Future Needs for Offshore Hydrogen Test Infrastructure in Belgium

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Belgian Offshore Days
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von KARMAN INSTITUTE
FOR FLUID DYNAMICS

HOH2TEST (Haalbaarheidsstudie Offshore Waterstof Testfaciliteit)

A Joint project of:

sirris

von KARMAN INSTITUTE FOR FLUID DYNAMICS

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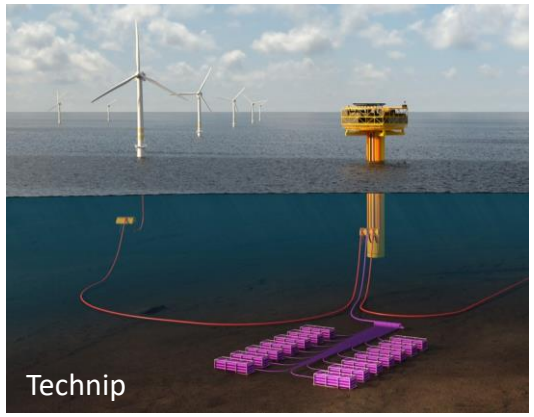
economie

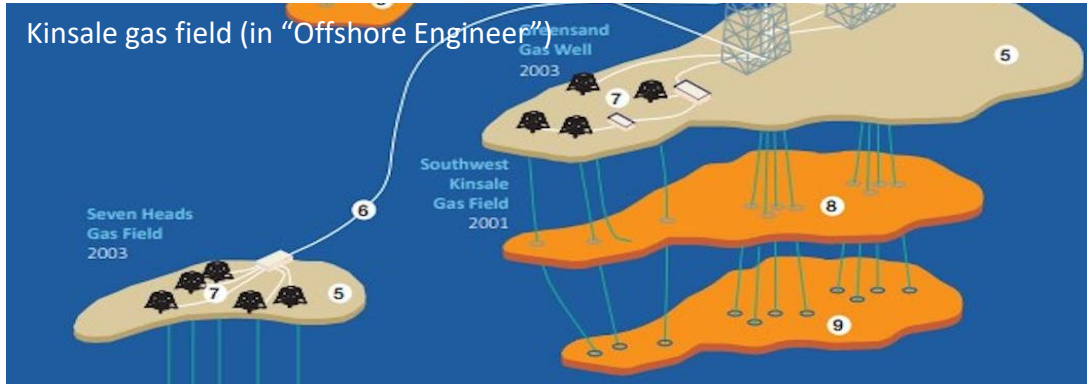
FOD Economie, K.M.O., Middenstand en Energie

Offshore Hydrogen Applications



Hydrogen as energy carrier for offshore (floating) wind power

Hydrogen for decarbonization of offshore (wind) industry

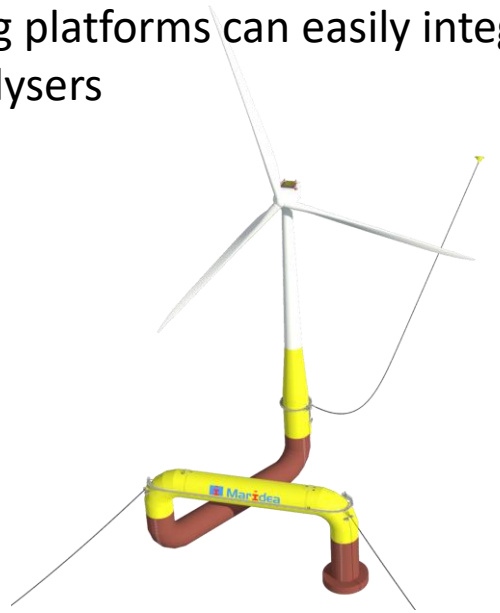


Offshore hydrogen storage in depleted gas fields

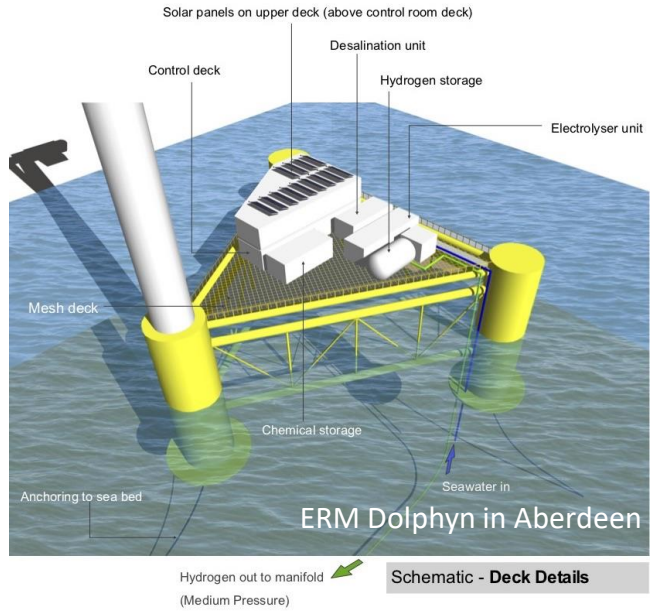
Hydrogen as Energy Carrier

Offshore hydrogen production in combination with floating offshore wind platforms:

- Floating in deeper seabeds, or further from the coast, for harvesting better wind conditions
- Conversion to hydrogen, as alternative to transport via electrical cables
- Floating platforms can easily integrate electrolysers



Moray Base by Multi / Maridea



Hydrogen for decarbonization of offshore industry

Crew Transfer Vessels (CTVs):

- Very specific sailing profiles
- 25 CTVs in Port of Oostende
  - nowadays 7,5 – 9 M tonnes diesel / year
  - 20-24 k tonnes CO2 emissions / year
- Huge potential for decarbonization
- Start with dual fuel
- WindCat – CMB, Piriou, GEOxyz

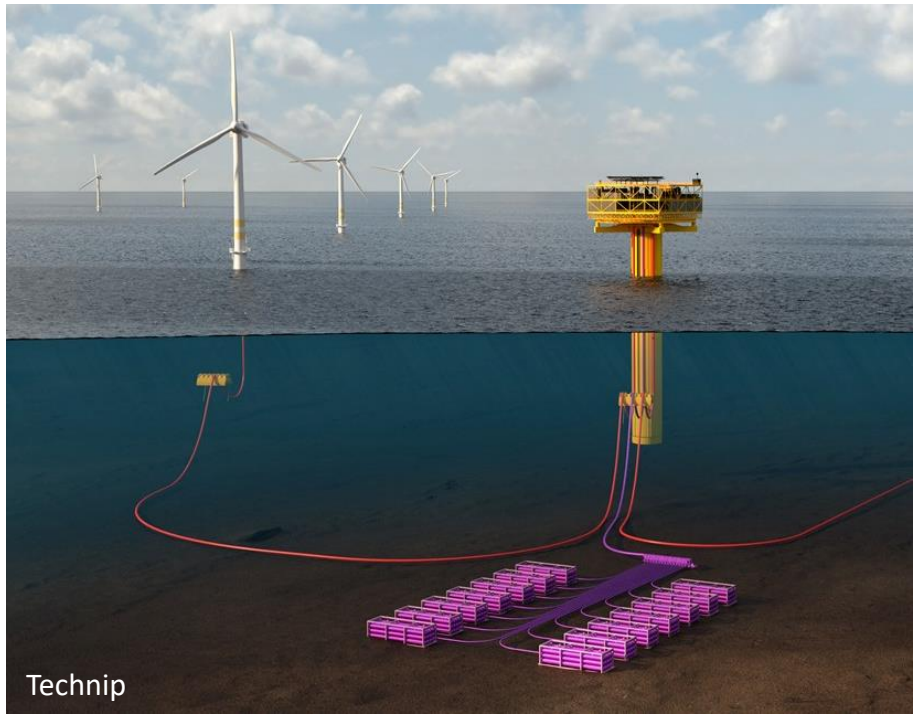
Commissioning Service Operation Vessels (CSOVs)

- New initiatives announced
- Edda, Ulstein, CMB.tech – WindCat – Damen

Drones

- For inspection of wind turbines
- Servicing
- Expanding flight envelope
- SABCA, Helicus

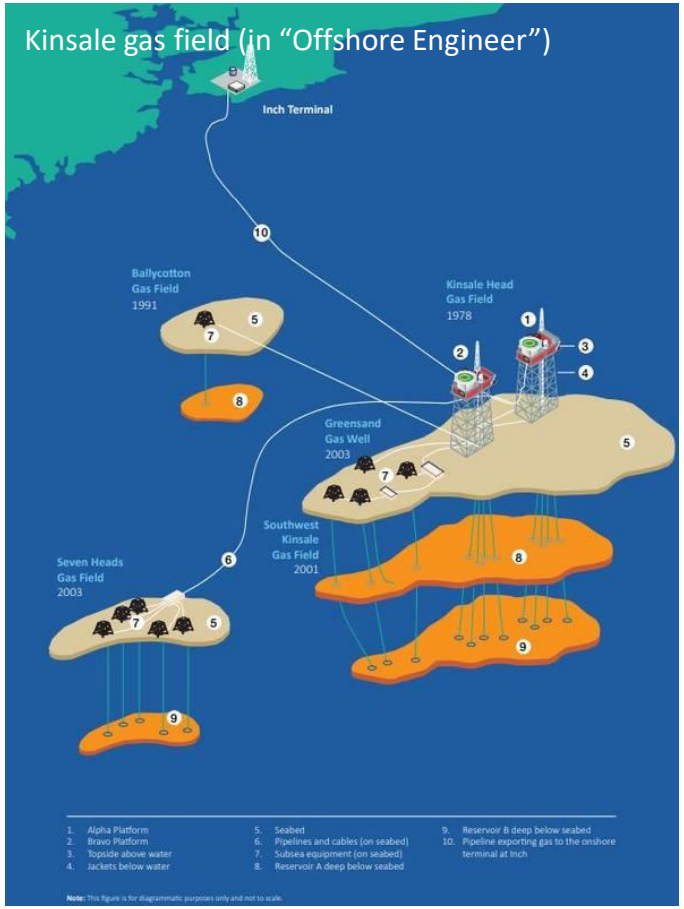
Offshore Energy Storage with Hydrogen



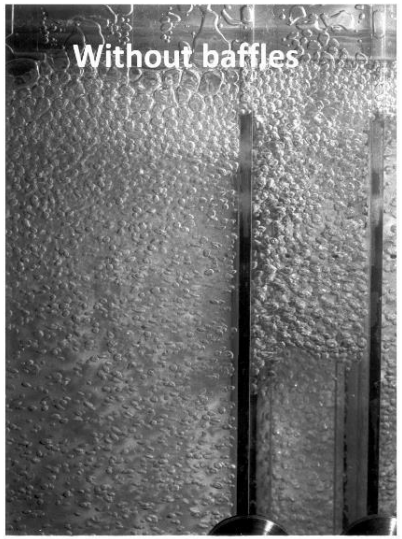
Storage in underwater storage tanks

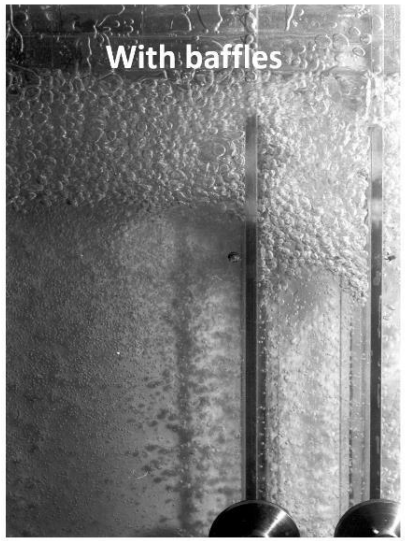
- Constant temperatures at seabed
- Safe

Storage in depleted gas fields



Impact of Harsh Offshore Conditions on H2 production





Electrolysers come with several challenges when used in offshore conditions:

- Bubble management in Electrolyzers
- Cold start of Electrolyzers
- Temperature effects and impact on efficiency
- Work with sea water vs. desalination
- Corrosion
- Intermittent operations… -> economically unefficient when only converting excess renewable wind energy

Disclaimer: examples do not suggest that shown products have deficiencies

Impact of Harsh Offshore Conditions on H2 engines

Combustion engine (BeHydro)

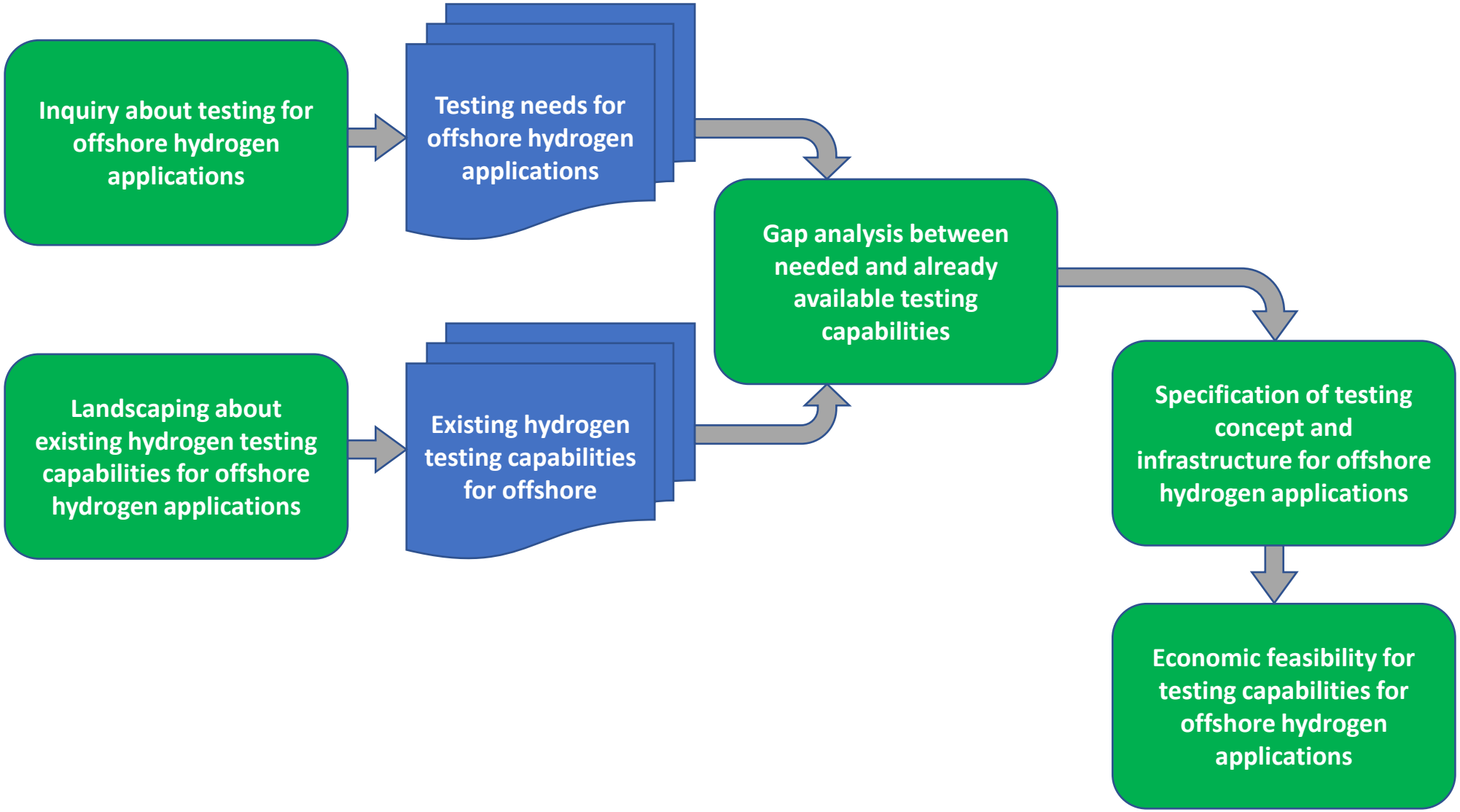
Reliability: ship engines must be available at any time for safe sailing in stormy conditions

Safety: skilled operators needed to operate this new technology

Effect of temperature variation on refueling process

Fuel Cell (Nedstack)

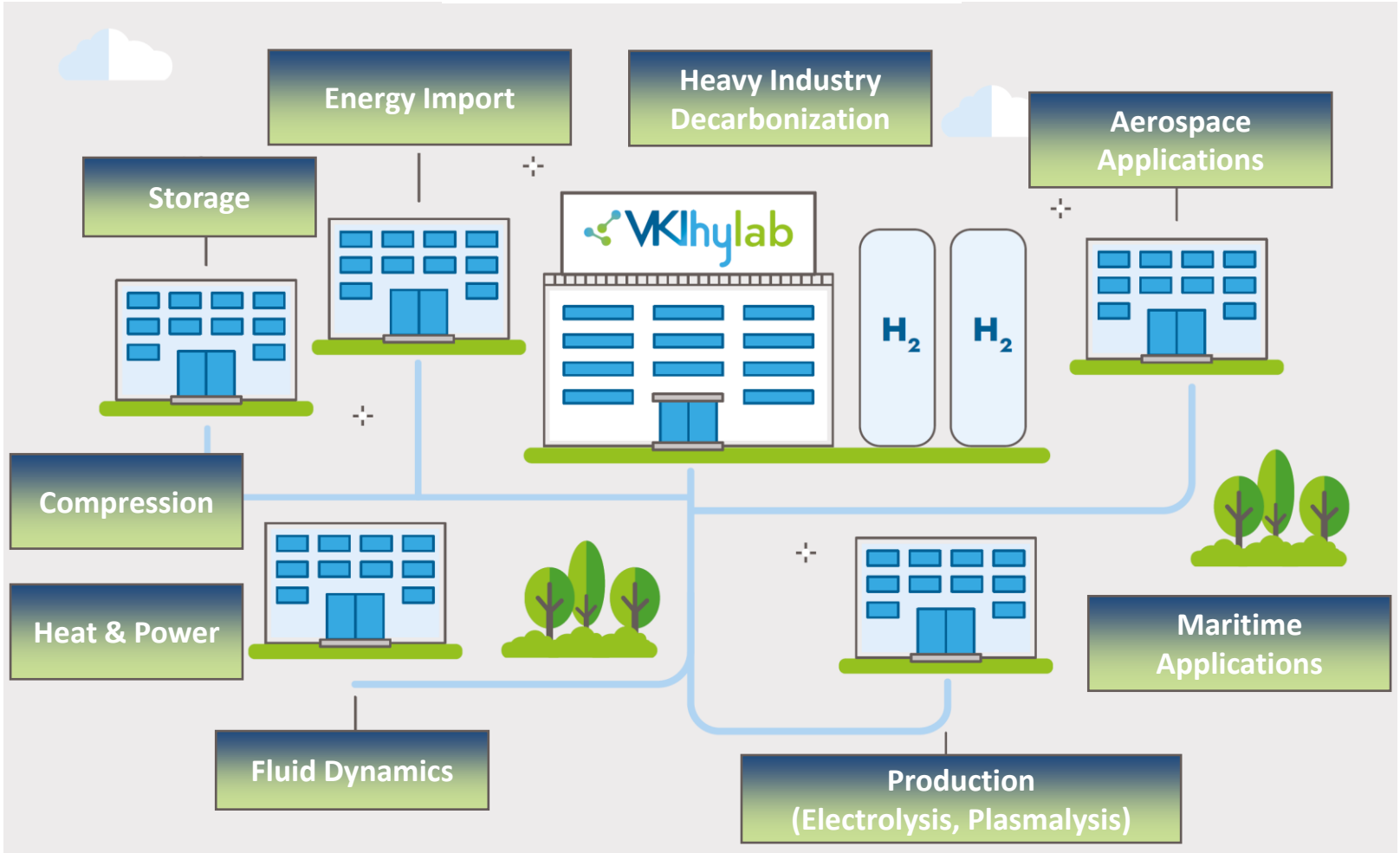
HOH2TEST project



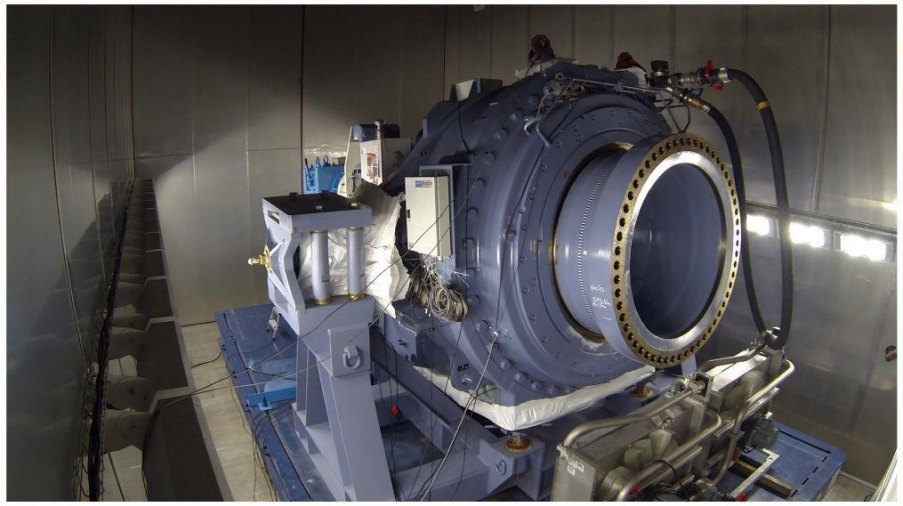
VKI Hydrogen Test center

VKI Hydrogen Lab

- A ready-to-use testing environment, providing:
  - All necessary safety provisions
  - Hydrogen supply and storage in sufficient quantities
  - Generic instrumentation & data processing
  - Remote operations
  - …
- Open for industrial testing
- Looking for synergies
- Looking for a site



Sirris OWI Lab Large Climate Chamber



Testing for Hydrogen Offshore Applications

Hydrogen Test Infrastructure

VKI hylab
VKI Hydrogen Lab

Environmental Test Infrastructure

sirris

OWI lab

New Offshore Hydrogen Test Infrastructure

Existing Offshore Test Infrastructure

User Needs – Q&A round table

https://portal.sirris.be/survey/start/1be4ea29-d562-4606-a53b-b666c0ee8c7c

What are your needs or interests?