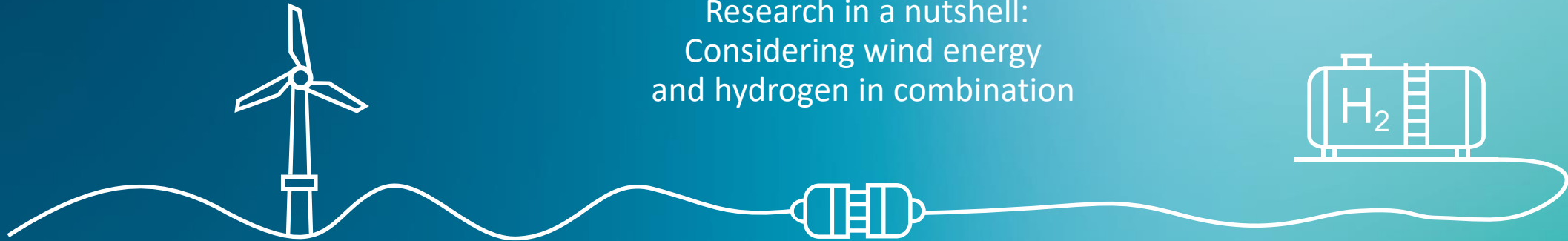


Research in a nutshell:  
Considering wind energy  
and hydrogen in combination



- 28<sup>th</sup> February 2024 / Hydrogen Cross Border Conference, Aurich



- Technology & Innovation – Why do we need a Hydrogen Lab Testing Infrastructure to support a business case?

Kevin Vincent Schalk, Group Manager Hydrogen Lab Bremerhaven

# Fraunhofer IWES

- 300 staff
- 90 publicly funded research projects
- € 38 m operating budget / year 2021
- € 100+ m investment in test infrastructure

Bremerhaven  
Main location

Emden/Leer

Oldenburg

Hamburg

Bremen

Hanover

Bochum

Leuna

Görlitz

Fraunhofer  
Funding Model

Public sector revenue

Industrial revenue

Basic public funding

€

© Jens Meier



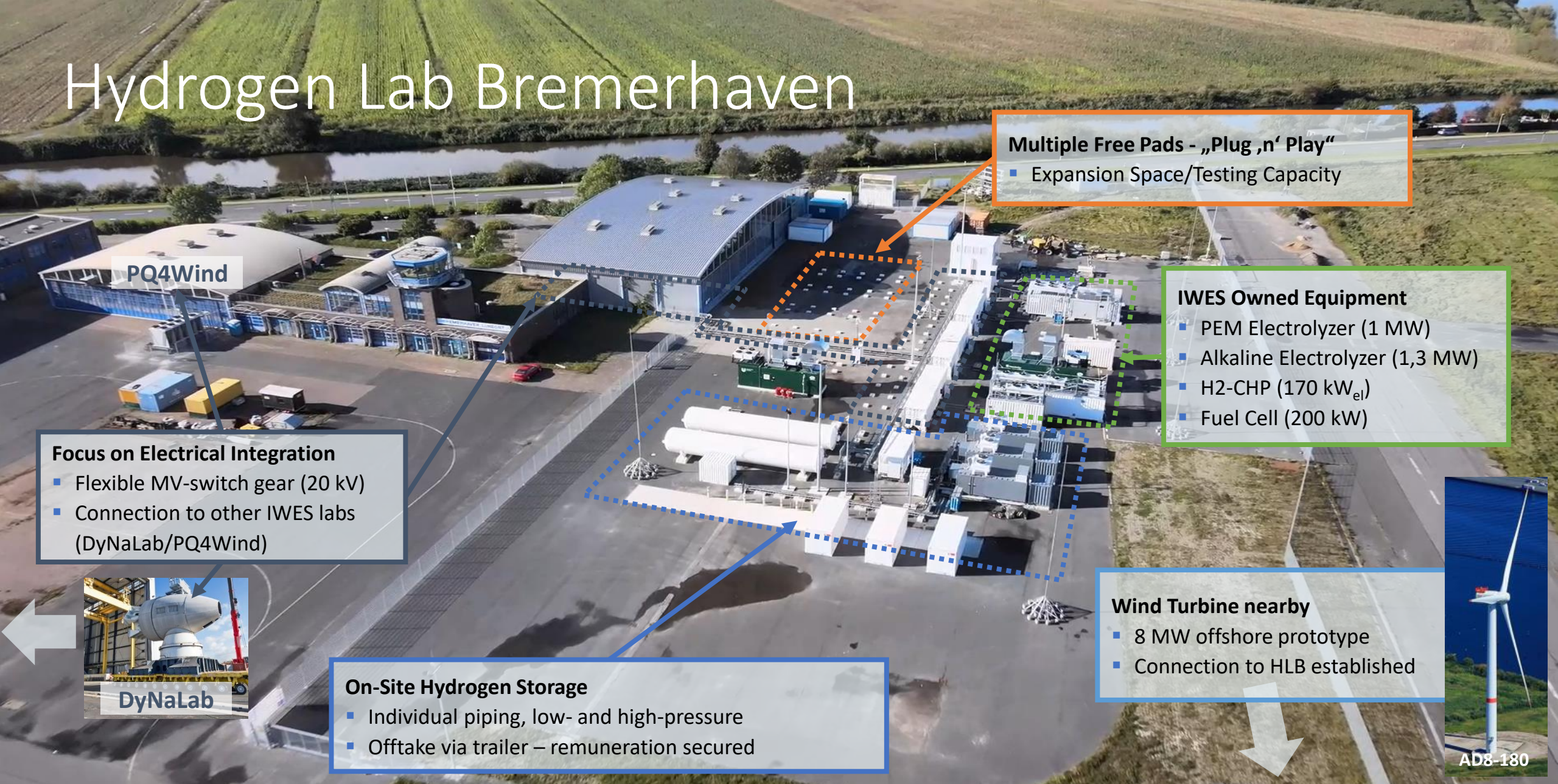
# Testing in the renewable industry

• Rotor blade type certification testing





# Hydrogen Lab Bremerhaven



## Multiple Free Pads - „Plug ,n’ Play“

- Expansion Space/Testing Capacity

## IWES Owned Equipment

- PEM Electrolyzer (1 MW)
- Alkaline Electrolyzer (1,3 MW)
- H<sub>2</sub>-CHP (170 kW<sub>el</sub>)
- Fuel Cell (200 kW)

## Focus on Electrical Integration

- Flexible MV-switch gear (20 kV)
- Connection to other IWES labs (DyNaLab/PQ4Wind)



DyNaLab

## On-Site Hydrogen Storage

- Individual piping, low- and high-pressure
- Offtake via trailer – remuneration secured

## Wind Turbine nearby

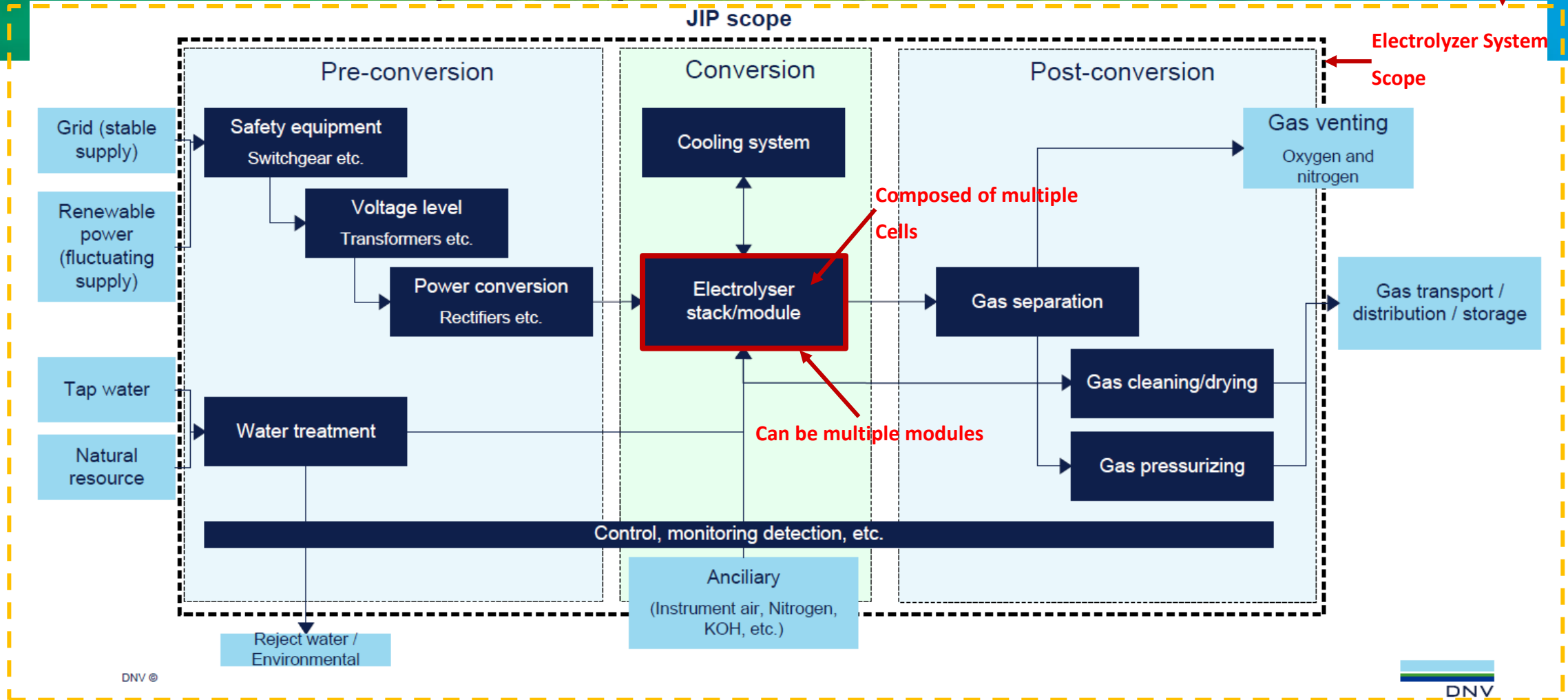
- 8 MW offshore prototype
- Connection to HLB established

AD8-180



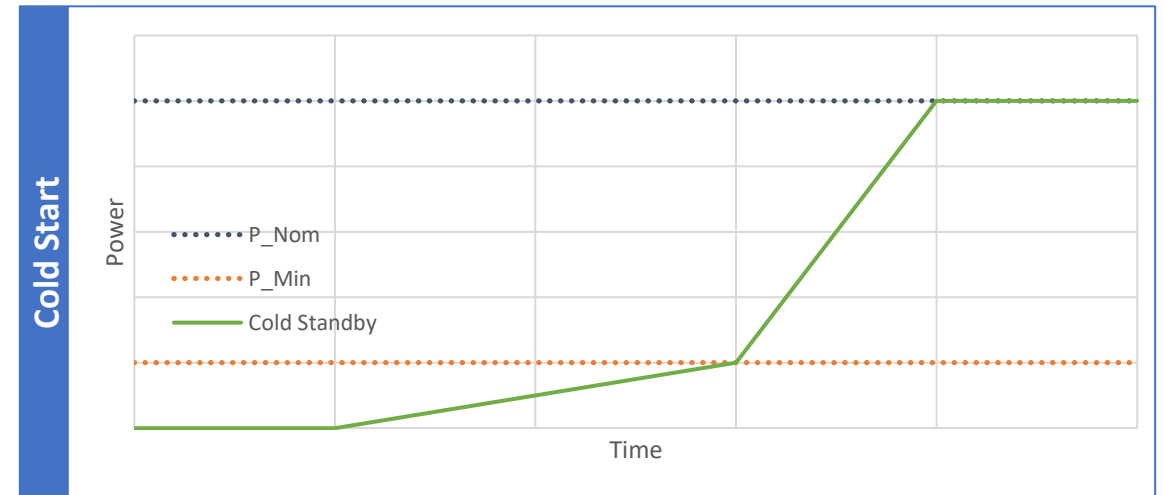
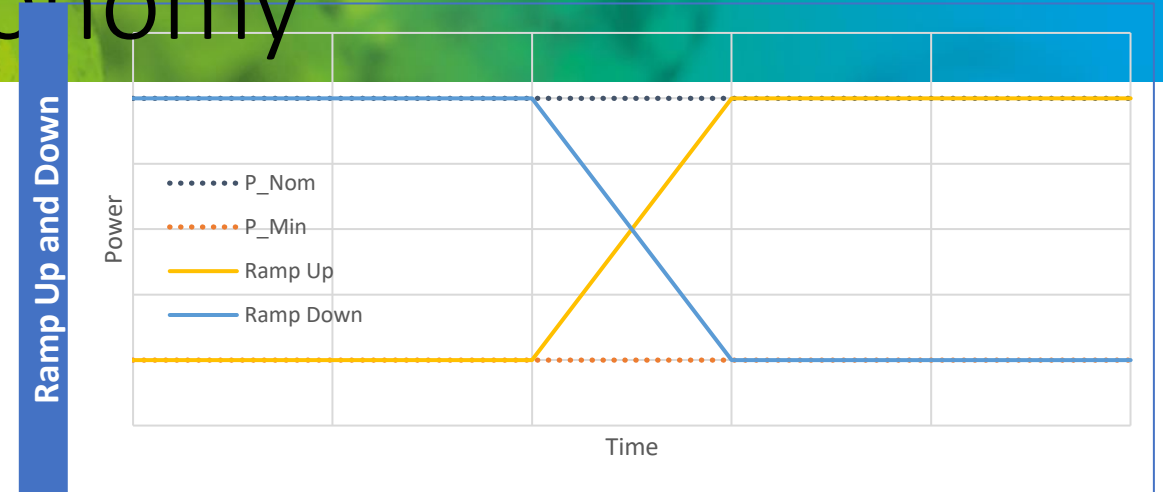
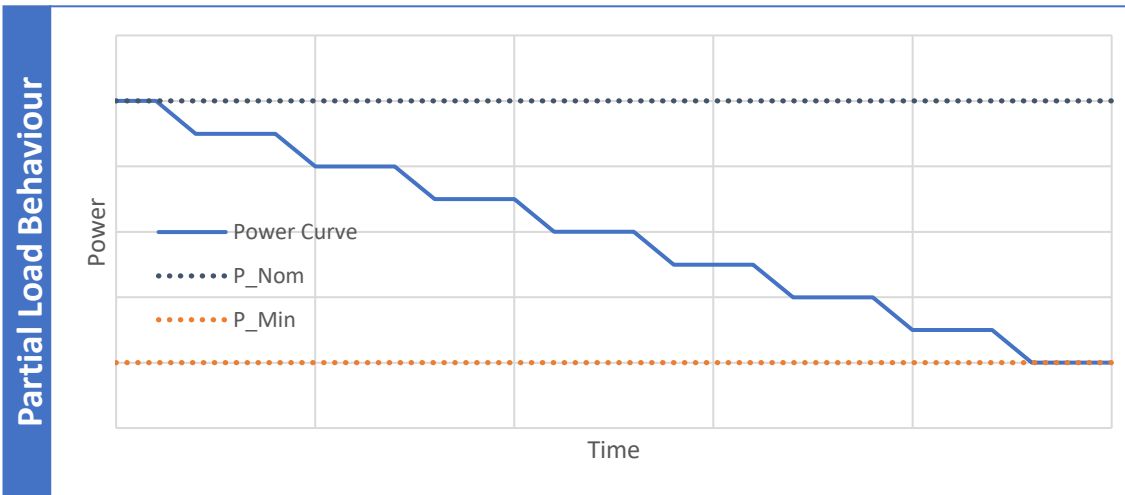
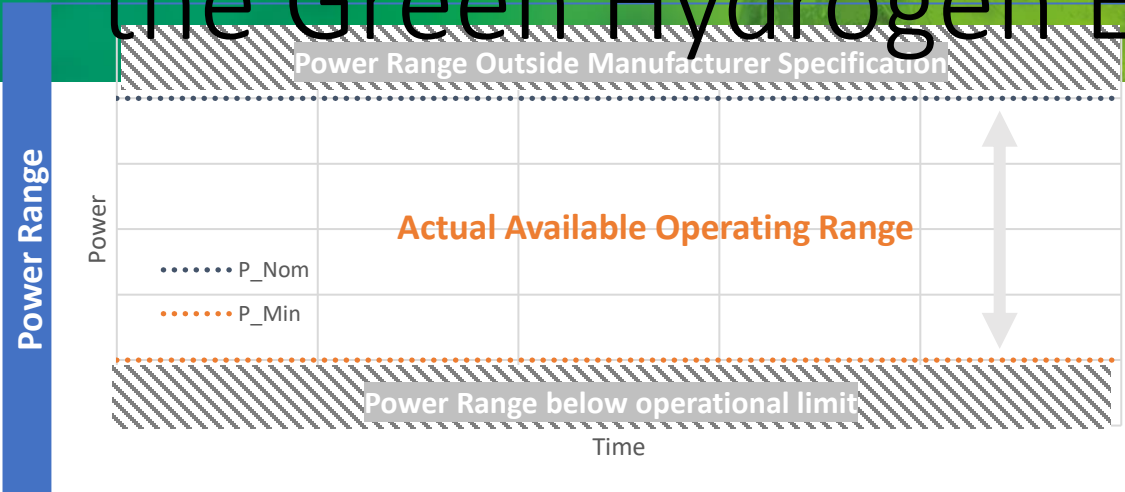
- Differentiation between testing of Cells, Stacks, System and Full Plants is important

# The electrolyser system and its environment



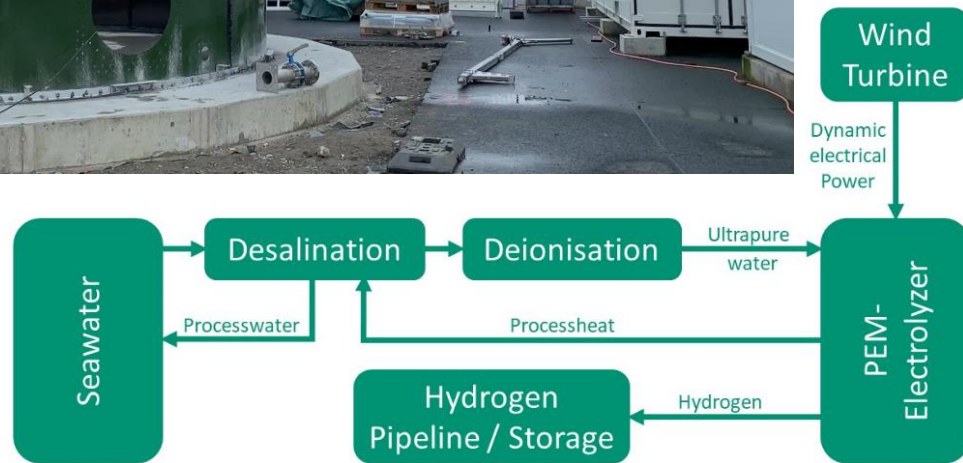
# Useful Methods for Electrolyzer Testing for the Green Hydrogen Economy

- Qualitative Representation of Test Protocols



# Water treatment

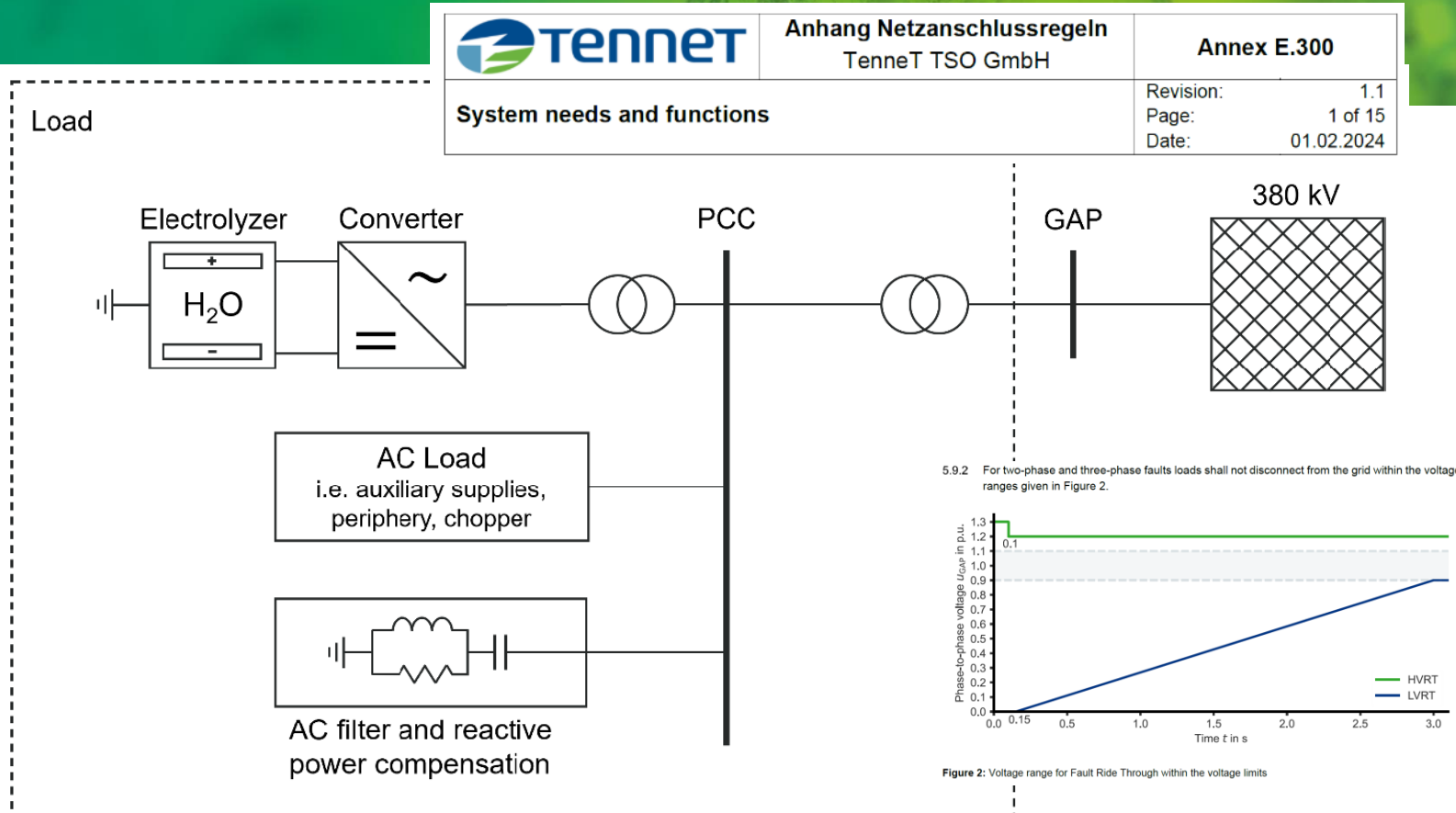
- H2Mare – H2Wind





# Making the Connection

- Upcoming Criteria to be met by Power-to-X plants



**Figure 1:** Exemplary demand facility with a load consisting of rectifier and electrolyser device as well as further possible installations

Especially for larger plants, expect specific requirements for:

- Tolerance against Frequency variation
- Tolerance of Voltage Ranges
- Asymmetrical Grid Voltage
- Accepted Power Quality
- Interaction with the grid
- Short-circuit power
- Reactive Power
- Fault Ride Through Tests
- Etc. ...



# Contact

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