

# Environmental aspect: Challenges and view from EnBW

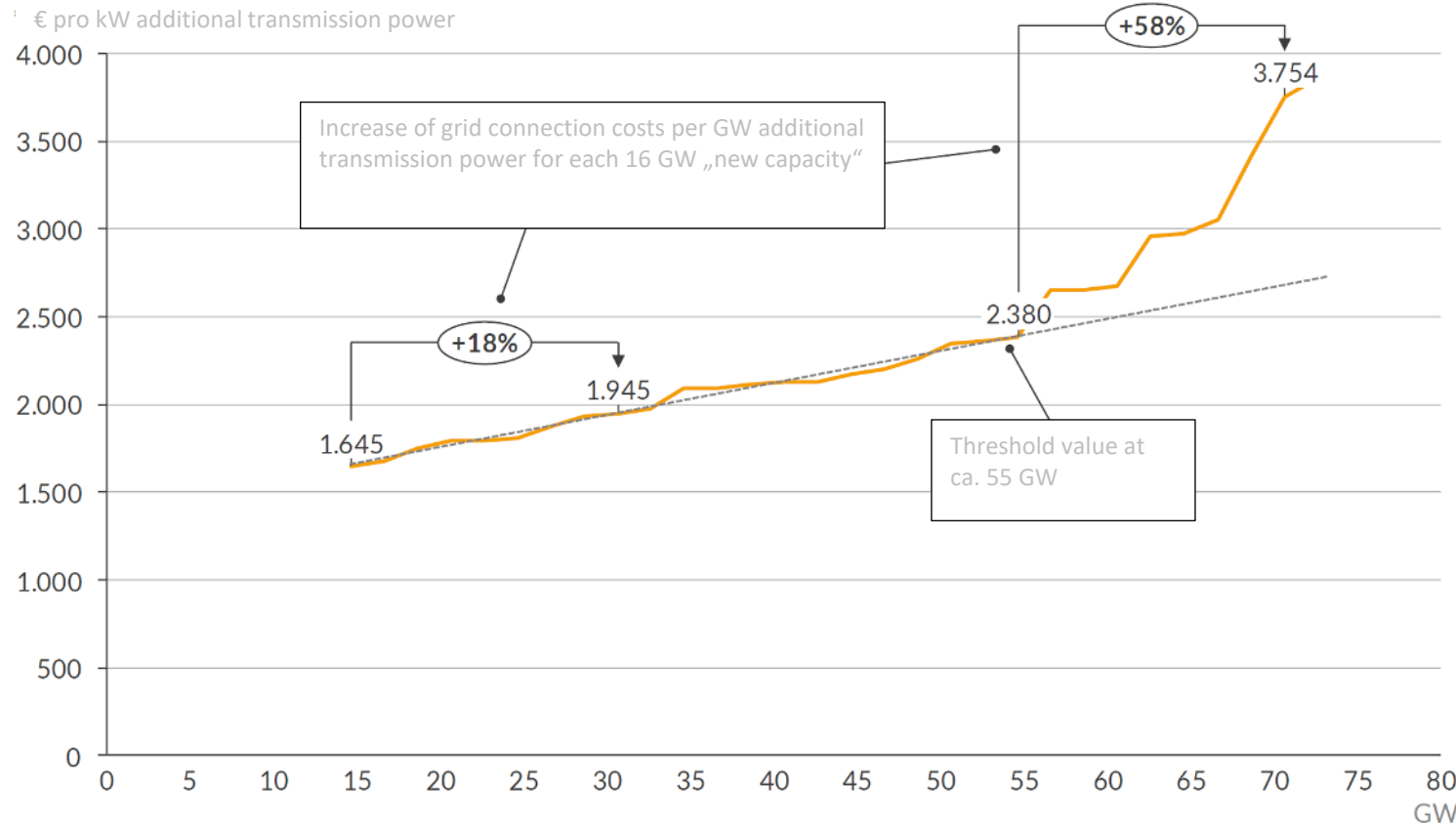
6<sup>th</sup> October: R&D Webinar: Offshore green hydrogen production: planning, systems qualification, and environmental issues

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# Potential Offshore Electrolysis

## Example Germany

Specific grid connection costs – Wind offshore German North Sea



Systemkostenreduzierter Pfad zur Klimaneutralität im Stromsektor 2040, Aurora Energy Research, 2025

### High system costs for the last 15 GW

Long distances results in higher costs for grid connections. The Auqua Ventus study shows advantages in hybrid connections

- Potential of cost savings due to bundling of wind farms using one pipeline (technically up to 20 GW possible)
- High usage of the remaining cable capacity
- Operational flexibility to serve grid utilization in case cable connections exists besides H2 pipeline

Offshore Electrolyse can be used to decrease energy system costs

# Current legal situation

## Undefined rules in Germany and Europe

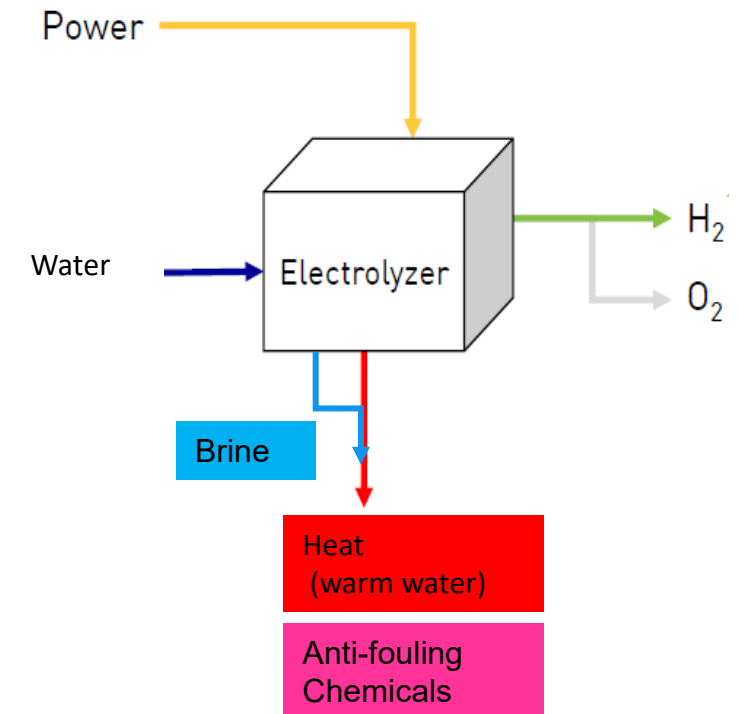
### Germany:

- Formerly the production of hydrogen was mentioned in Wind-auf-See-Gesetz by „sonstige Energiegewinnungsbereiche“ but without any grid connection opportunities -> this is addressed in a current draft
- Using an open cooling cycle resulting in discharge of agents (Anti-foulings) is not allowed. Limits of heat and brine needs to be defined.

### Other European markets:

- Also, other European markets haven't established frameworks
- First drafts show dependencies to former oil & gas regulations

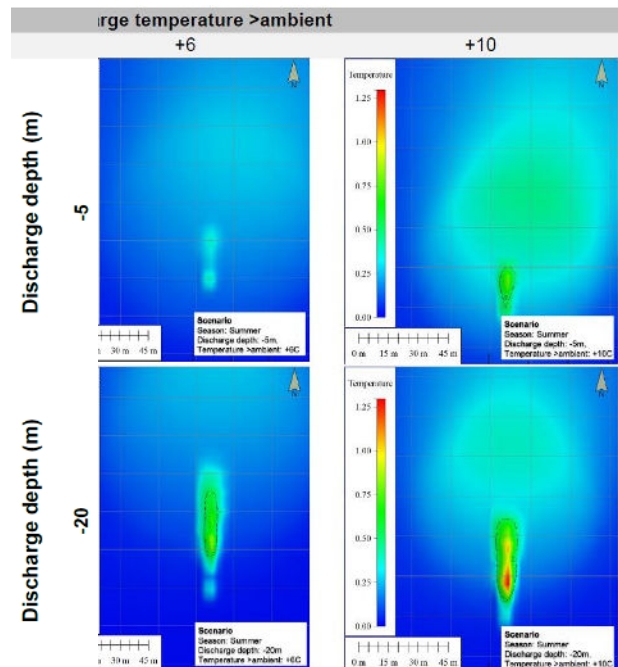
Offshore Electrolysis needs clear set of rules to establish a technical design which lays in between the best economical configuration and least environmental impact.



# Environmental studies show: Heat and salt impact can be managed.

## 1. DNV – H2 Environmental Concept for SEN-1 Project\*

- Legal Framework
- Scoping report for centralized and decentralized concept
- Water management concept incl. heat dispersion simulation

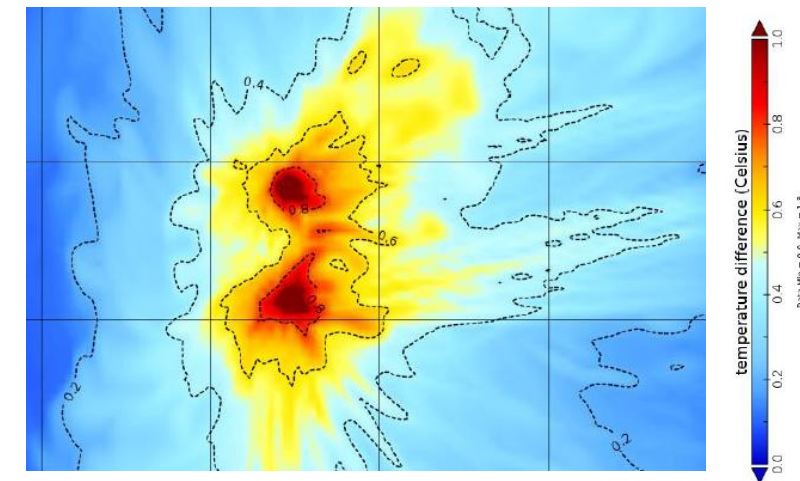


\*DNV Report no: 2024-4036, Rev. 00

- **Δ Temp:** Rapid Dispersion shortly after outlet
- **Brine:** No environmental impact in case mixed with outlet stream
- **Chemicals:** Impact to be investigated further

## 2. Hydepont – Discharge Dispersion Study\*<sup>1</sup>

- Near-and far field simulation
- Centralized platform concept



\*<sup>1</sup>Hydepont: Doc. ID: HYDE\_R\_241107\_00 Rev.02

## 3. Gasunie (EnBW was not involved)

- Thermal, Chemical and Salinity Dispersion Modelling of Sea Cooling Water in the Near Field and Far Field
- **Bromoform CHBr<sub>3</sub>** concentration modelling included

## Conclusion:

Legal framework to be established setting clear rules

Environmental impact to be further investigated

Technical concepts managing Temp and salinity are available

Currently the most urgent question is: How can green H2 been made attractive for offtakers?

# Thanks for listening - Questions?

