

North Seas Offshore Energy Clusters Study

Intermediate findings

**European
Commission**



Hamburg, 27 September 2018

Together with commercial and public stakeholders, we aim to trigger early-stage hybrid offshore development in the North Seas region

Context and objectives

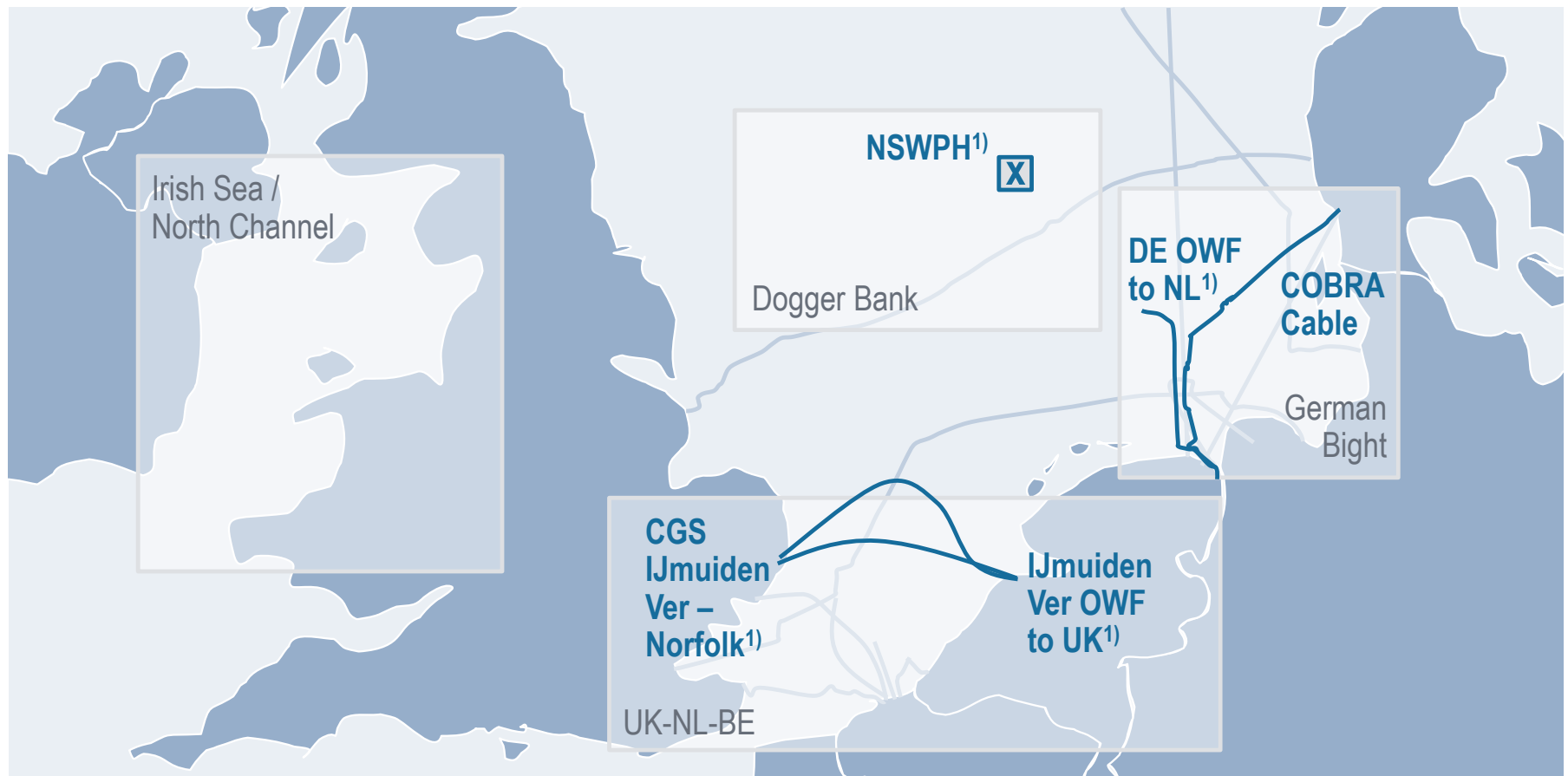
Objectives



- The hybrid project concept is currently gaining momentum – Stakeholders show genuine interest and start own project initiatives
- The objective of the North Seas Offshore Energy Clusters study is twofold:
 1. Demonstrate the benefits of the hybrid approach, by comparing costs / benefits of hybrid projects to conventional reference cases
 2. Develop measures to overcome barriers to hybrid project development and agree on concrete actions with stakeholders
- The study analyses hybrid project ideas with 'real' assets in early stage planning – Focus on projects with a chance of implementation
- Hybrid projects can pave the way towards a more coordinated and more efficient offshore development – Prerequisite for exploiting the offshore wind potential in the North Seas region

In a two-step approach we identified five hybrid project ideas with significant benefits

Selected hybrid project ideas



1) Location / routing indicative

Based on the hybrid project assessments underlying the selection process we derived five key learnings

Key learnings

1

Hybrid projects show **significant lifetime benefits**

2

Assessments reveal **no general principle**

3

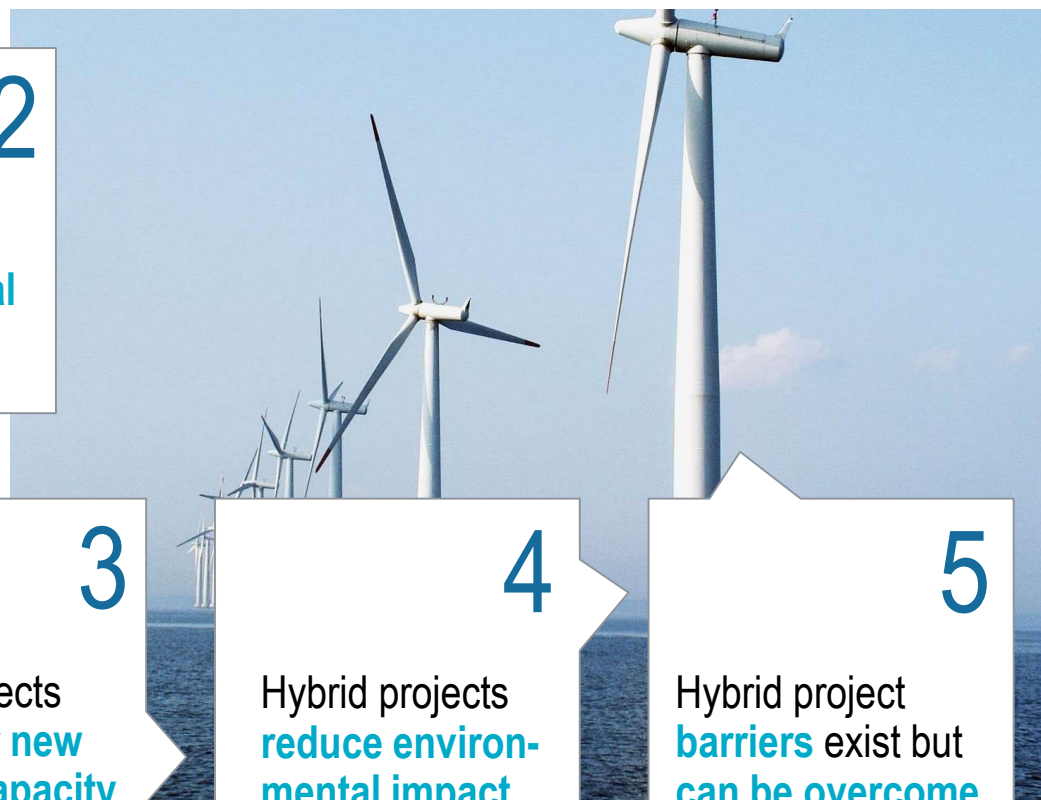
Hybrid projects may trigger **new IC / RES capacity**

4

Hybrid projects **reduce environmental impact**

5

Hybrid project **barriers** exist but **can be overcome**

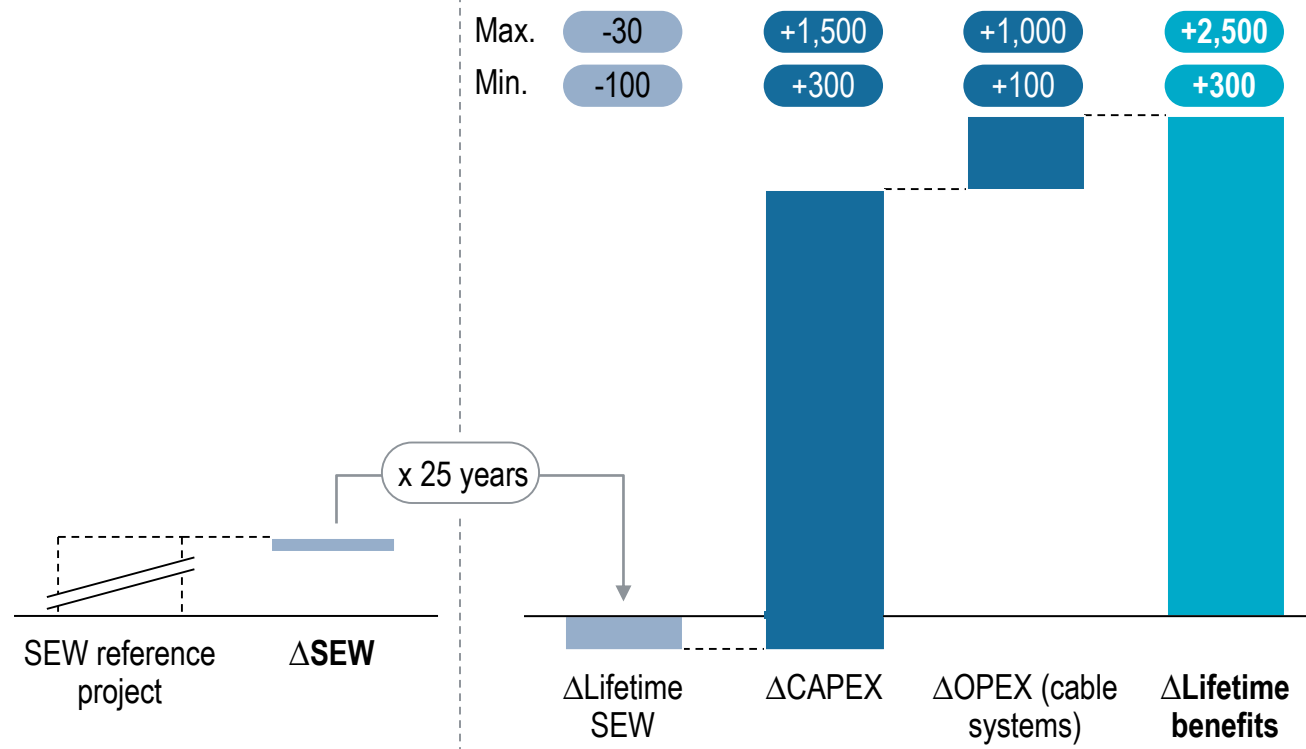


Hybrid case CAPEX and OPEX savings yield significant lifetime benefits

Learning 1: Significant lifetime benefits¹⁾

ΔSocio-economic welfare (SEW) (hybrid – ref. case)
[EUR m p.a.]

ΔLifetime benefit (hybrid – reference case) [EUR m]



1

Hybrid projects show **significant lifetime benefits**

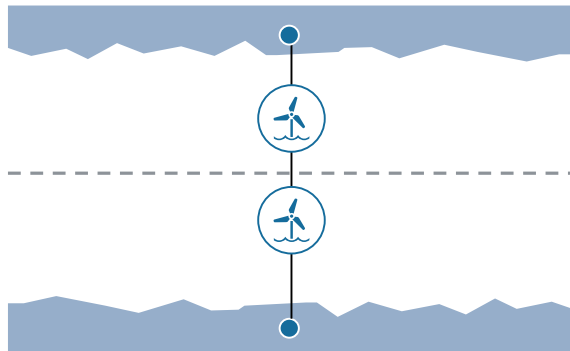
- > Hybrid project lifetime benefits can add up to 5-10% of project cost
- > Hybrid CAPEX / OPEX savings range from EUR 300 m to more than EUR 2 bn
- > Hybrid SEW positive but smaller than reference case SEW

1) 8% discount factor

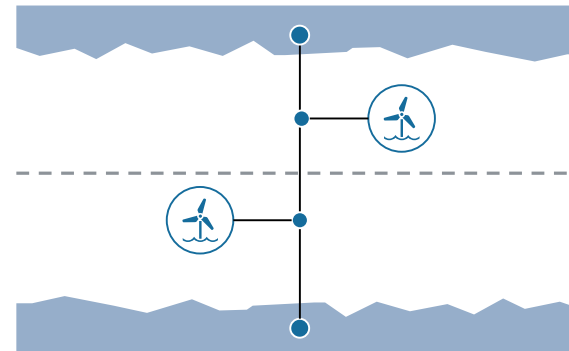
Hybrid projects need to be assessed case-by-case – Six out of ten hybrid projects show positive results

Learning 2: No general principle

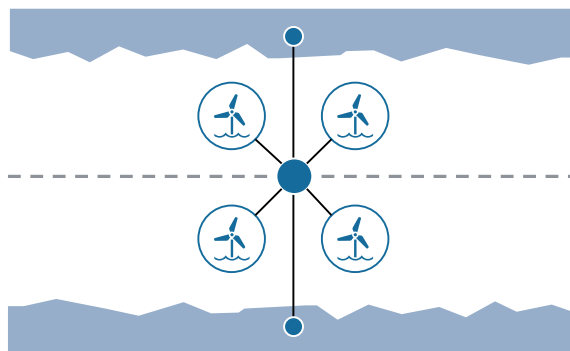
CGS IJmuiden Ver – Norfolk



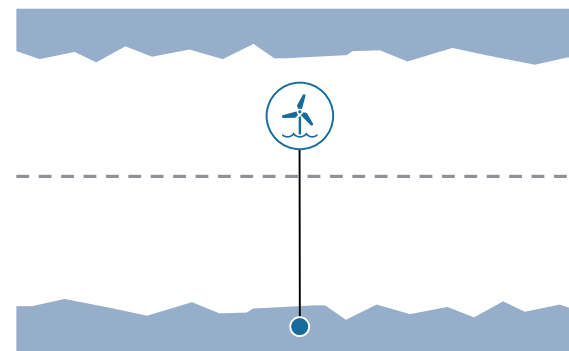
IJmuiden Ver OWF to UK, COBRA Cable, "Project Irish Sea"



North Sea Wind Power Hub



DE OWF connected to NL



 Offshore wind farm
  Converter station
 - - EEZ border
 — Offshore cable

Source: Roland Berger

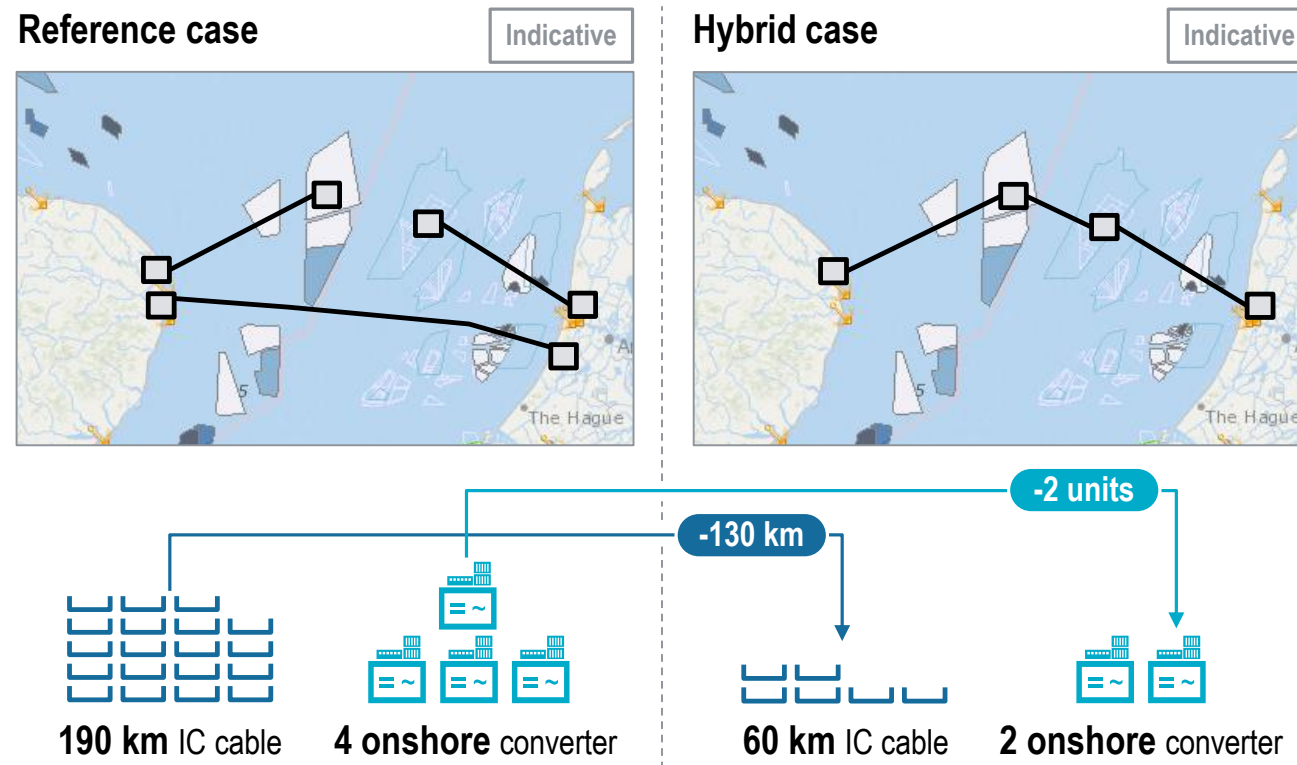
2

Assessments
reveal **no general
principle**

- > Six out of ten projects show positive results
- > Project benefits are dependent on specific project setup
- > Results are independent of type of hybrid project (CGS, tie-in, etc.)

Lower CAPEX and OPEX improve interconnector business case and increase probability of realisation

Learning 3: New IC / RES capacity



➤ Cost savings improve business case and probability of realisation

□ Converter station — Transmission cable

Source: 4COffshore; Roland Berger

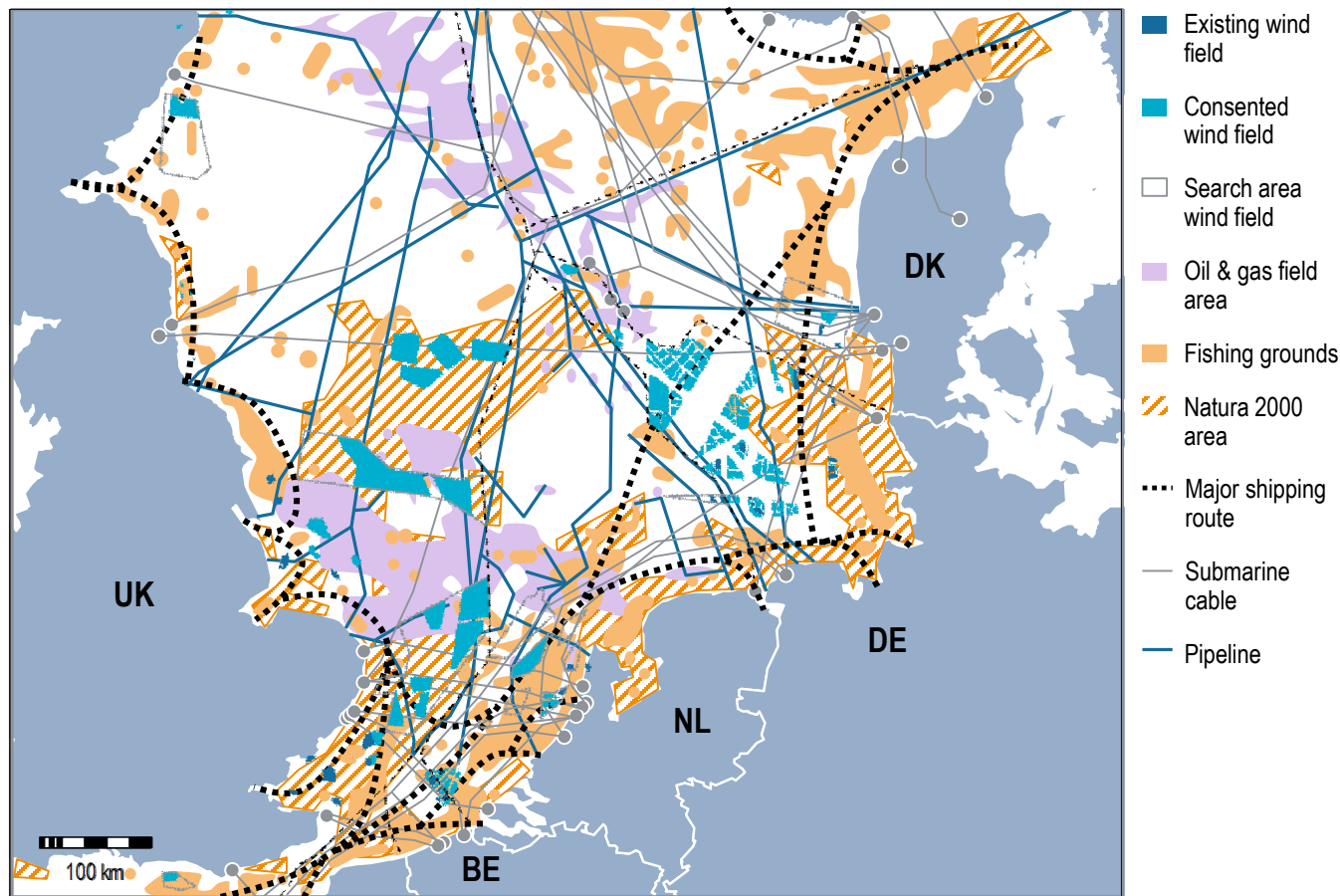
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Hybrid projects may trigger **new IC / RES capacity**

- > Add. interconnection capacity can be developed at marginal cost (vs. a new interconnector)
- > Hybrid projects may support the development of previously untapped offshore wind sites

Preservation and other use of North Seas call for coordinated hybrid offshore development to significantly increase offshore generation

Learning 4: Reduced environmental impact



4

Hybrid projects
reduce environmental impact

- > Reduced space requirements for offshore infrastructure and cable systems
- > Efficient use of available resources in heavily used North Seas region (shipping, oil & gas, fishing, etc.)

Legal and regulatory barriers need to be overcome to trigger hybrid project development – No general "showstoppers"

Learning 5: Barriers can be overcome

2018

2019



North Seas Offshore Energy Clusters study

- > Identify project-specific barriers with stakeholders
 - Legal clarifications
 - Planning procedure
 - Energy market rules
 - Business case, financing
 - Political support
- > Develop project-specific mitigation measures with stakeholders
- > Define and agree specific actions for implementation with stakeholders

Implementation of action plans

- > Implement agreed actions on national and EU level
- > Short-term: project-specific approach, bilateral agreements
- > Long-term outlook: Joint framework for hybrid projects based on lessons learned
- > R&D and feasibility studies by commercial stakeholders

Commercial development

- > Initiate commercial development of hybrid projects
- > Based on reduced risk provided through barrier mitigations

5

Hybrid project **barriers** exist but **can be overcome**

- > No general "showstoppers"
- > Short-term, project specific approach for barrier mitigation (cf. CGS Kriegers Flak)
- > Lessons learned help to build a framework for hybrid projects in the long-term

Roland
Berger
THINK:ACT

