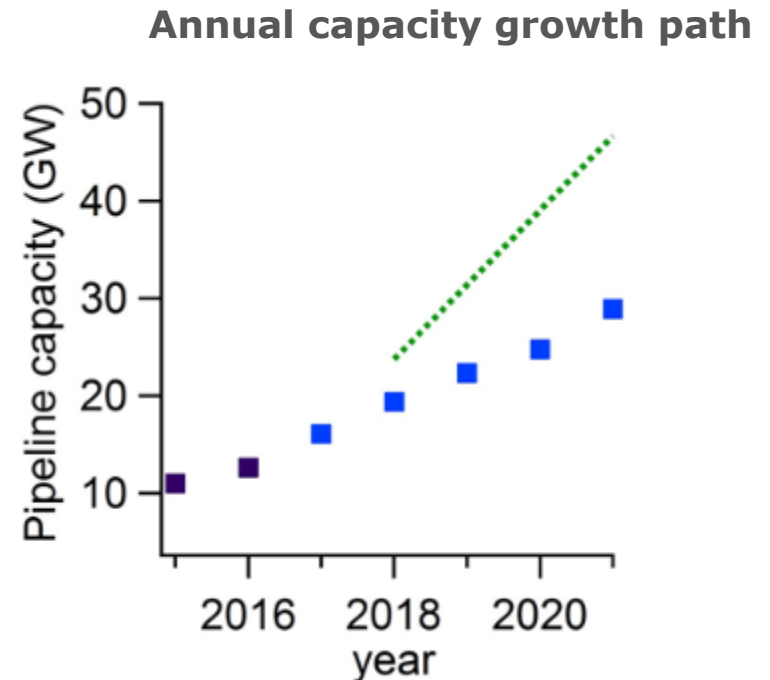
- Allow for high vRES penetration
- Allow for realization of the 2050 vision of a fully sustainable power system
- Increase security of supply
- Drive significant investment
- Increase the number of jobs in the RES sector threefold



DELIVERING THE VISION REQUIRES...

1. A COORDINATED REGULATORY ACTION

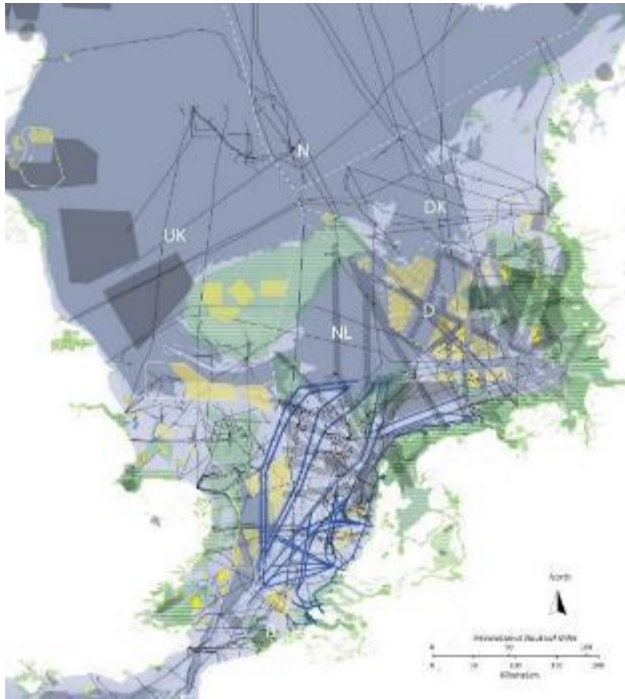
- Ambitious long term policy goals
- Strong and transparent governance
- Coordinated/ joint support schemes
- Stronger standardization of standards and regulations



*Development path at ~7 GW/year until 2045
will secure realization of the vision*

2. STRATEGIC APPROACH TO OVERALL SPATIAL PLANNING OF OFFSHORE WIND IN THE NORTH SEA

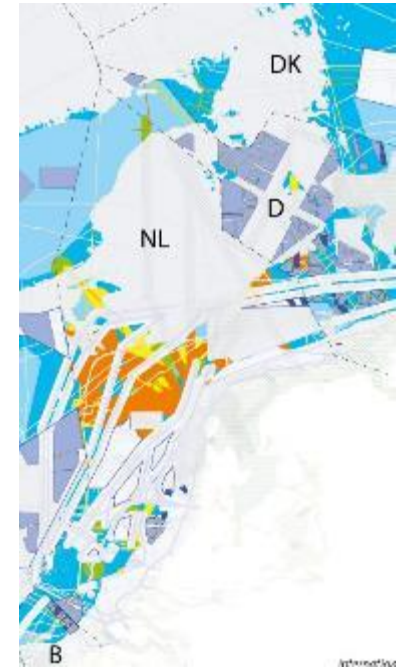
Current constraints



Natura 2000

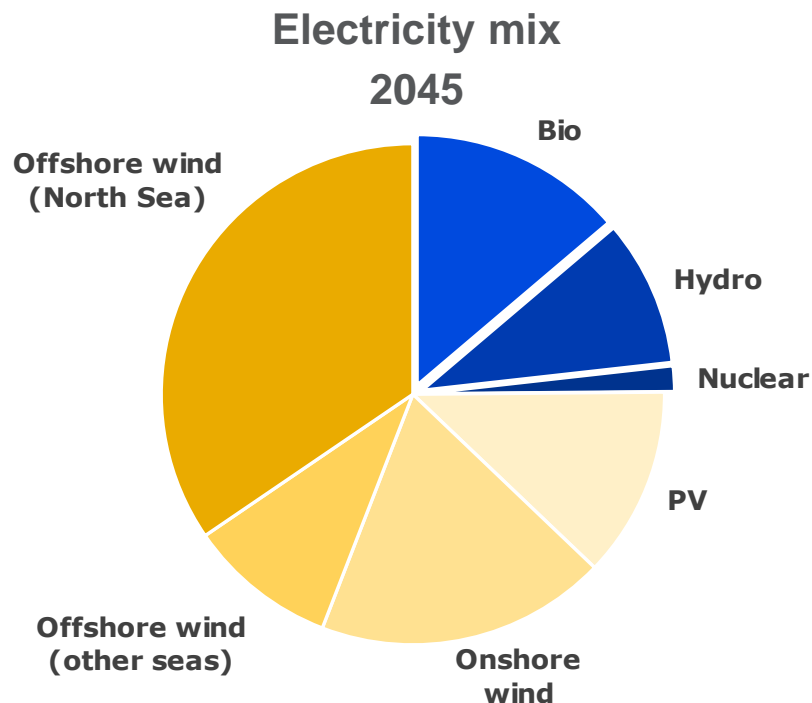


Oil & gas decommissioning
(example Netherlands)



International spatial planning strategy will ensure **cost efficient** utilization of the resource, aligned with **off- and onshore grid developments** and maximum benefit for the **environment**

3. SIGNIFICANT INCREASE IN FLEXIBILITY OPTIONS



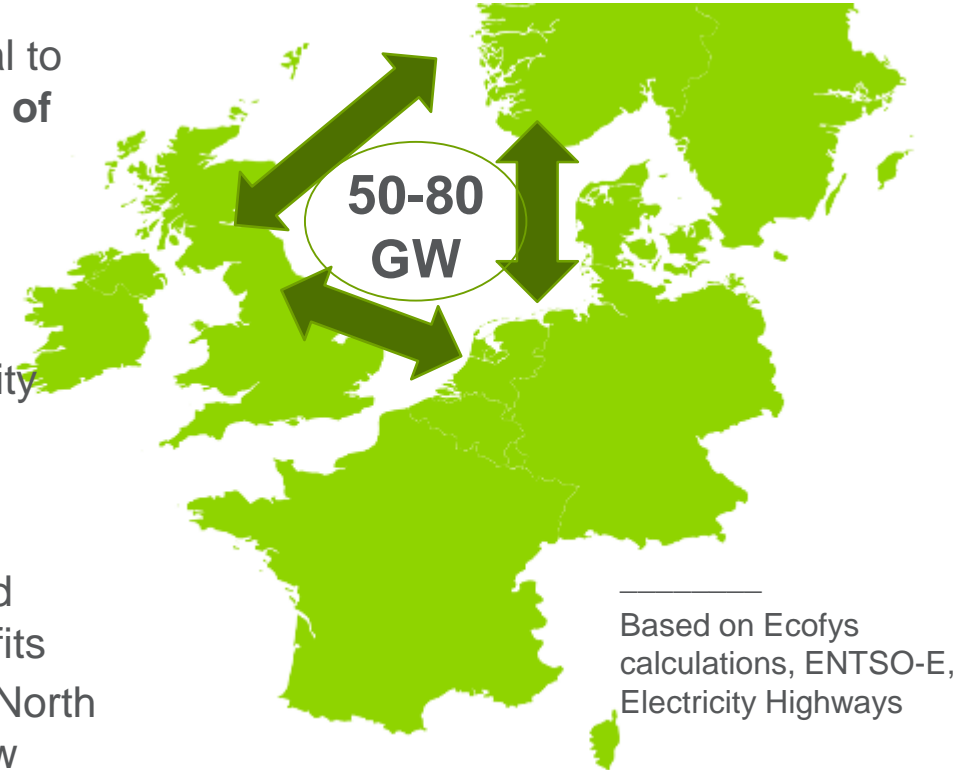
- There is need for **better understanding of market/operation issues** resulting from this energy mix, including economic triggers and additional capacity reserves.
- **Increased use of cost efficient flexibility options**, such as demand response, small/large-scale storage, power-to-gas, etc., will become essential in the 2045 scenario in face of decreasing dispatchable generation capacity.

Based on IEA, Fraunhofer ISI, PRIMES, WindEurope studies and Ecofys expert

A **realistic and robust potential roadmap** is needed for all flexibility options by 2045, including a trade-off of some flexibility options with interconnection levels.

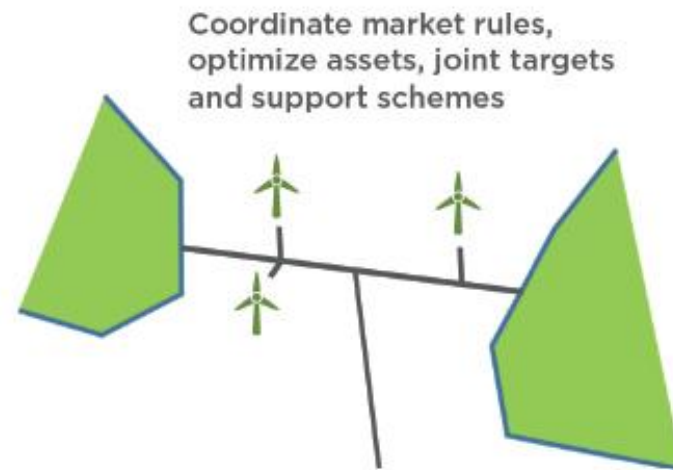
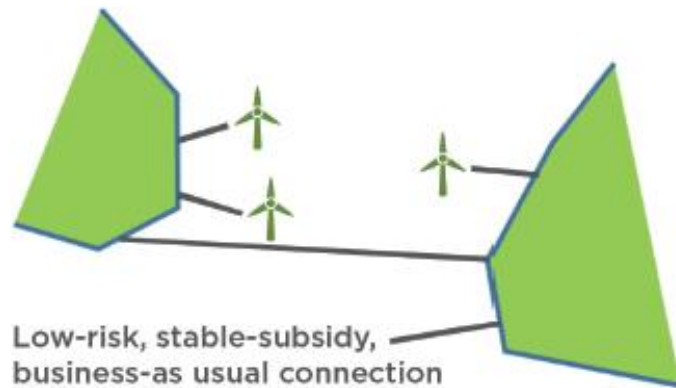
4. INCREASED INTERCONNECTIVITY

- Sufficient interconnection capacity is essential to **maintain operational security** and **security of power supply**
- A higher share of variable sources requires increased **flexibility options**, which may be optimally used with better interconnection
- An increased roll-out of interconnector capacity requires a cost-benefit appraisal that goes **beyond current economic triggers** of operational cost savings
- A **good balance** of radial, meshed and hybrid solutions is key to maximize the overall benefits
- The **onshore grid** is an essential part of the North Sea grid too, and needs to cope with new flow patterns



Development of methodology to **value grid stability** will incentivise interconnector capacity to maintain operational security

RADIAL VS MESHED GRID



Net cost of the meshed grid may be higher and requires more coordination but the potential benefits outweigh the costs

KEY BENEFITS OF THE COORDINATED APPROACH

EXAMPLES „BENEFITS OF THE MESHED OFFSHORE GRID“

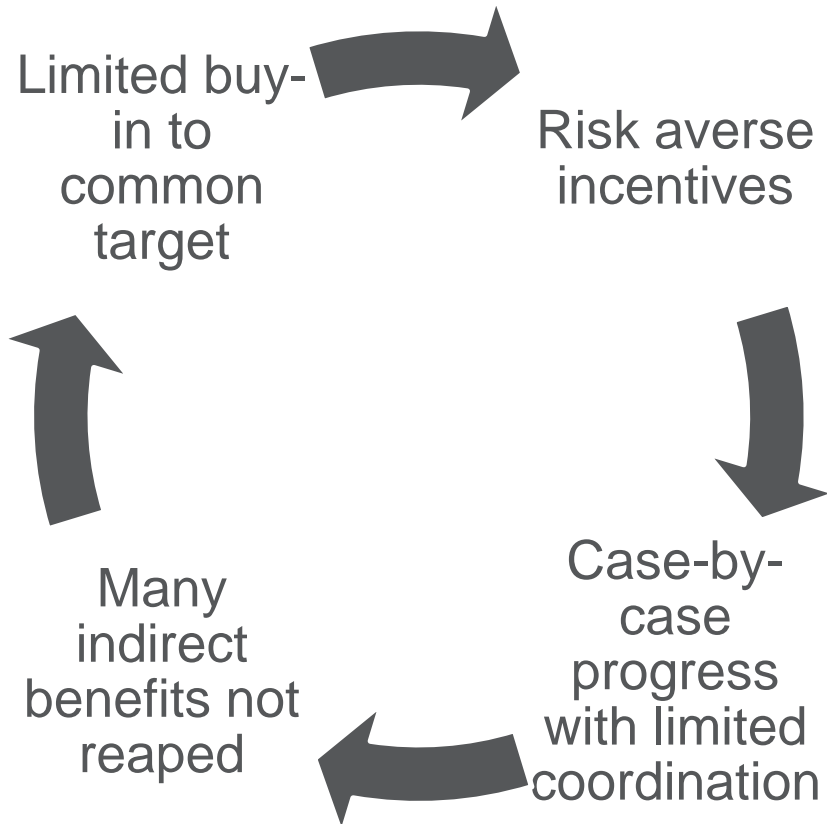
- CO2 reduction up to 25-45 Mt CO2/yr
- 14-37% less RES curtailment
- 35-44% shorter cables
- 12-15% reduction of overall power generation costs in the region
- Reductions of installed capacity investments 8-19 GW
- Security of supply increase
- Investment savings in onshore grids



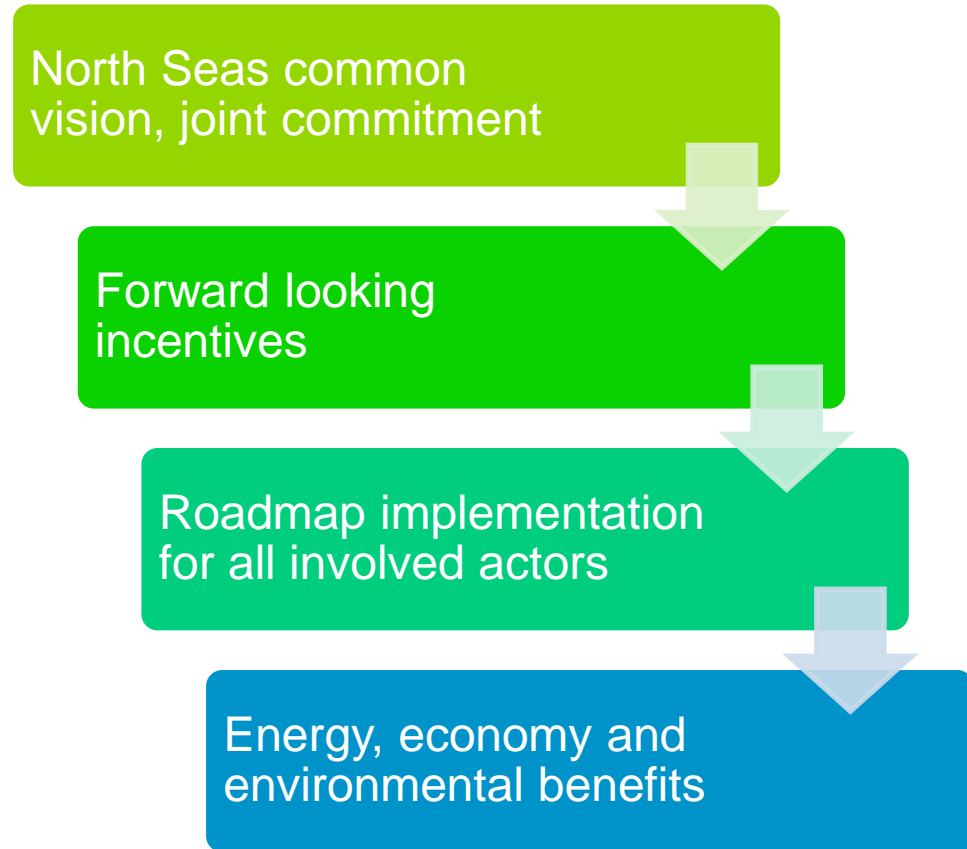
Source: Benefits of a Meshed Offshore Grid in the Northern Sea region, 2014

KEY BENEFITS OF THE COORDINATED APPROACH

Uncoordinated approach



Coordinated approach



CONCLUSIONS

- The Baltic Sea region pioneered in regional energy cooperation and wind offshore developments
- The North Sea offshore wind power has been developing much faster over the last 7 years due to long term ambitious targets and goals
- The North Sea region is currently a role model in regional offshore developments
- The North Sea vision estimates wind offshore can cover up to 35% energy production in the region
- A concerted action is needed in the region to
 - Coordinate policies and regulatory framework
 - Develop joints approaches to spatial-, grid- and capacity planning
 - Increase interconnectivity
 - Optimize the use of flexibility resources
- It gives more broad benefits but also requires a coordinated action
- The same principles, applied in the Baltic Sea region will drive offshore wind developments in a cost-efficient way, contributing to economic- and environmental welfare of the region and increased security of supply



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