



**Baltic
InteGrid**
Integrated Baltic Offshore
Wind Electricity Grid Development

Offshore meshed grid in the Baltic Sea Insights from Germany

Hamburg, 26 September 2018



EUROPEAN
REGIONAL
DEVELOPMENT
FUND

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RES targets | OW targets in the energy transition



- **Change in policy...**
 - ➔ Clean energy package
- **... and in regulation**
 - Extensive reform of EU energy law (Electricity Market Directive/Regulation, EED, EnEffD...)
- **2030 RES target:** new EED sets a Union-wide binding target of at least **32%**
- **OW target:** (-)



- **Change in governance...**
 - ➔ Koalitionsvertrag
- **... and in regulation**
 - Legislative reforms on their way (EEG, WindSeeG)
- **2030 RES target:** target of **65%** intended in the Koalitionsvertrag
- **OW target:** installed OW capacity of **15 GW** until 2030, starting 2021
 - ➔ Forecasted **3.3 GW** in the Baltic Sea

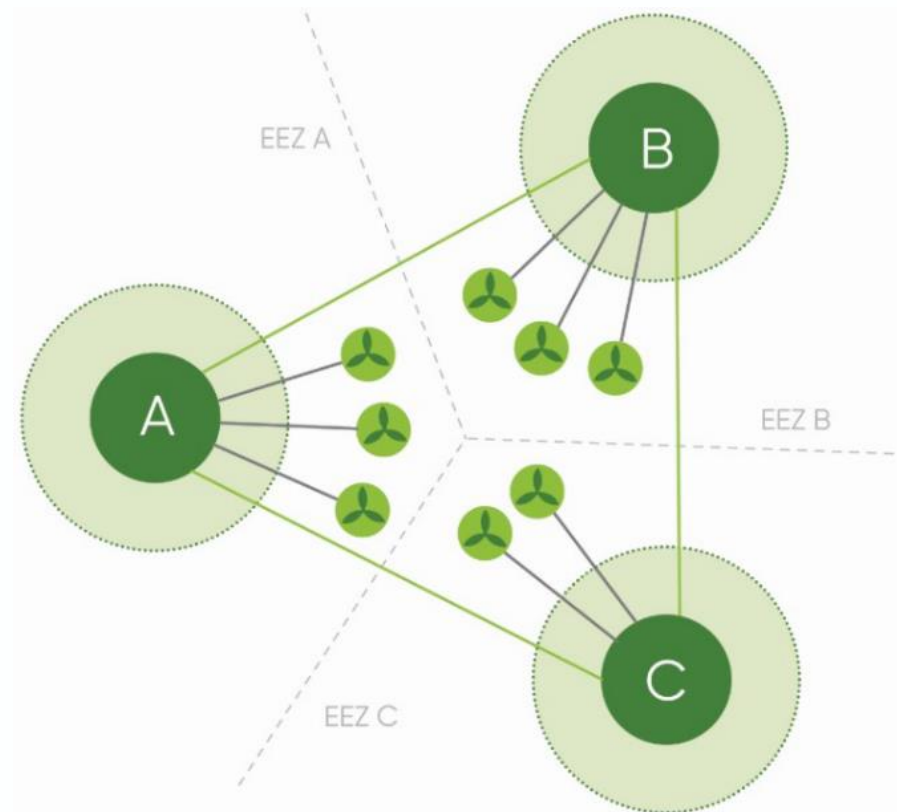
The way to a meshed grid: hybrid projects

What is a hybrid project?

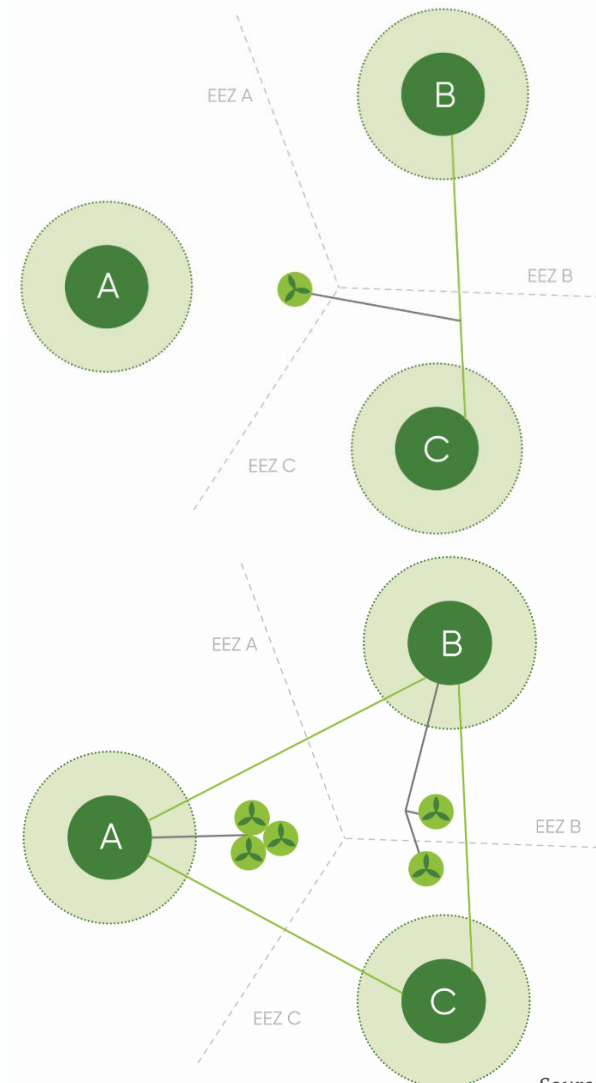
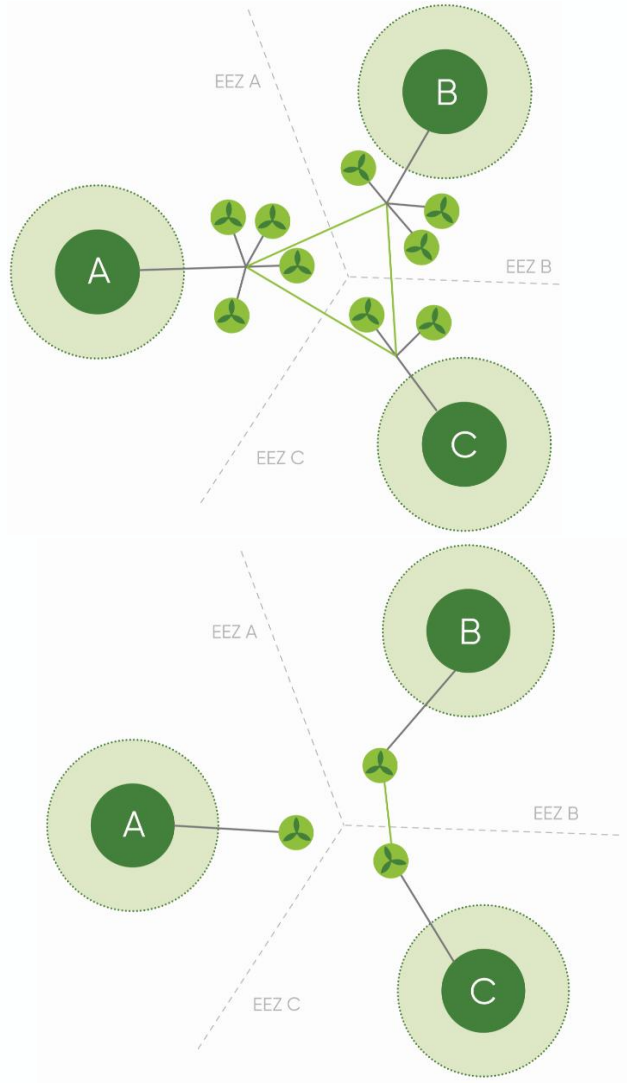
- Negative definition: all which is not strictly radial
- “single-purpose” vs. “dual-purpose” cables

Why hybrid projects?

- Increase efficiency: space, construction works, costs...
 - Some IC are only used to 25% of their capacity
- Increase security of supply and end energy isolation



Source: NSCOGI, IKEM



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Hybrid projects

Kriegers Klag Combined Grid Solution

- AC connection between KF and Baltic 2
- Installed June 2018 | in operation early 2019
- PCI status
- Connecting Germany (50Hertz) Denmark (Energinet.dk)
- Different frequencies between countries: back-to-back converter in Germany
- Different voltages of German and Danish OWFs: transformer on Danish offshore platform



KRIEGERS FLAK – COMBINED GRID SOLUTION

- CGS project (interconnector)
- 400 kV substation (AC)
- 150 kV substation (AC)
- Converter station (AC/DC)
- 220 kV substation (AC)
- 220 kV cable
- 150 kV cable

Source: Energinet.dk

Hybrid projects

COBRAcable OWF connection

- 700 MW HVDC interconnector
- In operation from 2019
- PCI status
- Connecting Denmark (Energinet.dk) and the Netherlands (TenneT)
- Cable will enable the connection of an OWF
 - Also from Germany?



Source: Stiftung Offshore Wind

Regulatory barriers to hybrid projects

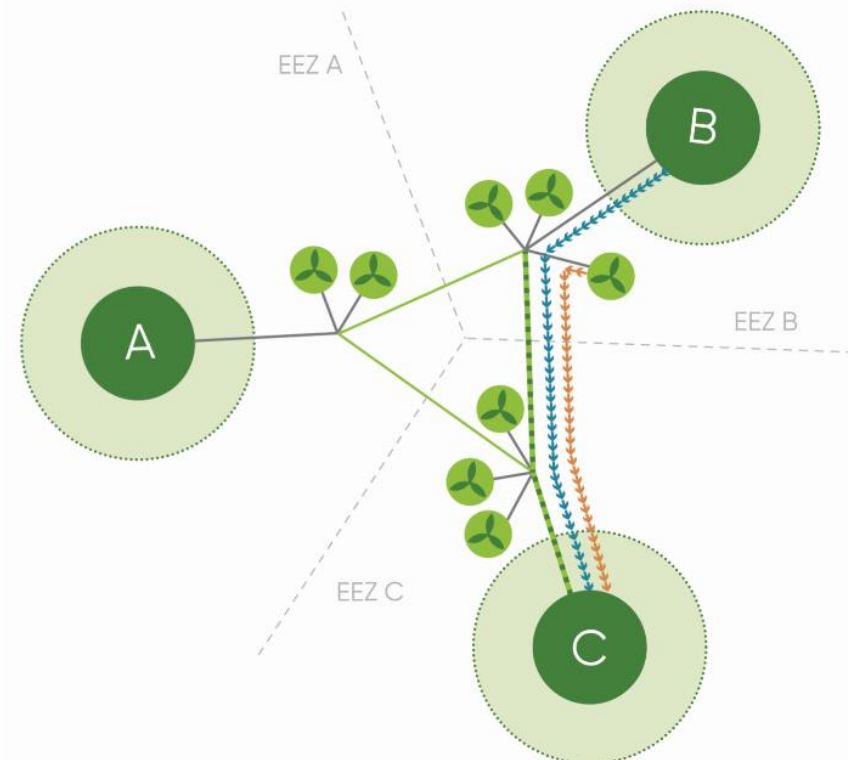
Legal barriers

- Dual-purpose cables non-existent in the (EU) legal framework
 - Importance of legal definitions!
- Priority dispatch
 - EU → Clean energy package
 - National → BSR: only in Germany, Denmark, Poland and Lithuania
- Complex (contract) design of multi-lateral / dual-purpose grid investment
- Public acceptance issues may lead to failure of projects (VwGO|UmwRG)

Regulatory barriers to hybrid projects

Legal barriers: concrete examples

- Who may operate a dual-purpose cable?
 - Interconnector → TSO
 - Park-to-shore → TSO (Germany) or plant operator
- Capacity conflicts (IC/OWF) and compensation
 - TSO-plant operator | TSO-TSO
- In Germany: permitting for OWF only possible if tender is won and OWF connected to the national grid



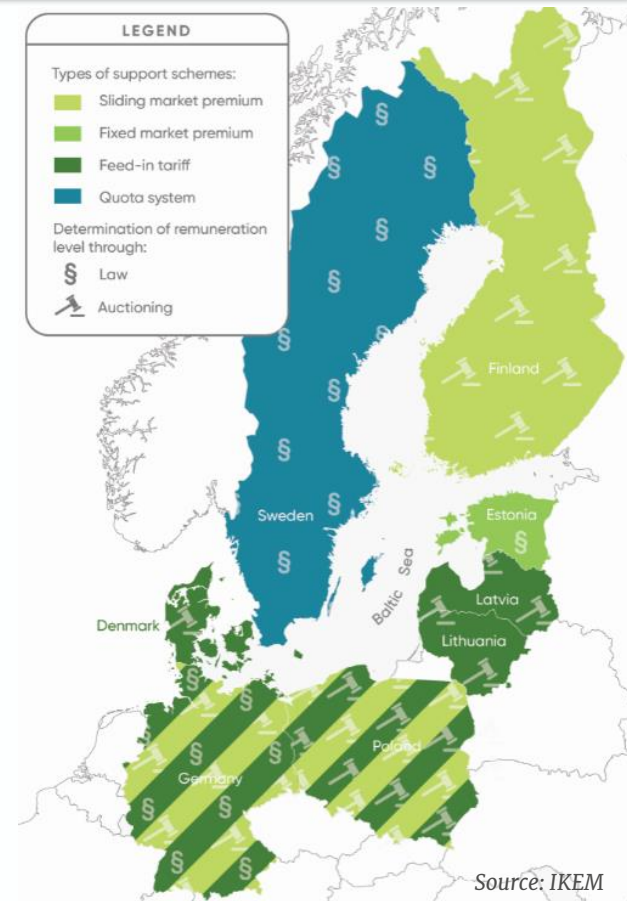
Source: IKEM

Regulatory barriers to hybrid projects

Economical barriers

- Lack of coherent RES support
 - EU-wide
 - National: ever-changing legislation and remuneration levels

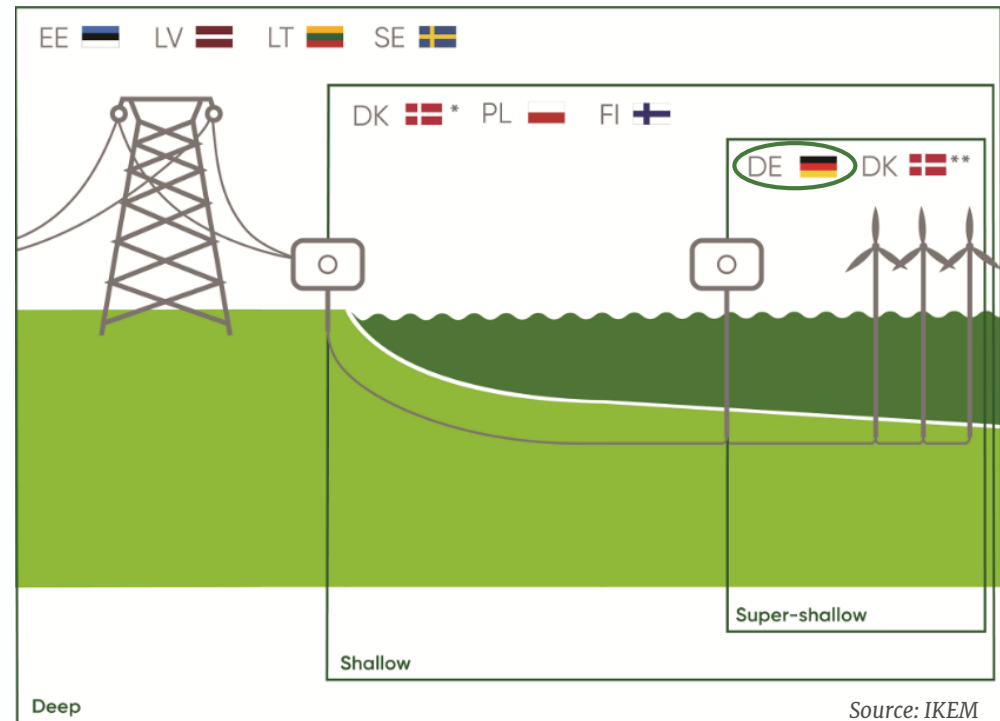
- National support schemes (mostly) reserved to national production
 - Germany: Sec. 5 EEG opens 5% of tendered capacity to plants EU-wide



Regulatory barriers to hybrid projects

Economical barriers

- Different cost allocation models for connection
- No consistent regulatory framework for TSO's cost recovery
- Lack of regulatory framework for multi-lateral / dual-purpose grid investment
 - Cost-benefits for stakeholders not clear



Solutions?

Regulatory solutions for legal and economical barriers

- Clear legal definition and operation regime for dual-purpose cables
- Regulatory rules for an OMG / supra-national regulatory authority / ROC?
- Cost allocation harmonisation (super-shallow approach) – *together with:*
- Consistent regulatory framework for TSO cost recovery building on the specificities of OMG / specific incentive mechanisms
- Harmonisation of grid tariff access
- EU-wide non-discriminatory and stable RES remuneration
- Priority dispatch for RES?
- Schemes and measures for social acceptance

Optimising the regulatory framework

Wishes for regulatory improvement?

- Multi-level regulatory framework...
 - EU
 - National
 - Regional / local
- ... due to complex share of competences
 - EU - national: subsidiarity principle
 - Federal level - *Länder*: GG
- Any take-home messages?

Thank you for your attention!
