



# Advanced technical developments require different regulations and regulator

Thursday, May 11, 2023

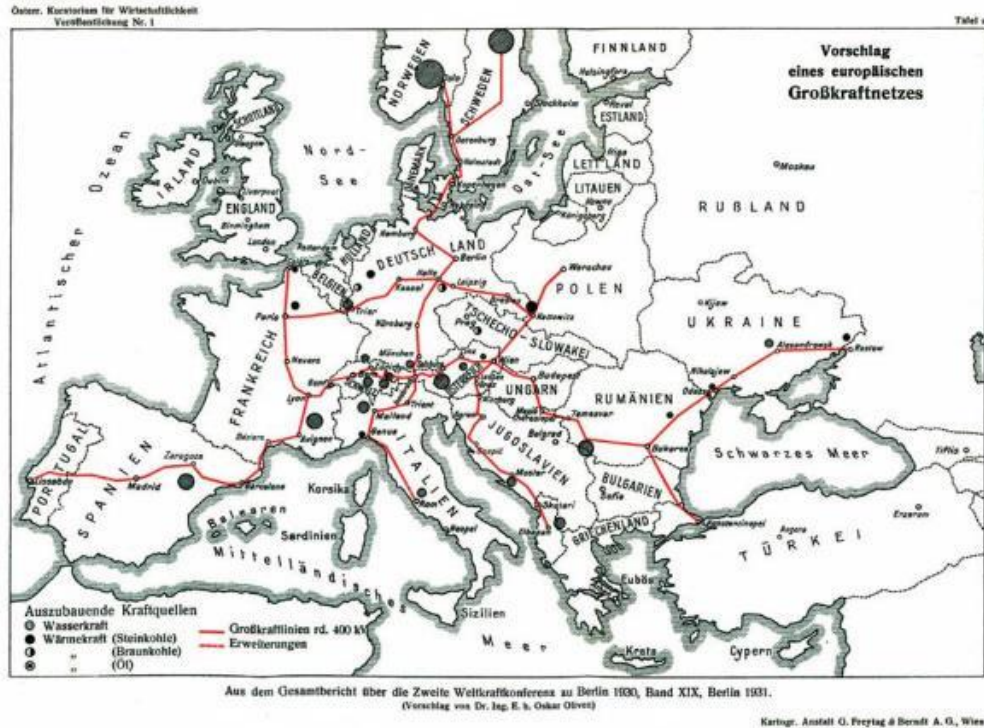
Ronnie Belmans



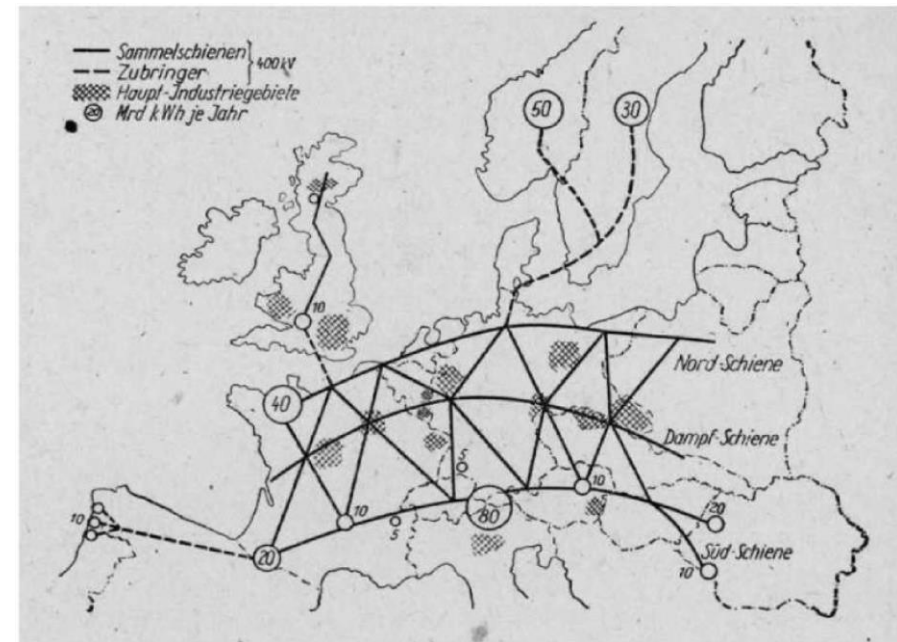
The challenge: build a grid for a new energy system in a very short time



# No new challenge as such



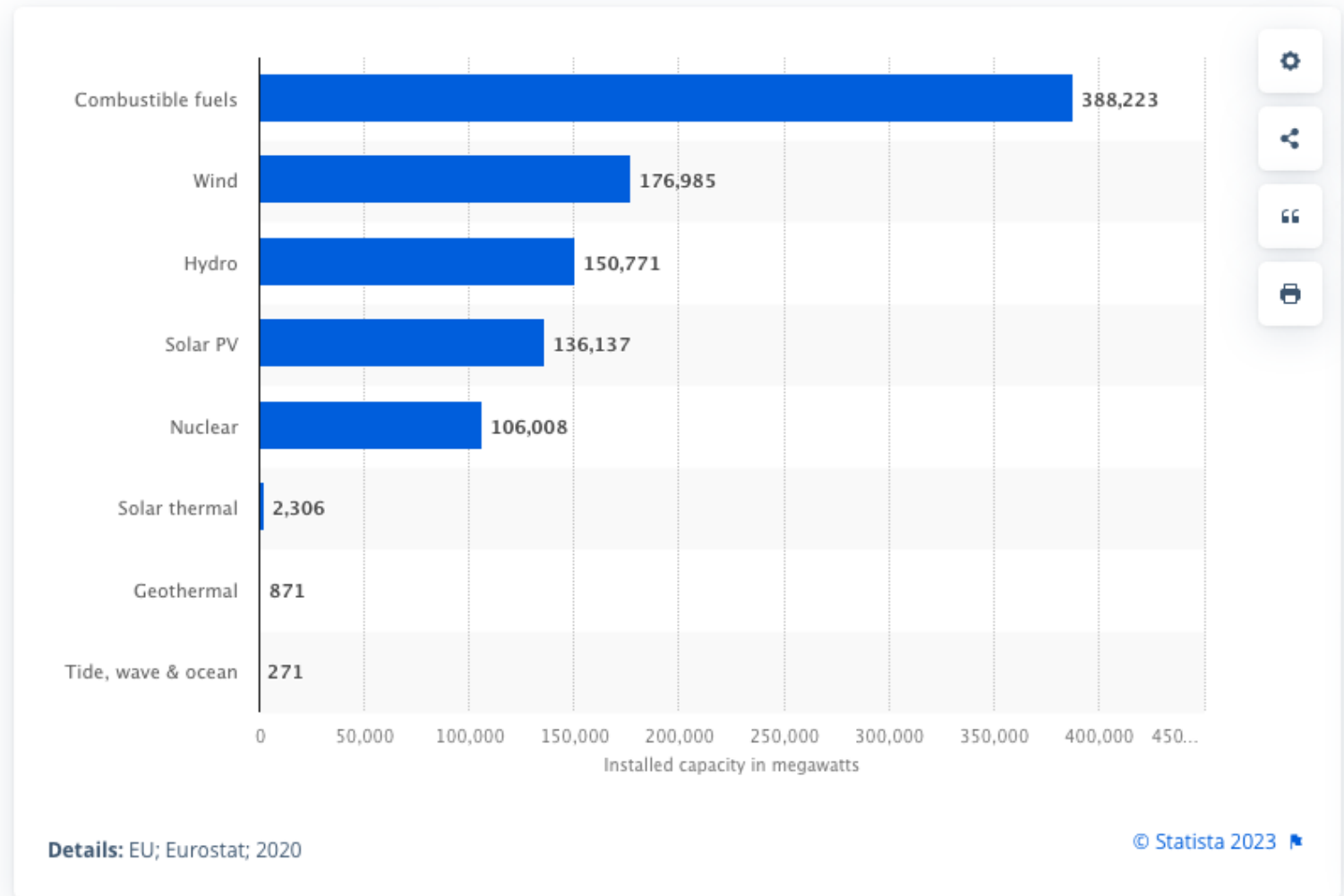
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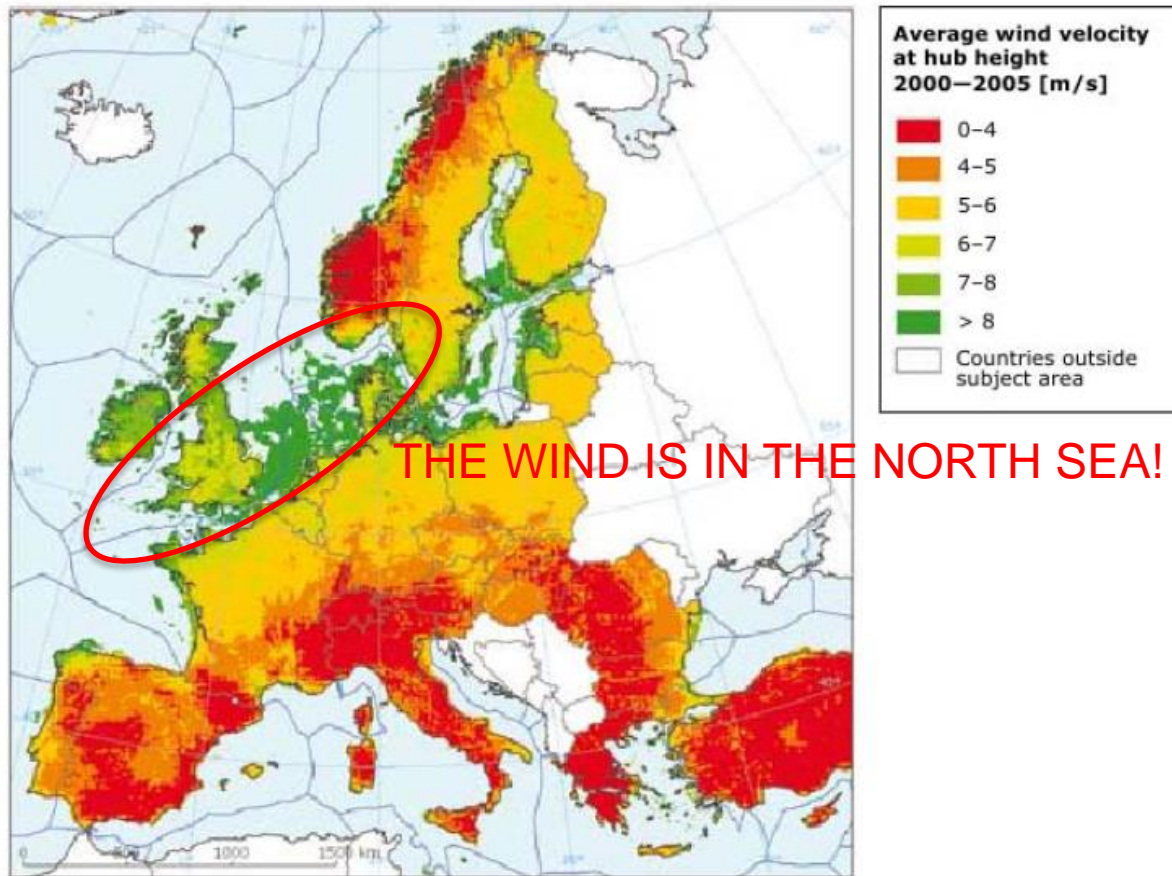
1950



# Current generation capacity: 959 GW (313 Wind and PV)

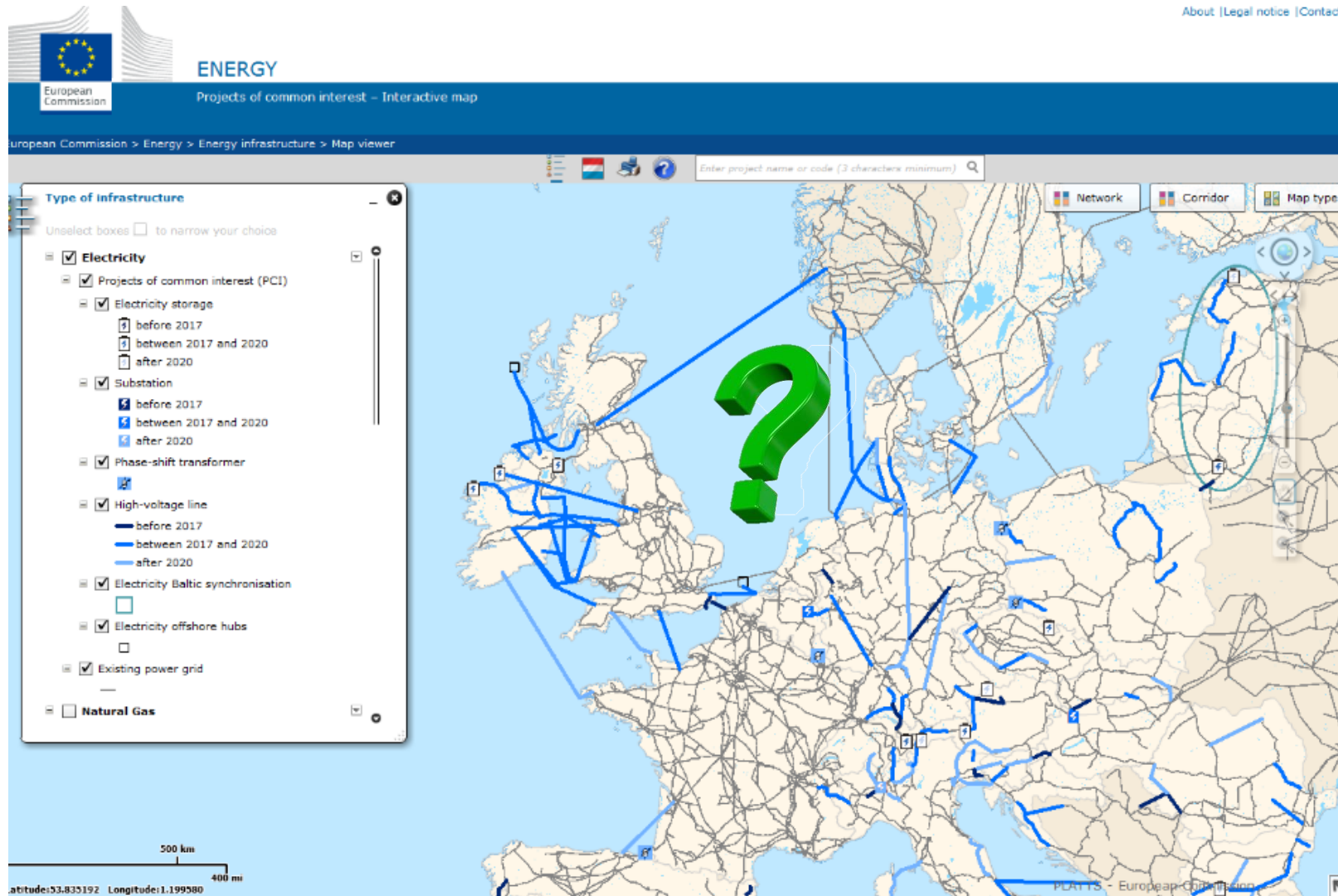


# We want to harvest wind and sun





# But, where is the grid?



Source: [http://ec.europa.eu/energy/infrastructure/transparency\\_platform/map-viewer/](http://ec.europa.eu/energy/infrastructure/transparency_platform/map-viewer/)

# Ambitions are immense

- Now: 205 GW wind in EU 27
- Target (REPowerEU) 510 GW by 2030 (and 600 GW PV)
- WindEurope target: 440 GW for EU27 (higher capacity factor)
- 31 GW per year
- UK: 50 GW target 2030
- Norway: 12 GW estimate by 2030
- Source: Rystad Energy – The State of the European Wind Energy Supply Chain – April 2023



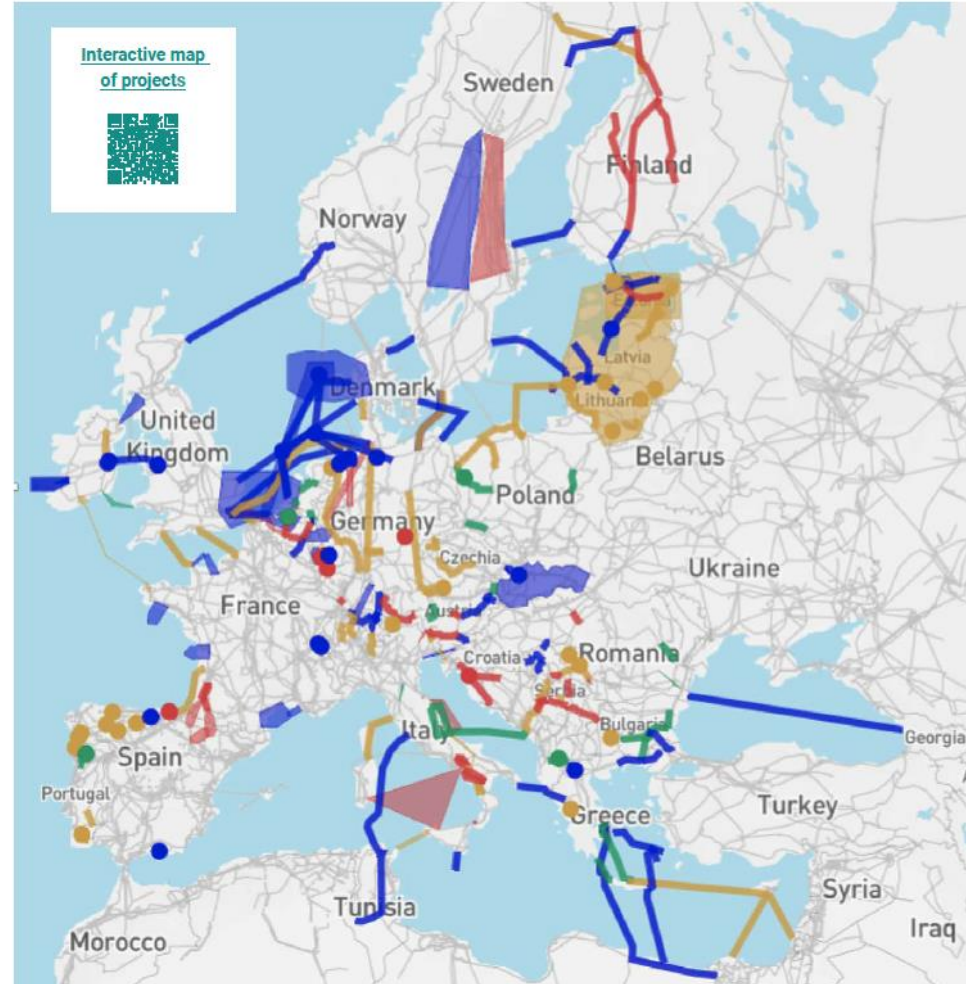
# Ostend: lets have a party

120 GW by 2030 (from 30 now) – (300 GW by 2050)





All together by 2030: 64 GW more capacity in EU27 (2040, 88 GW)



# Where do we need to go?

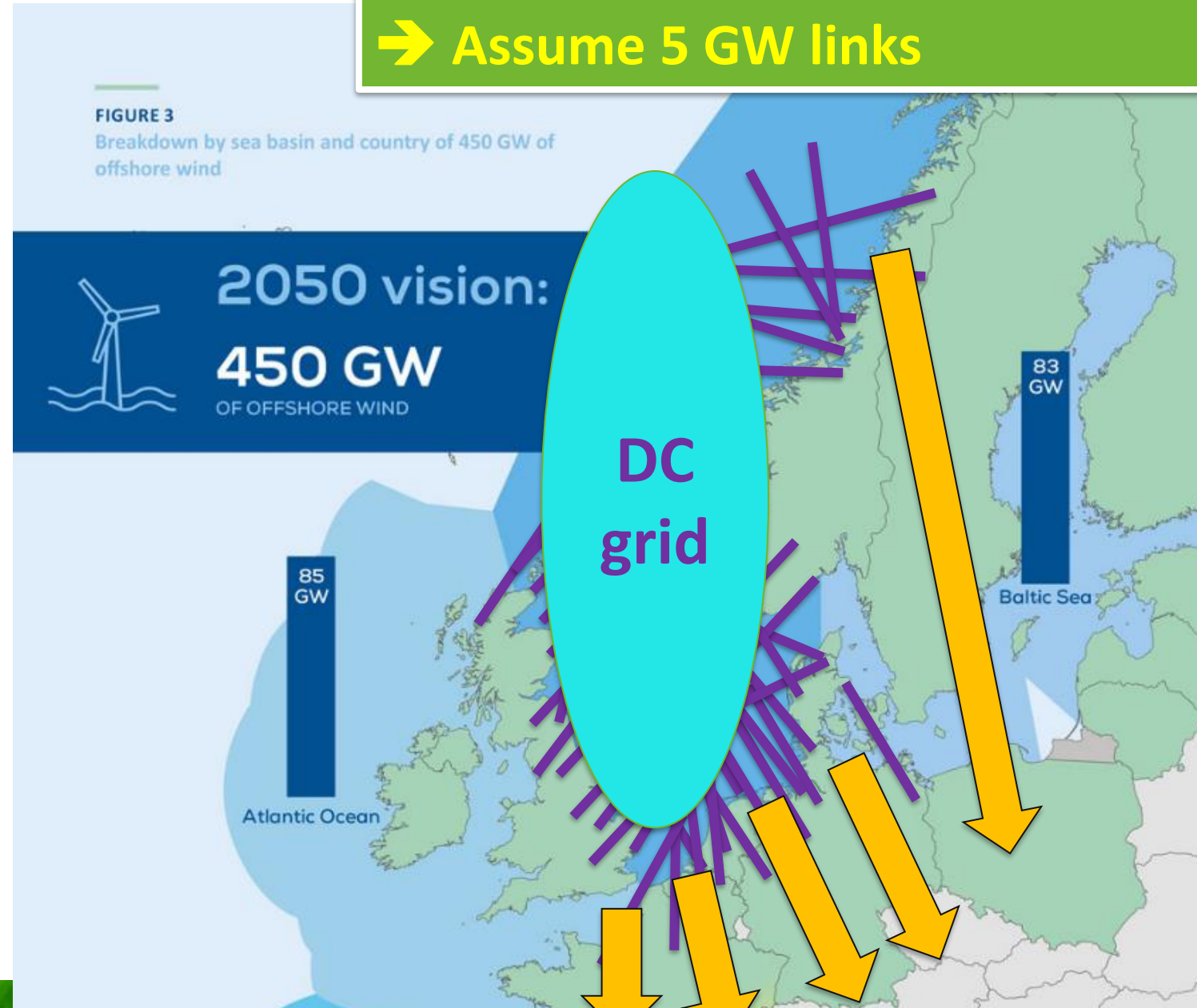
## Ambitious goals

- Offshore requires massive investments (EC: 2/3<sup>rd</sup> of 800 Billion by 2050)
- Meshed HVDC grids are the only realistic option:
  - Connections are increasingly further from shore
  - Needs to be integrated in the existing system (hybrid AC/DC)
  - Towards new backbone grid



Figure: WindEurope

**We need to connect 200 GW  
from the north sea  
→ Assume 5 GW links**







Who will do the job?  
More questions than answers



# Why are investments stalling?

- TSOs are hesitant to invest in a multinational offshore grid as long as there is not a harmonized regulation
- Regulators have no means to harmonize and improve regulation as long as there is no multinational offshore grid
- Technology manufacturers are hesitant to invest in new manufacturing capacity (cables, converters, and even very basic switchgear and transformers)

*THE OLD CHICKEN AND EGG PROBLEM ...*



# “An” Answer: DESIGN GRID

🌿 A five line grid connecting:

- ⚡ Denmark
- ⚡ Belgium
- ⚡ Netherlands
- ⚡ Germany
- ⚡ Sweden
- ⚡ Iceland
- ⚡ UK
- ⚡ Norway



🌿 Allowing integration North Sea offshore wind farms

# An Answer: DESIGN grid

🌿 **DESIGN Grid** will allow trade between

⚡ Denmark	}	<b>DKK</b>	}
⚡ Belgium		<b>Euro</b>	
⚡ Netherlands			
⚡ Germany			
⚡ Sweden	<b>SKK</b>		
⚡ Iceland	<b>ISK</b>		
⚡ UK	<b>GBP</b>		
⚡ Norway		<b>NOK</b>	

DESIGN grid

🌿 This way, TSOs will develop new products and services, based on the possibilities offered by **DESIGN grid**



# Building Blocks of a Regulatory Framework

## Planning and Design

- Need and routing of connections (concessions)
- Coordination of national and regional transmission expansions

## Ownership

- Investing in individual concessions
- Impact monopoly of local TSO (parallel path)

## Cost Allocation





- Distribution of the costs amongst regions: new cost allocation methods
- New tariff schemes (cfr. national regulators)

## Operation

- Network Codes to ensure compatibility local TSO and Newco
- Redesign of Ancillary Services
- Coordination maintenance, scheduling and dispatch of transmission assets

# Operation and Regulation

## Operation and maintenance in the hands of **DESIGN operate**

-  Collecting grid fees
-  Maintenance
-  Scheduling and real time operation (ISO approach, e.g. CORESO)
-  Payment of concession holders

## Interaction with national grids is important

-  Although power transfer managed by **DESIGN operate**, reactive power control can be given to national TSOs

## Fundamental rewrite of grid codes is required to coordinate interactions

# Financing and Regulation

- ✦ Regulatory Framework determines feasibility of North Sea Grid Developments
- ✦ How to match national operational standards, regulatory and legal framework?
- ✦ How to handle inland connections?
- ✦ Is landing in more than one country feasible (technical, regulatory)
- ✦ Further away countries benefit, but how do they contribute



# Summary

- 🌿 There is a need for a North Sea offshore grid
- 🌿 **DESIGN grid** shows how it may be built
- 🌿 Nevertheless, support from the European Union is needed to tackle challenges
  - ⚡ Regulation
  - ⚡ Interoperability
  - ⚡ Financing

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