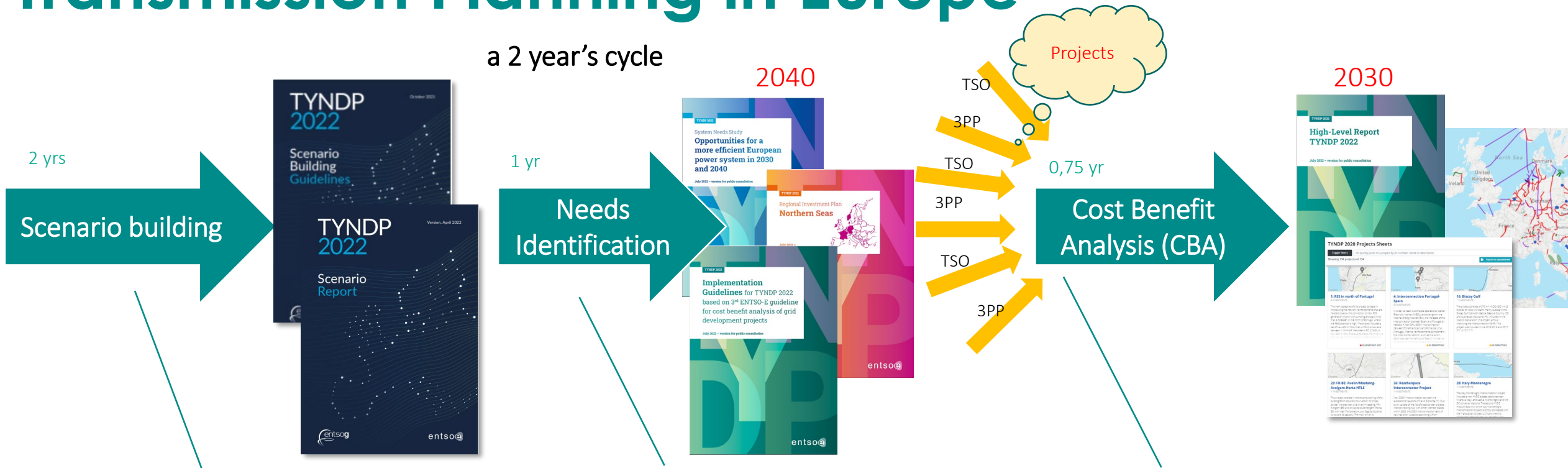


EUROPEAN TRANSMISSION PLANNING WITH OFFSHORE NETWORKS

ESIG Technical Workshop 28th March 2023

Antje Orths

Transmission Planning in Europe

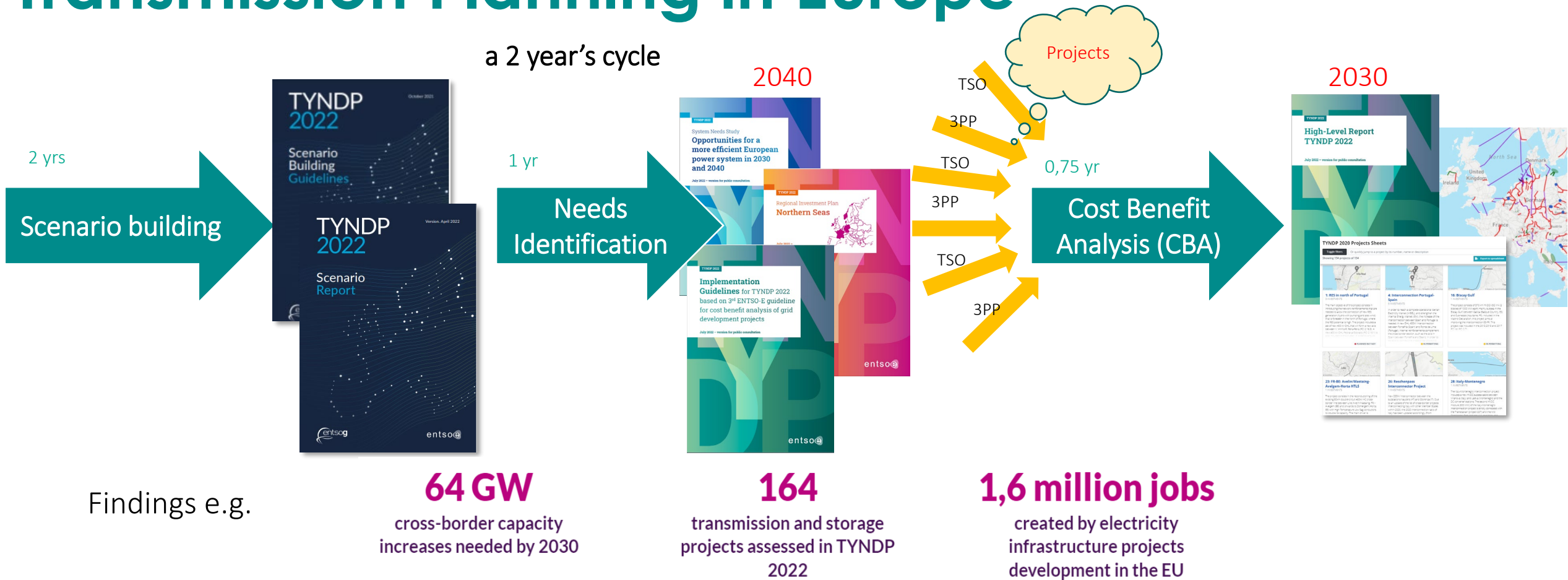


- Scenarios describe key factors of potential development in technology, economic growth, generation, demand,
- across several time horizons
- Combination of bottom-up and top-down scenarios

- Identification of system needs (IoSN): (focus on capacity increases in transmission system)
- Based on:
Socioeconomic welfare (SEW),
Integration of renewables (RES) &
Security of supply (SoS)
- Based on long term scenarios for 2040

- Cost Benefit Analyses (CBA) of individual projects on mid term time horizon 2030
- Also additional studies on e.g. Interconnection Targets and Impact of “No-Grid development” study

Transmission Planning in Europe



	2030	2040
Saved TWh curtailments	17	42
Decrease gas dependence for Power TWh/yr	9	75 14% (2021)
Mio t CO2 avoidance	14	31
Annual generation cost decrease (bn € / yr)	5	9

ONDP

Offshore Network Development Plans

New ENTSO-E mandate derived from new TEN-E regulation.

Strategic ONDPs per sea basin shall provide a high-level outlook on offshore generation capacities' potential and resulting offshore infrastructure needs. First edition by 24/01/2024, based on goals jointly set by the Member States, which are collaborating in TEN-E offshore corridors (by 24/01/23).

EC Nov 2020:

800 bn € offshore
Investments needed,
of which 2/3 are for
offshore infrastructure



REVISED TEN-E: ENABLING INFRASTRUCTURE DEVELOPMENT

TEN-E regulation
(EU) 2022/869

Art. 14.2

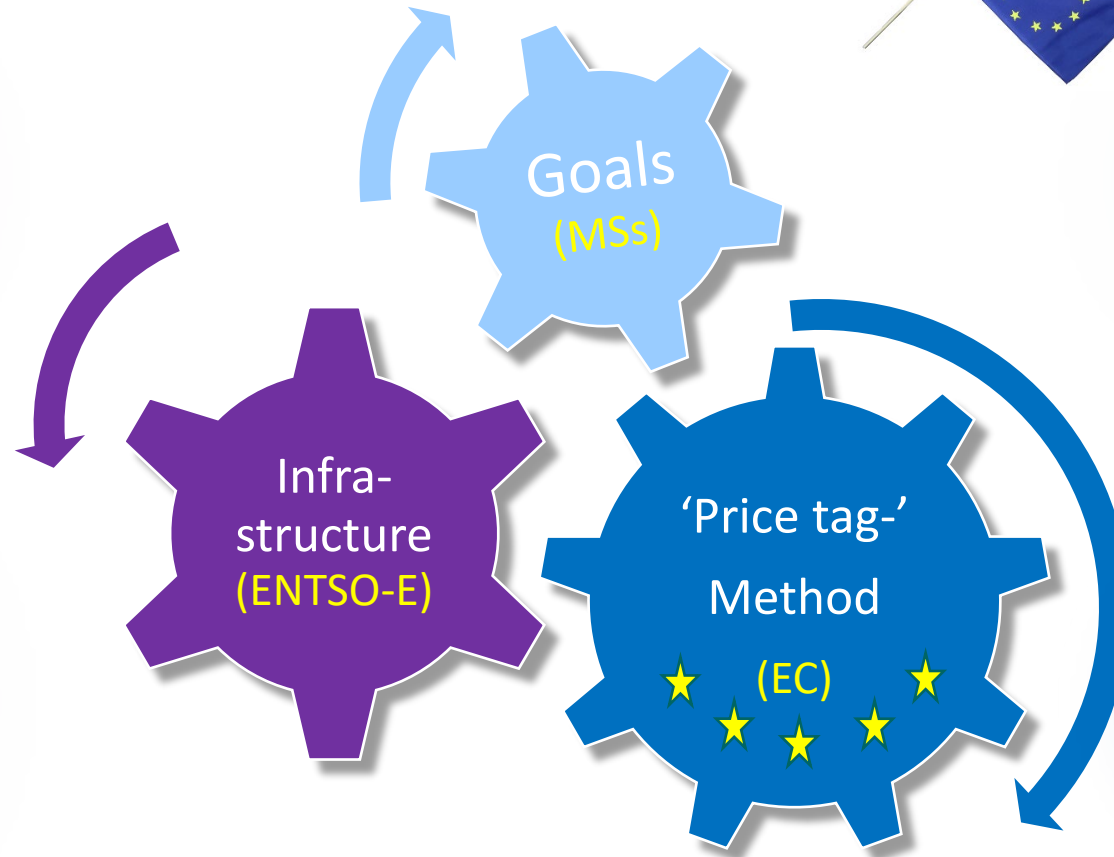
- 2) Offshore Network Development Plans

24/01/2024

Art. 15.2

- 4) Results of Sea Basins' Cost benefit – Cost sharing calculations

24/06/2025



Art. 14.1

- 1) MS agreements on offshore goals for 2030, 2040 and 2050

24/01/2023

Art. 15.1

- 3) EC Guidance on specific cost-benefit, cost sharing methodology

24/06/2024

Collaboration at all levels is essential to make this a success!

Offshore Network Development Plans: Think European, Coordinate Regionally!



ENTSO-E to develop Offshore Network Development Plans (part of the TYNDP) by January 2024



High-level outlook on offshore generation capacities potential and resulting offshore grid needs

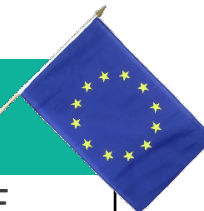
2030

2040

2050

TEN-E Priority ^{SEP} Offshore Grid Corridors

TEN-E Priority ^{SEP} Offshore Grid Corridors	Countries involved
1. NSOG	BE, DK, FR, DE, IE, LU, NL, SE
2. BEMIP offshore	DK, EE, FI, DE, LT, LV, PL, SE
3. Atlantic offshore grid	FR, IE, PT, ES
4. South & West offshore Grid	FR, GR, IT, MT, PT, ES
5. South & East offshore Grid	BG, CY, HR, GR, IT, RO, SI



The scope of the Offshore Network Development Plans

The ONDPs, will deliver the following information for each time horizon (2030, 2040, 2050) and sea basin.

- **Overview of the Offshore RES capacity clusters located in the different sea basins.**
 - *How much RES in the different timeframes? Located where? Are there any potential conflicts with other sectors?*
- **Possible configuration of the transmission infrastructure, potentially connecting the different clusters to each other and/or to the onshore systems.**
 - *What are the possible configurations for connecting the different clusters, considering the space available and the relevant technological assumptions?*
- **A high-level overview over related transmission categories, as required in Art. 14.2 of (EU) 2022/869: Offshore grid needs, including the potential needs for**
 - Interconnectors,
 - hybrid projects,
 - radial connections,
 - reinforcements and
 - hydrogen infrastructures.

What is the amount of investments per category [km/ number/ €] needed to integrate the offshore RES potential?



A15(2) - results of the application of the cost-benefit and cost-sharing to the priority offshore grid corridors

MOVING TARGETS

Esbjerg Declaration, 19.05.2022
Joint Offshore Wind
& Combined H2 Target [GW]



Marienborg Declaration 30.8.2022
Sea basin Goals [GW]

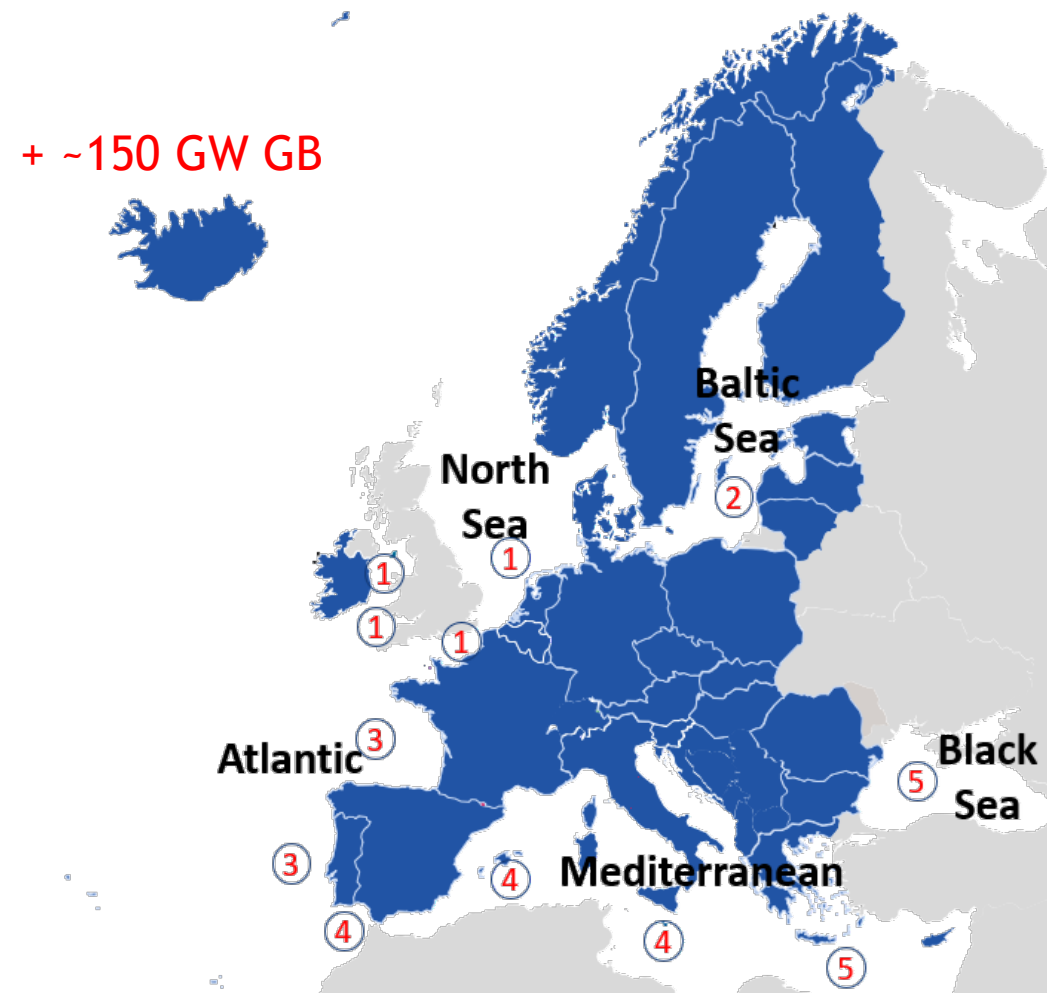
Joint Statement Dublin, 12.09.2022
Country Goals [GW]



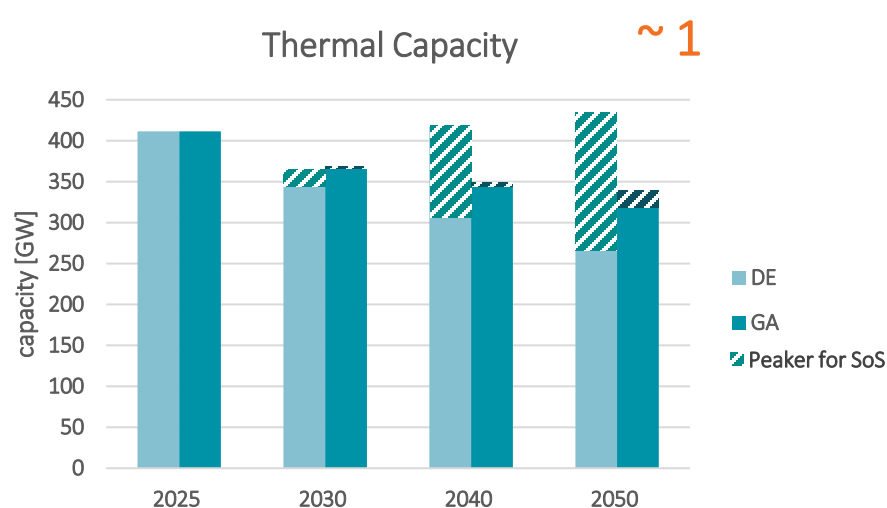
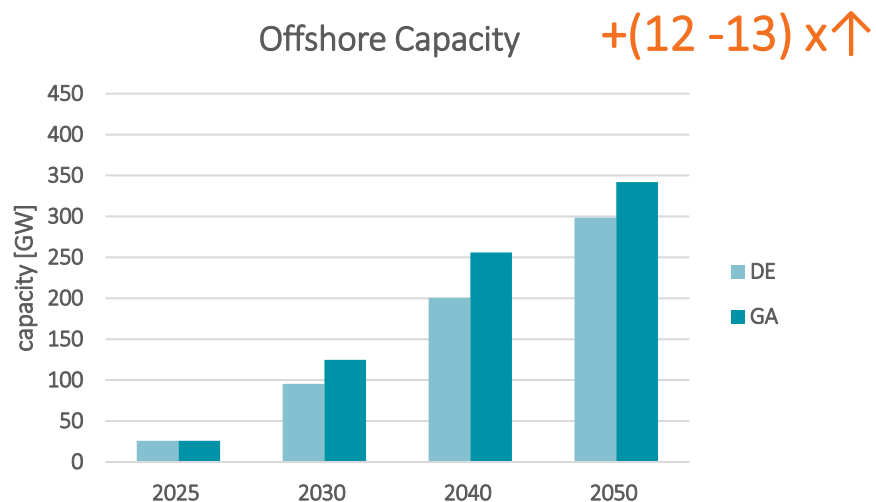
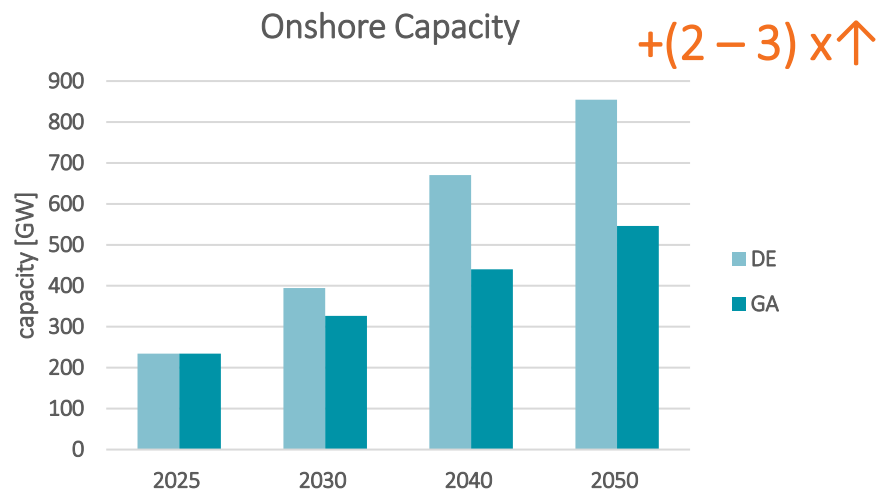
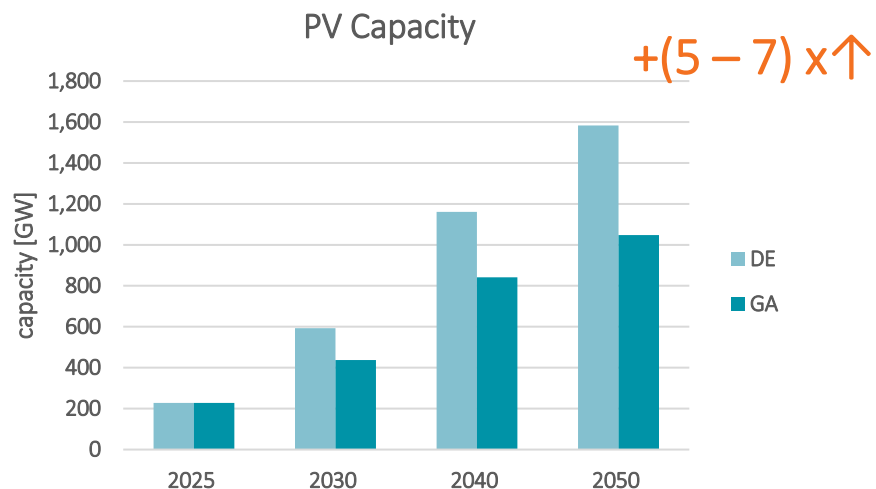
ESIG Spring Technical Workshop 2023

JOINT NON-BINDING MS AGREEMENTS ON OFFSHORE GOALS - 20.1.2023

	2030		2040		2050	
	min	max	min	max	min	max
1 NSOG	60,3	60,3	134,9	158	171,6	218
2 BEMIP	22,5	22,5	34,6	34,6	46,8	46,8
3 AOG	12,74	14,26	21,74	26,06	29,74	43,06
4 SWOG	5,15	6,15	6,7	12,6	6,7	20,1
5 SEOG	8,81	8,81	16,8	16,8	25,9	25,9
Total	109,5	112,0	214,7	248,1	280,7	353,9



EUROPEAN PRODUCTION CAPACITIES, EU27



Huge increase of RES installations expected to fulfill the European Climate targets and to cover the increasing electricity demand

Demand:

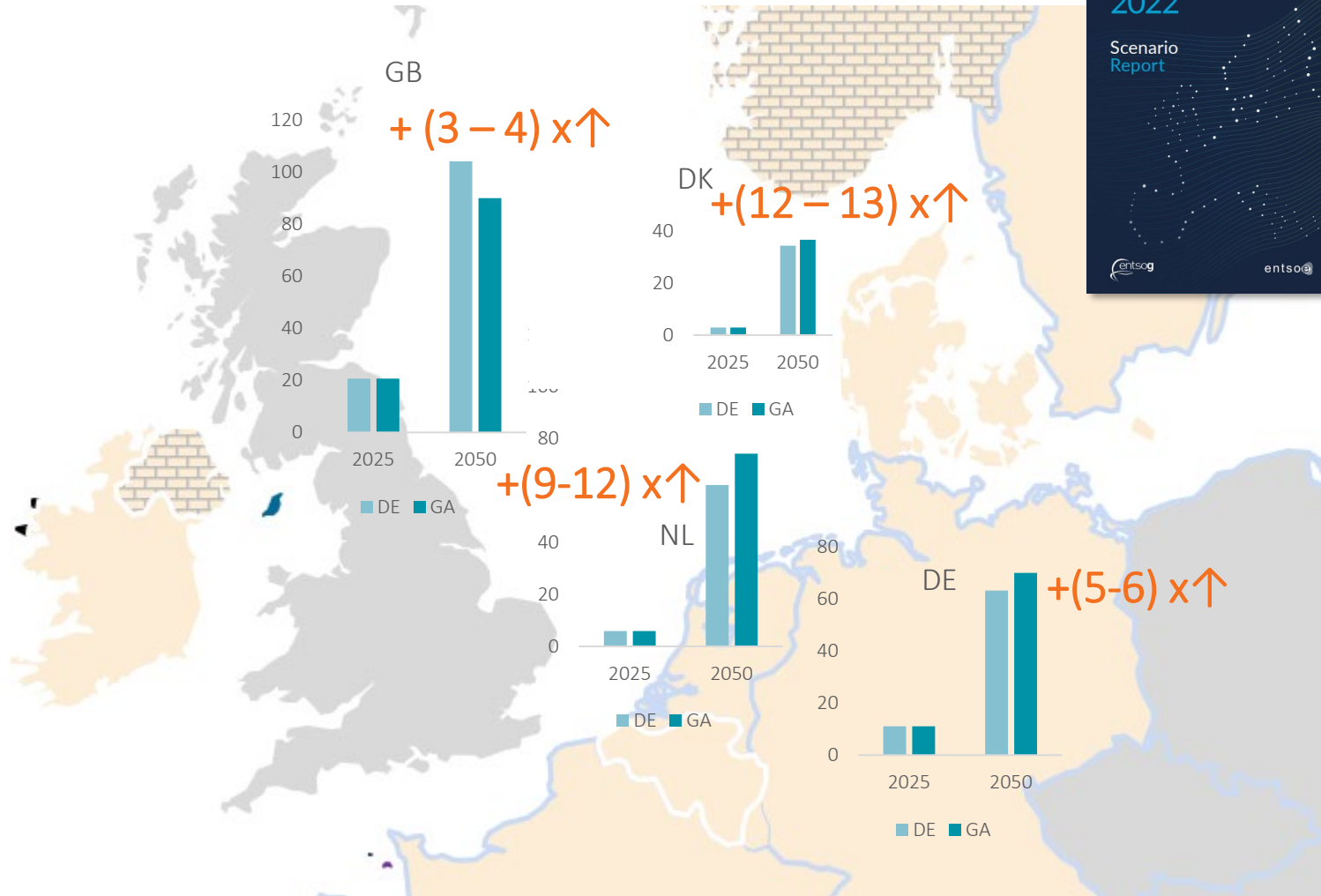
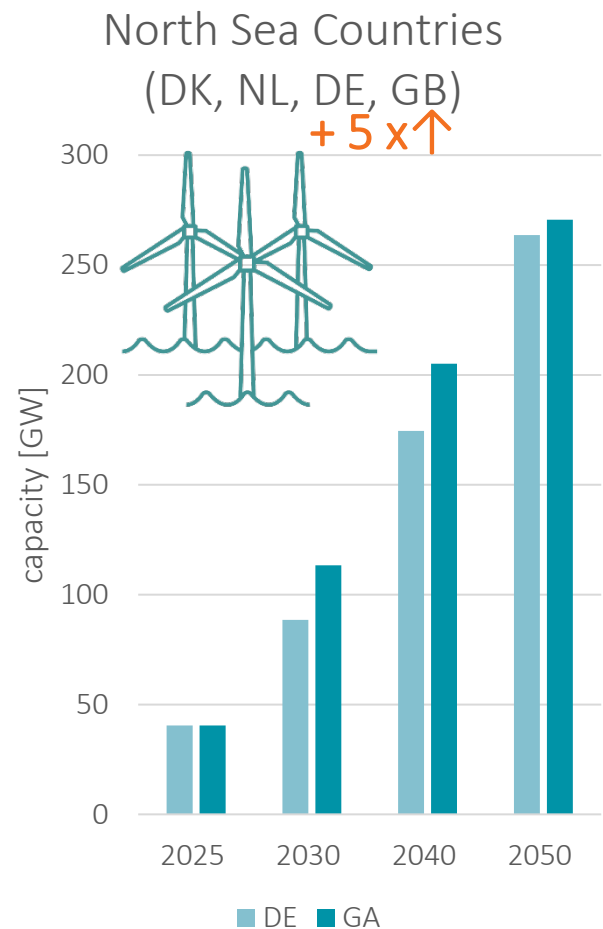
2025 Ref: 2500 TWh

2050 DE: 4000 TWh

2050 GA: 3600 TWh



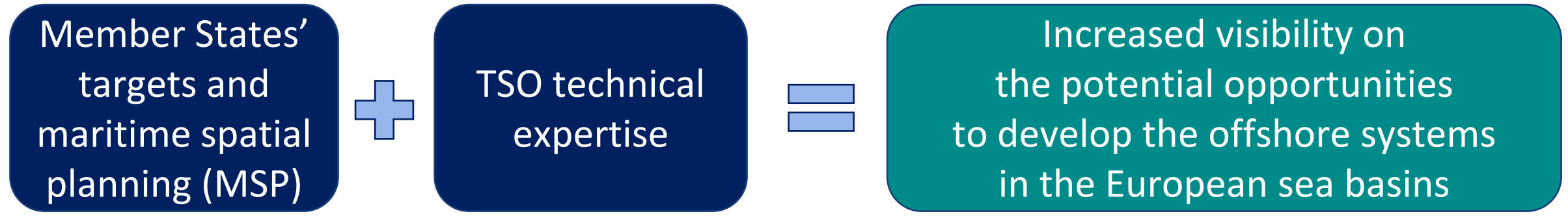
TYNDP 2022 SCENARIOS: OFFSHORE RES - INCREASE IN SELECTED NORTH SEA COUNTRIES



1

	2030		2040		2050		
	min	max	min	max	min	max	
NSOG	60,3	60,3	134,9	158	171,6	218	+ ~150 GW GB

OFFSHORE NETWORK DEVELOPMENT PLANS: PLANNING TOMORROW'S OFFSHORE SYSTEMS



Collaboration of **all stakeholders** (institutional, industrial, NGOs) is critical for the delivery of a high-quality product.



ENTSO-E, together with the European Commission, developed [a guidance document for the Member States](#) to help them deliver the **key input data for the elaboration of the ONDPs**.

- **Offshore RES targets in the different time horizons**
- **Locations of above offshore RES in smaller clusters**

ENTSO-E has been supporting the regional cooperation platforms, coordinated by the European Commission, to deliver technical insights on how to ensure optimal development of offshore systems.

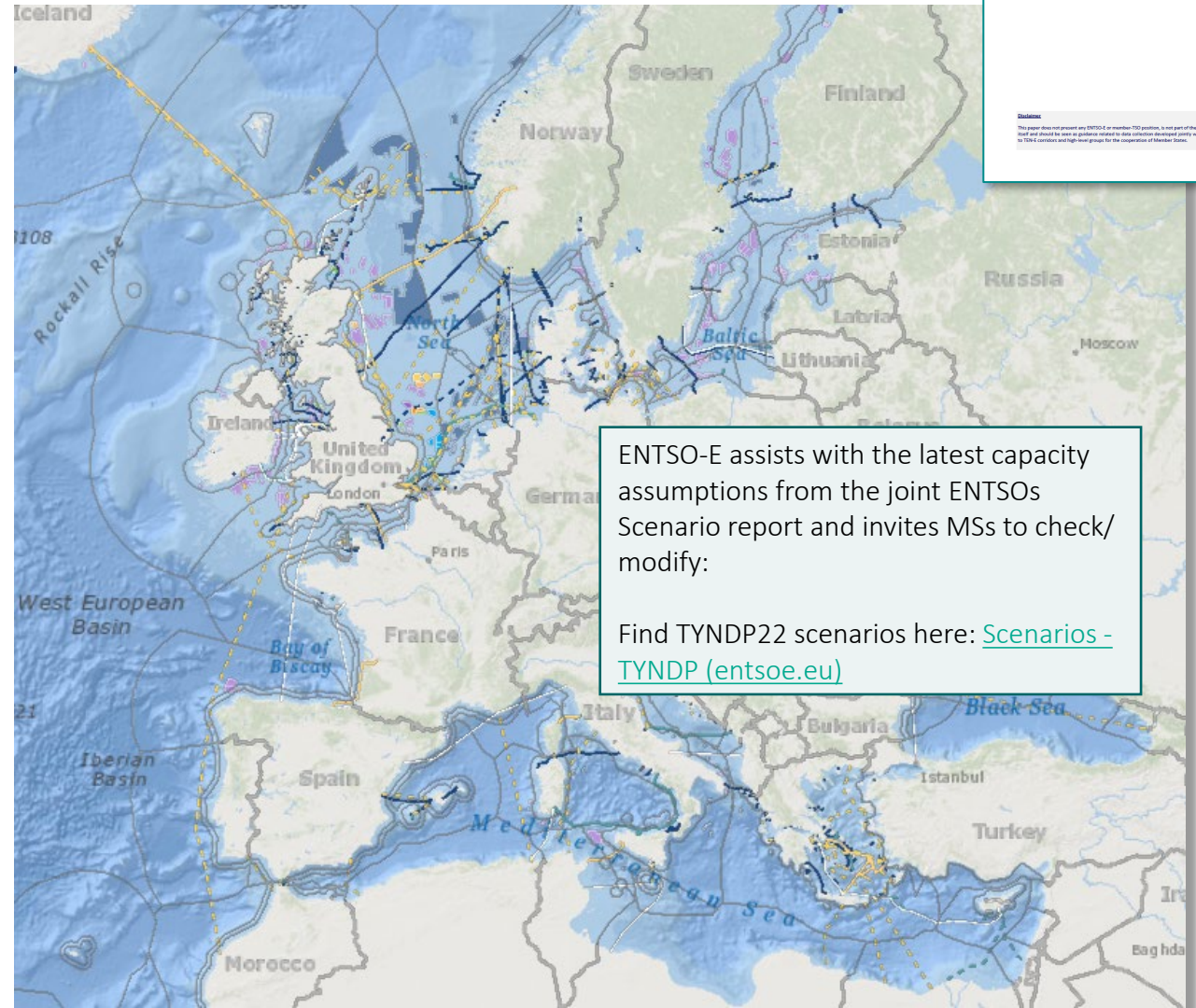
National “Government + TSO”- discussion recommended to align ENTSO-E assumptions as good as possible with MSPs and MS views. (ongoing mid Feb)

WHAT ENTSO-E NEEDS FROM MEMBER STATES

For each time horizon: 2030, 2040, 2050

- Offshore RES Capacities
- Offshore RES Locations
-> e. g. necessary for cable lengths
- Maritime spatial plans
-> what do we have to surround?

See [Guidance Document for the Member States](#)



IDENTIFICATION OF SYSTEM NEEDS – FINDING OFFSHORE HYBRID PROJECTS, TEST OF NEW METHODOLOGY IN THE TYNDP 2022

52

Offshore transmission projects,
one third of the total TYNDP
portfolio.

+ 17 projects

7 radials

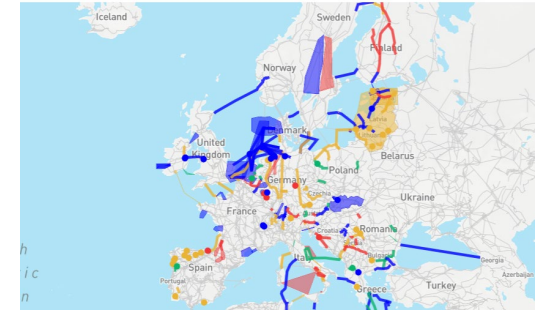
3 hybrids

(6 in total)

TYNDP 2022 Projects Sheets

The TYNDP 2022 tested how 141 transmission and 23 storage projects respond to the 2030 and 2050 scenarios. You can find more information about the projects by clicking on their location on the map below, or heading to the projects by country, type of infrastructure or status.

Storage projects

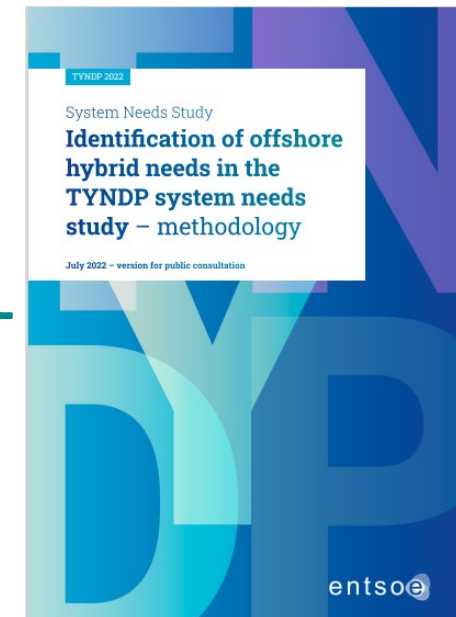


New methodology to assess needs for hybrid offshore infrastructure.

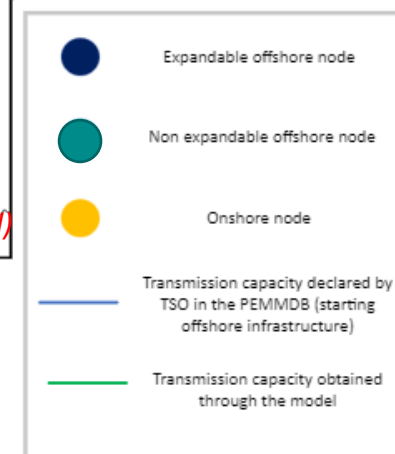
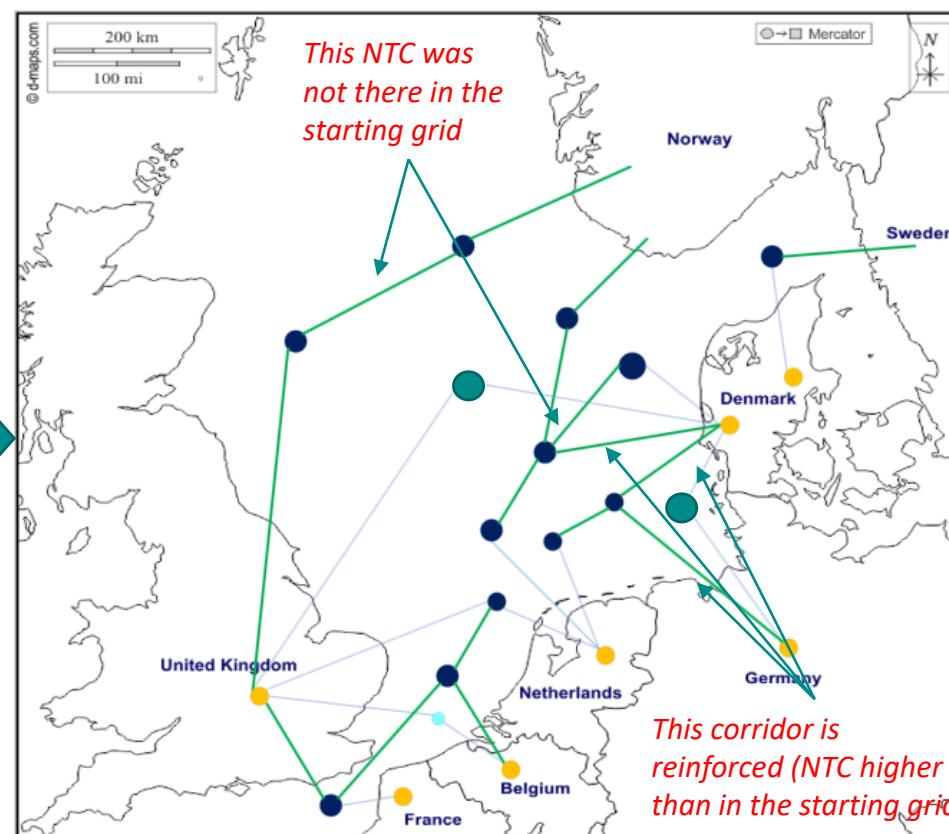
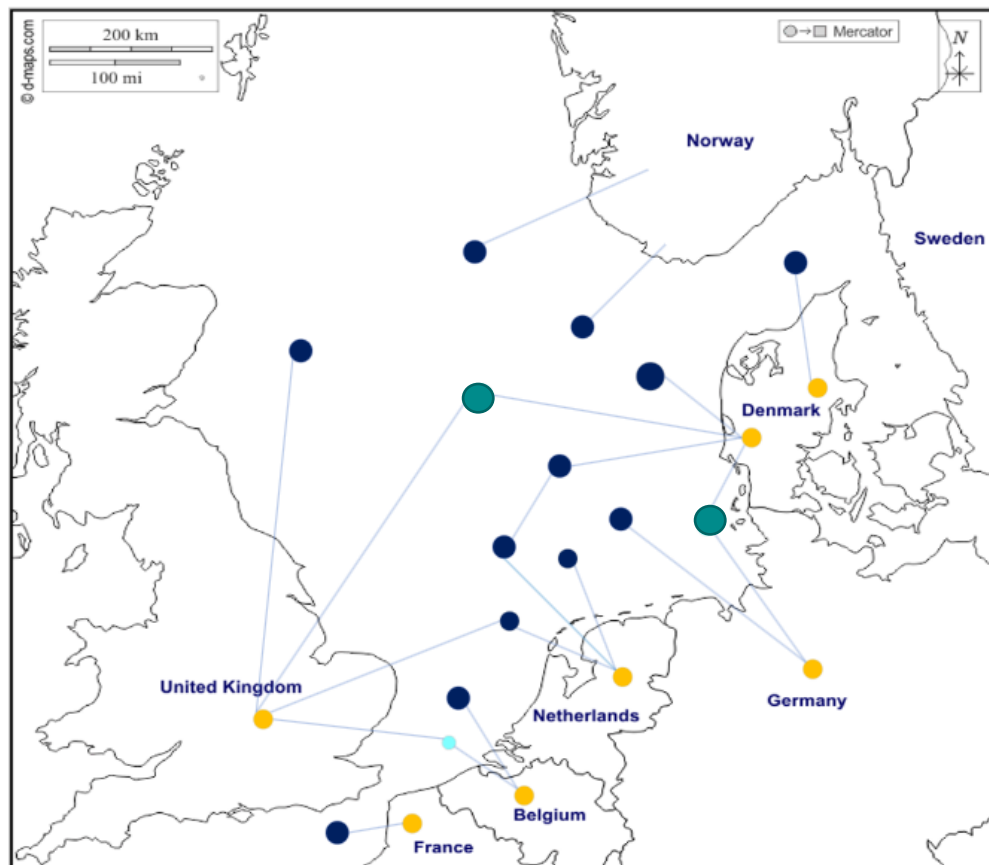
(Public consultation until September 16th)

1. Are there **systemic needs for hybrids and other solutions** to facilitate achieving the necessary price convergence, CO2 targets, RES integration levels and security of supply criteria?
2. **Can offshore hybrid projects offer higher benefits to the system compared to single purpose solutions?**

[link](#)



MODEL RUNS FOR 2040 AND 2050



The North Sea

3 GW offshore wind,
later 10 GW – enough
for **10 million**
households

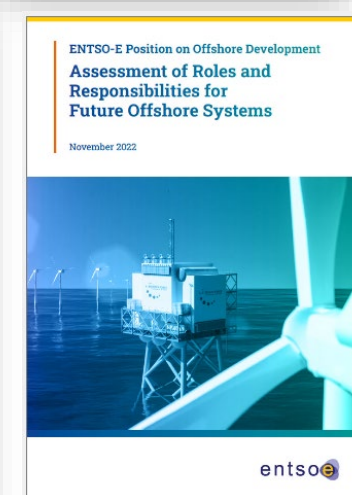
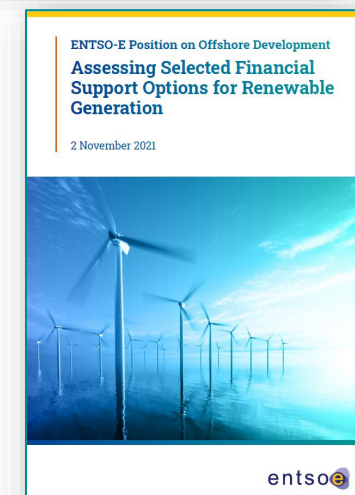
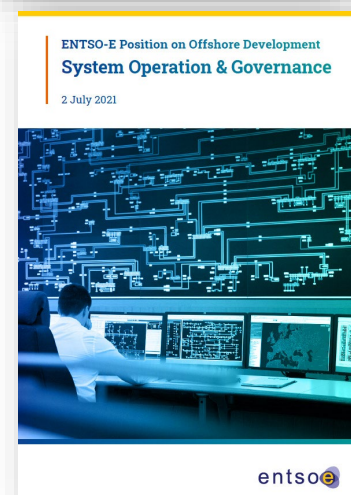
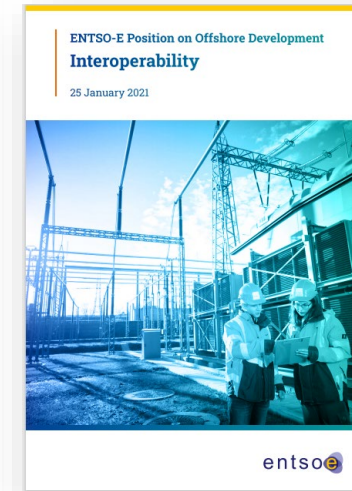
The Baltic Sea

3 GW offshore wind – enough
for **3 million**
households



ENTSO-E'S MESSAGES

Many aspects of offshore development are investigated in ENTSO-E's position papers





THANK YOU!

Antje Orths
Convenor ENTSO-E ONDP Group
ano@energinet.dk