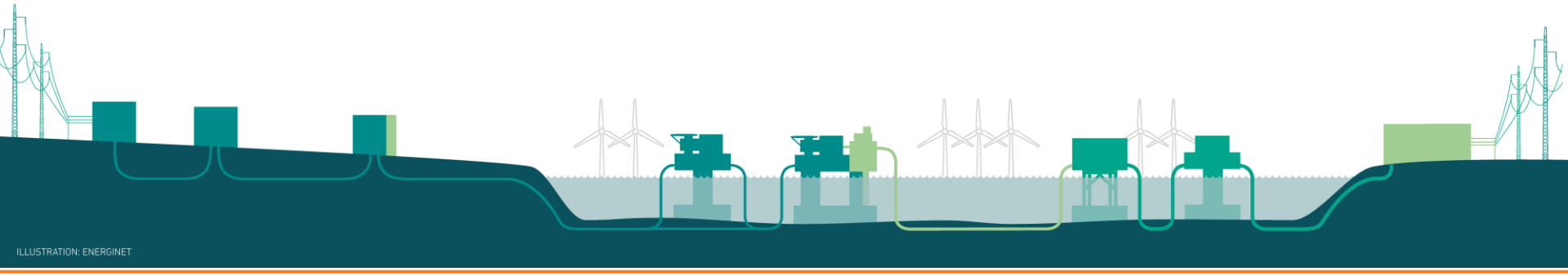
First of the kind: Kriegers Flak CGS

Offshore hybrid projects in the North Seas and the Baltic Sea
NSEC side event, WindEurope Conference, Bilbao 2019

Rebekka Falk, Energinet



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PROGRAM

- Objectives and motivation
- General introduction to the KF CGS inkl. video
- A sneak peak on the technical system
- Challenges and experiences
- Key take away
- Future perspectives

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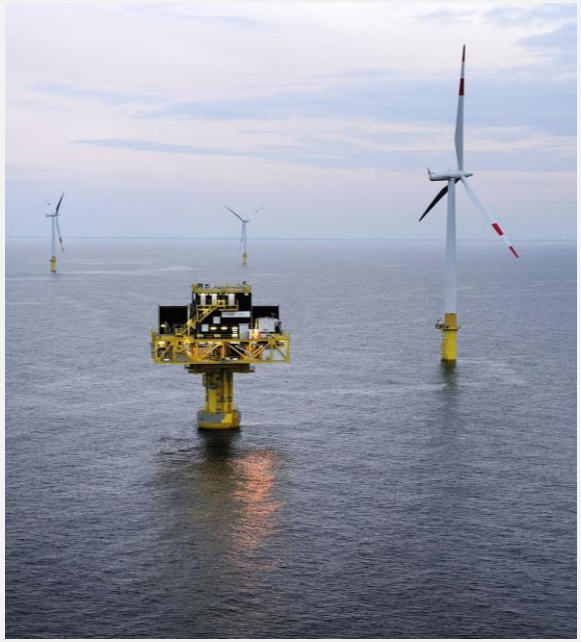
Objectives – EU policy level

The Combined Grid Solution…

- contributes to the **single electricity market**
- fosters the energy transition in Denmark and Germany by strengthening the **integration of renewable energy** in the electricity grid.
- contributes to the objective of the European Council to provide 15 per cent of generating capacities as interconnector capacities.

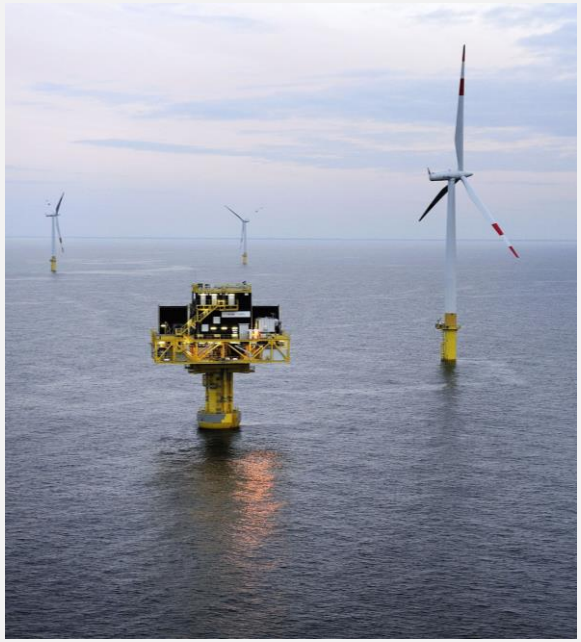


Offshore platform Baltic 1 / © 50Hertz

Objectives – DK/project partners

The Combined Grid Solution…

- Increases the security of supply and stabilises the electricity system
- Increases the utilization of infrastructure
- Explores new technical solutions
- Increases cooperation with neighbouring countries



Offshore platform Baltic 1 / © 50Hertz

Combined Grid Solution - Brief Overview

- KF CGS will link the German Mecklenburg-Western Pomerania and the Danish region of Sjaelland
- Interconnection between the existing German offshore wind farms Baltic 1 & 2 and the new Danish offshore wind farm(s) (OWF) Kriegers Flak (2021)
- Project partners: Energinet.dk and 50Hertz (+ EU)
- In operation Q3 2019

Introduction video

https://youtu.be/wsuQaf-msaE

A SPEAK PEAK ON THE TECHNICAL SYSTEM…

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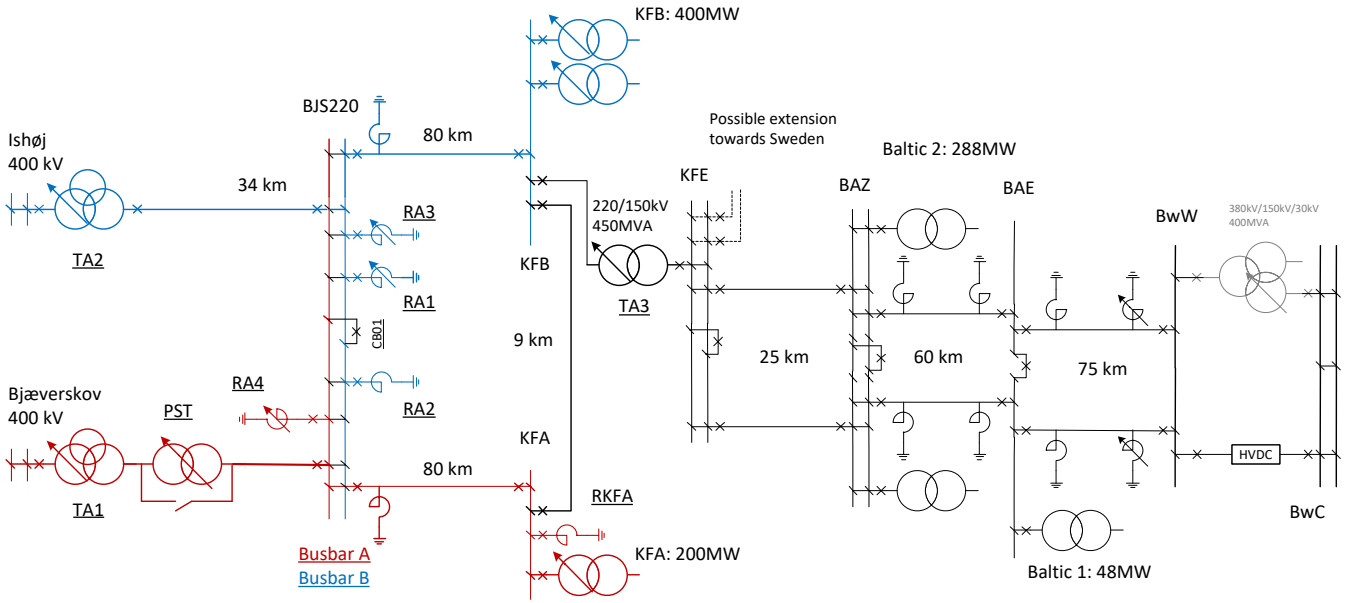
Kriegers Flak CGS – Electrical System Assets



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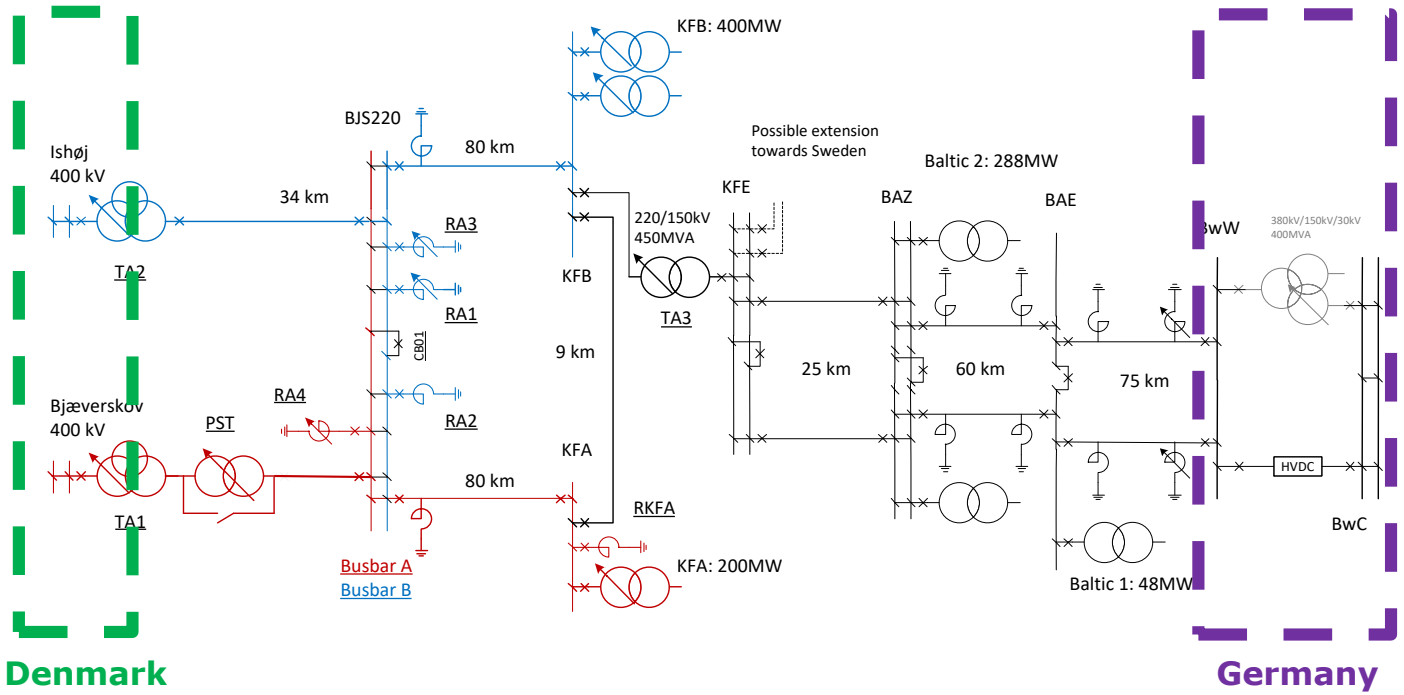
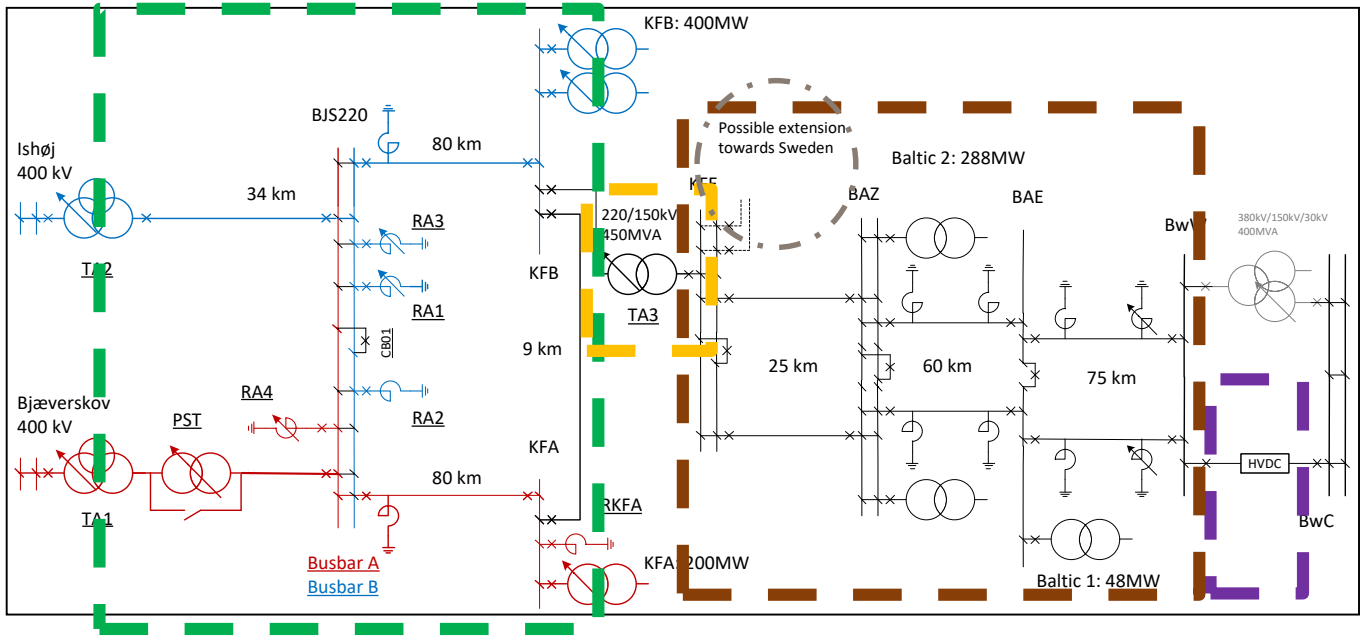
Kriegers Flak CGS – Electrical System Assets



Kriegers Flak CGS – Electrical System Assets



CHALLENGES AND EXPIRIENCES

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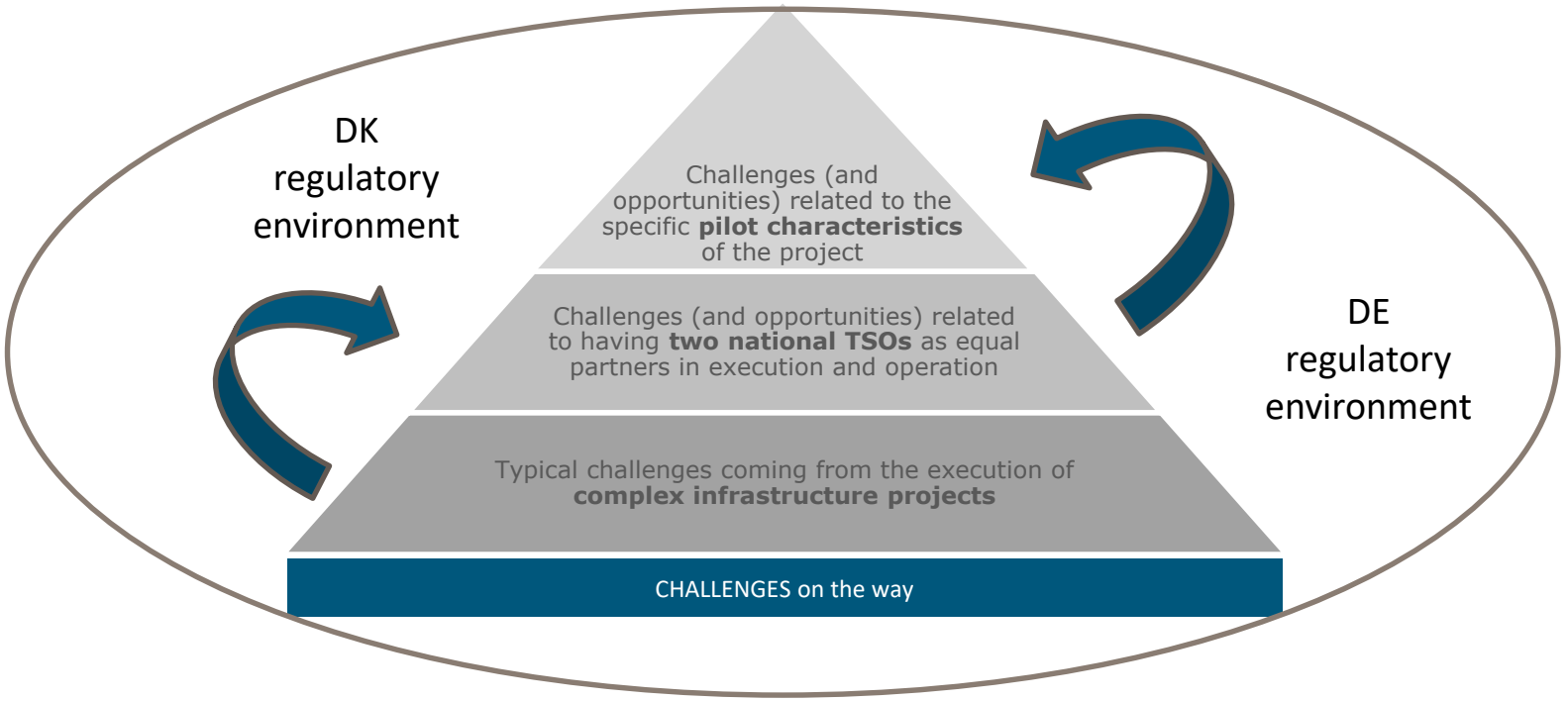
3.1 Challenges (and Opportunities)



Challenge dimension 1 = Context…

Two regulatory environments for permitting and approvals:

- National differences adds increased complexity and time management risks
- Coordination of approval timelines needed

Law / regulation

- EU Regulation 347/2013 for Projects of Common Interest
- Federal Immission Control Act (BImSchG)
- Regulations on Noise Control
- Offshore Installations Act (for installations within the exclusive economic zone)
- Nature and Landscape Conservation Act (BNatSchG)
- Environmental Impact Assessment (UVP)

Authorities / Institutions

High-level approval authorities

- German Maritime and Hydrographic Agency
- Waterways and Shipping Directorate

Other involved public institutions

- Immission Protection Authority (district administration)
- Building Authority
- Environment Protection Authority (district administration)
- Water Authorities (district administration)
- State Agency for Health and Social Affairs
- State Agency for the Environment, Nature Conservation and Geology
- Department for Regional Development
- Municipality of Broderstorf
- Municipality of Bentwisch
- District Rostocker Heide

Law / regulation

- EU Regulation 347/2013 for Projects of Common Interest
- Law of Energinet.dk, § 4
- Law of Energinet.dk, § 4a survey permits
- Law of Energinet.dk, §4a construction permit

Authorities/Institutions

High-level approval authorites

- Danish Energy Agency

Other involved public institutions

- Danish Maritime Authority
- Danish Geodata Agency

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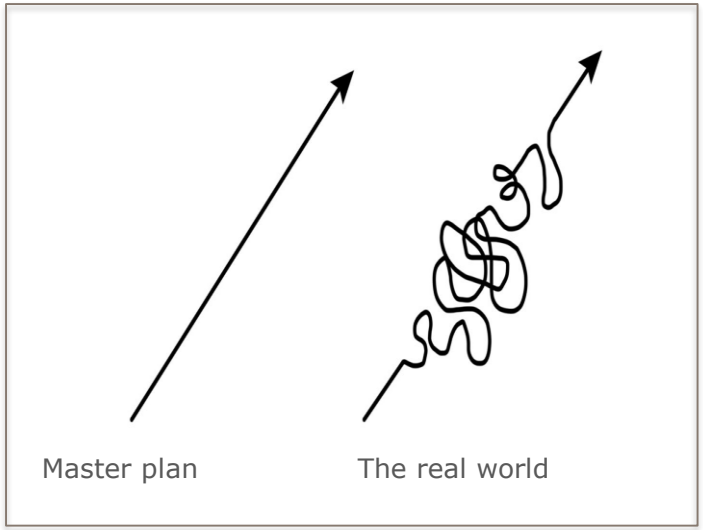
Challenge dimension 2: „Just" typical challenges coming from the execution of complex infrastructure projects

Nothing new - no words needed…



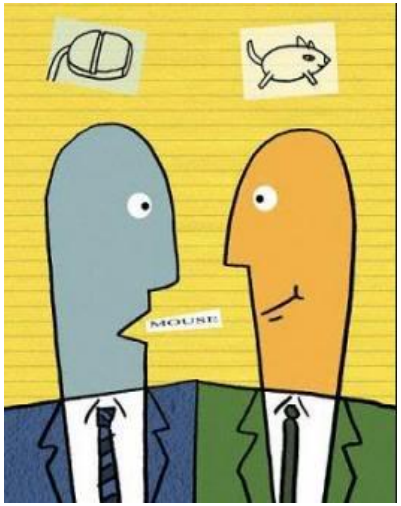
Challenge dimension 3: Issues related to having two national TSOs as equal partners

Cultural clash

- TSOs are different in set up and culture (and so are people…)

Need for new ways due to ownership of assets

- 50% ownership for each TSO
- Contract setup for main contracts as 3-side contracts with both TSOs as employers
- Different insurance approaches of the TSOs had to be aligned.
- System operation and maintenance strategies need to be harmonized.



Mirrored project team – each key function in the project has its counterpart

- High amount of communication traffic
- Energinet in lead for Offshore / 50Hertz in lead for Back-to-Back

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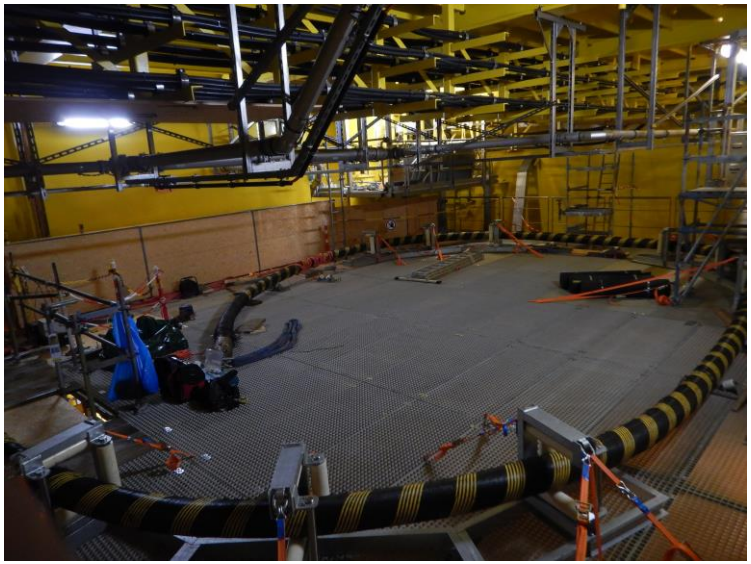
Challenge dimension 4: Specific pilot characteristic – part1

→ Integration into existing and new OWP infeed infrastructure and onshore substations

Offshore platform Baltic 2 / © 50Hertz



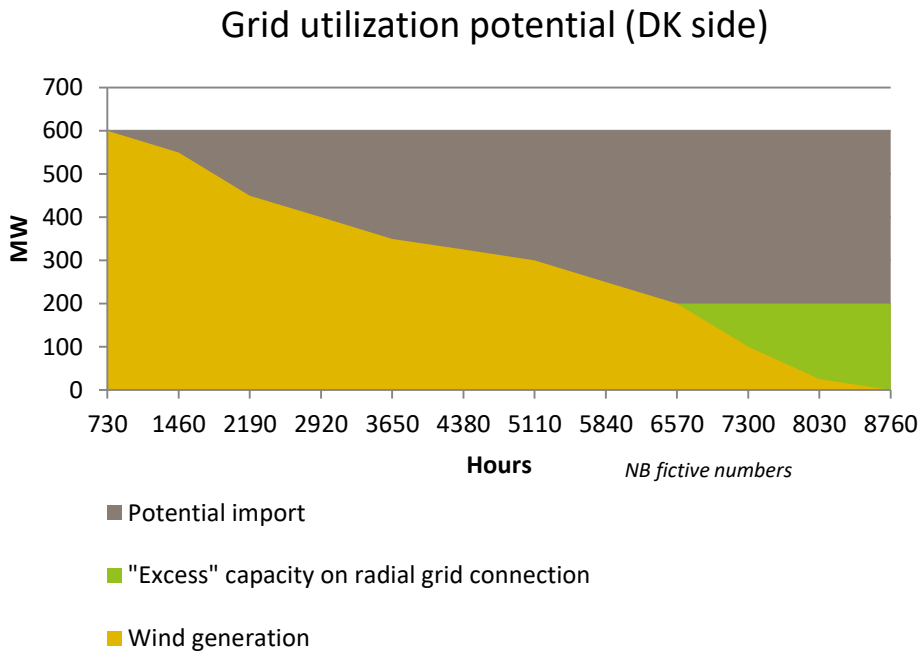
Sea cable pull in at Ba2 plattform

Challenge dimension 4: Specific pilot characteristic – part2

→ Market arrangements and system operation

Driven by heritage and context…
- Existing DE OWFs
- DK OWF close to tender

Pragmatic solution:
- Full access (priority) to OWFs
- Excess capacity to the market (interconnector)



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Energy transport

1. Business As Usual.
2. Offshore wind to Land

(High wind scenarios)

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Energy transport

1. Interconnector.
2. Offshore wind to Land

(High wind scenarios)

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Energy transport

1. Interconnector.
2. Offshore wind to Land

(High wind scenarios)

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Energy transport

1. Land to Offshore.
2. Then Offshore to Land

(Low/No wind scenarios)

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Energy transport

1. Land to Offshore.
2. Then Offshore to Land

(Low/No wind scenarios)

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Lessons Learnt

KF CGS → Successful according to the objectives, but has also showcased issues for consideration in future hybrid projects:

1. Cooperation and mutual cultural understanding is key – and takes time..

2. ”First of its kind” requires
   - Regulatory coordination
   - Regulatory innovation
   - Political support and commitment

3. Starting point matters: ”add on” versus initial design impact:
   - Technical concept design
   - Market rules
     - From ”first and special case” to more mainstream concept within the EU-regulatory framework?

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Thank you for the attention!

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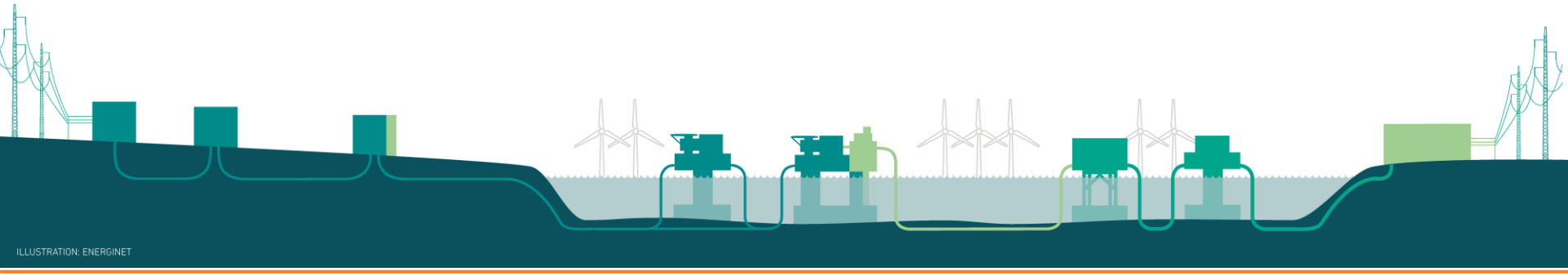

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Future perspectives

- One way of travel..
- Rules of the game are changing
- Need for new tools inside and outside the electricity system