Flagship Project
TransHyDE

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Hydrogen Flagship Project TransHyDE

Jimmie Langham I International Delegations - GIZ I 28.-29.09.2022

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TransHyDE

- Project duration: 04/2021 – 03/2025
- 83 + approx. 20 associated partners
- Project volume: approx. 181M €,
- Funding: approx. 135M €

TransHyDE develops various supra-regional storage and transport infrastructures for green hydrogen, evaluates, demonstrates and scales them up.

Coordinators

Robert Schlögl

MAX PLANCK GESELLSCHAFT

Mario Ragwitz

Fraunhofer IEG

Jimmie Langham

cruh21
enabling energy innovation

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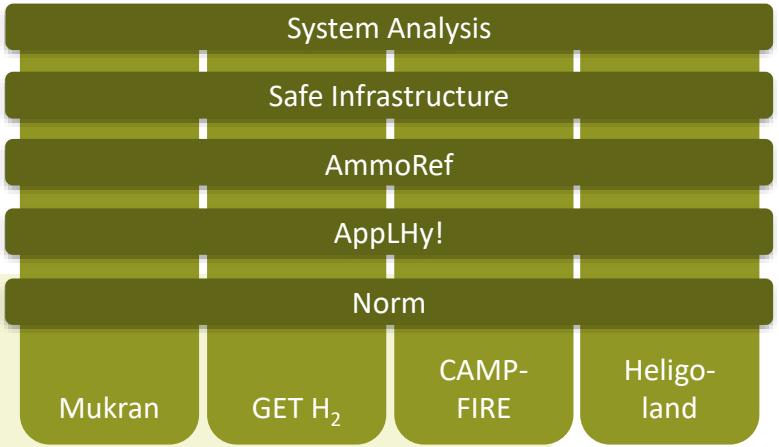
TransHyDE Structure



- Four implementation projects implement pilots for promising technological options for H_2 transport, create a basis for large-scale industrial scaling, and specifically identify and reduce barriers that arise in the process.
- Five research associations support the four TransHyDE implementation projects with scientific findings.
- The TransHyDE office supports the coordinators in their tasks.

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01. System Analysis

Project tasks

- Spatial, temporal development of the transport infrastructure for H_2 from the actor (energy-intensive industry) vs. system perspective (optimization of economic costs) incl. methodology assessment.
- Consistent and harmonized system boundaries and parameters for sustainability assessment of H_2 transportation technologies.
- Communication and stakeholder integration.
- Roadmapping: evaluation of technology development, conceptualizing its role in the energy system.

Challenges

- Assessment of future demand for H_2 in the spatial and temporal dimension (industry, transport, household and commerce).
- Selection and evaluation of infrastructure options and transport technologies for the applications.
- Evaluation of the technology options within the context of the energy system.

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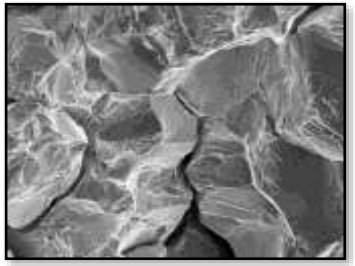
02. Safe Infrastructure

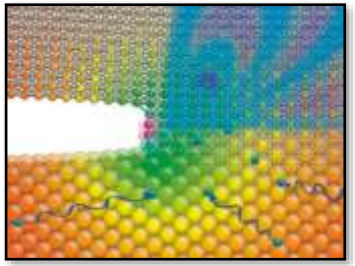
Project tasks

- Guideline for accident-proof construction and operation of plants for H_2.
- Mechanical testing of materials and components in H_2.
- Sensor technology to determine the concentration and quality of H_2.
- H_2 leakage detection.
- Calibratable measuring stand for H_2 flow meters.
- Roadmap for the conversion of a distribution network from natural gas to H_2.

Challenges

- Technically and economically realistic assessment of accident safety and lifetime of equipment for transport and distribution of H_2.





Source: Fraunhofer Institute for Mechanics of Materials IWM

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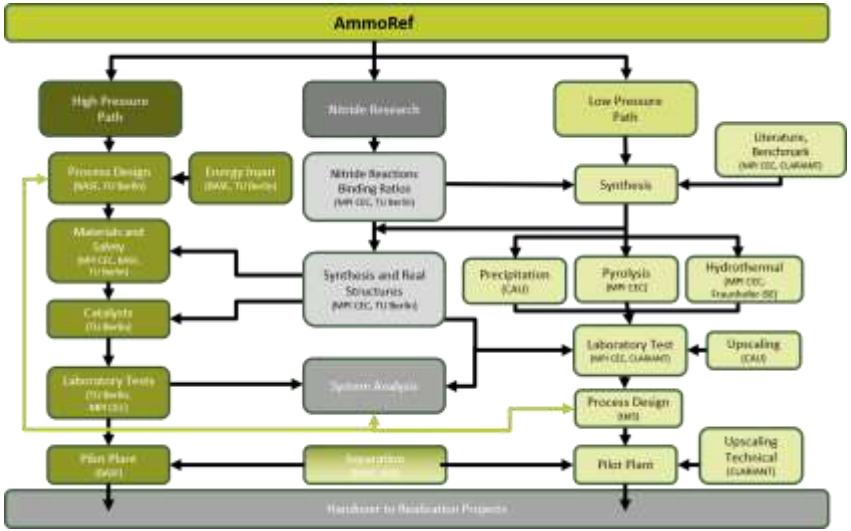
03. AmmoRef – Reforming Ammonia

Project tasks

- Application-oriented, industrially feasible, safe and cost-effective technology for reforming ammonia.
- Low pressure reforming (atmospheric pressure).
- High pressure reforming (>30 bar).
- Catalyst development and testing.
- Pilot plant.
- Separation.

Challenges

- Hydrogen purities.



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04. AppLHy! – Transport and use of liquid hydrogen

Project tasks

- Developments on energy-efficient liquefaction, storage and transport.
- Clarification of safety and material issues.
- Concepts for LH_2-fueled/cooled electric power applications.
- Exploration & demonstration of transportation synergies.

Challenges

- Efficiency increase of industrial liquefaction process.
- Combination of cryogenics and reactivity.
- Minimally invasive system integration in applications.
- Bulk energy transport over longer distances.
- Cooling along the entire temperature range.

05. Norm – Standardization and certification

Project tasks

- Inventory of technical regulations, standards, certification requirements.
- Needs analysis of regulations for H_2 transport options in TransHyDE.
- Standardization strategies and stakeholder analysis.
- Development of a data basis for standardization activities.
- Roadmap "Standardization and certification”.

Challenges

- Holistic documentation of existing specifications and, based on this, a needs analysis of regulations to be developed or revised for various H_2 transport technologies, resulting in a clear recommendation for action.

Source: Project Management Jülich, Forschungszentrum Jülich GmbH

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Mukran - Novel storage solutions for hydrogen

Project objectives

- Developing and testing of innovative H_2 high-pressure spherical vessels for flexible, standardized transport, considering the technical requirements of tri- and intermodal logistics options.
- Investigating the technology chain, logistics options and market potentials, from H_2 generation to H_2 use, for decentralized hydrogen distribution with gaseous hydrogen.

Challenges

- Successfully operating a hydrogen value chain from H_2 filling in novel storage vessels with transport to H_2 end users.
- Enabling the economic supply of green hydrogen through technical development.

Source: Mukran Port

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B. Get-H_2 - Conversion of natural gas pipelines and new construction of hydrogen pipelines

Project task

- Construction and operation of a test pipeline.
- Identification of practical measurement concepts for gas properties and volume flow.
- Clarification of material issues.
- Development of technologies for pipeline monitoring (pigging, remote gas detection).
- Evaluation of compressor concepts.

Source: GET H2

Challenges

- Develop and build a safe and reliable H_2 transport infrastructure in the public sector.

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C. CAMPFIRE - Ammonia as a transport medium for hydrogen

Project tasks

- R&D activities for the implementation of the ammonia transport chain.
- CAMPFIRE Open Innovation Lab at the Rostock-Poppendorf site.
- Logistics structures for ammonia import and ship operation.
- Energy security service through regional generation and storage of ammonia.
- Dynamic energy conversion technologies for stationary and mobile energy supply as well as filling station supply and pipelines.
- Solutions for the economic distribution of ammonia.

Source: CAMPFIRE

Challenges

- Requirements due to high dynamics of load changes with high cost efficiency and requirements for miniaturization and integration of systems in the application.

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D. Heligoland - Hydrogen transport with liquid organic hydrogen carriers (LOHC)

Project tasks

- R&D for storage and transport of LOHC, incl. system integration on Heligoland and the mainland.
- Development of the total value chain for large-scale implementation of hydrogen conversion, storage, utilization.
- Development of first pilot and stand-alone solutions at demonstrator scale.

Challenges

- Total value chain for LOHC as a carrier material so far only implemented on a very small scale - technical and economic scaling required for emergence of a new (LOHC) market.

Source: Jakob Martens

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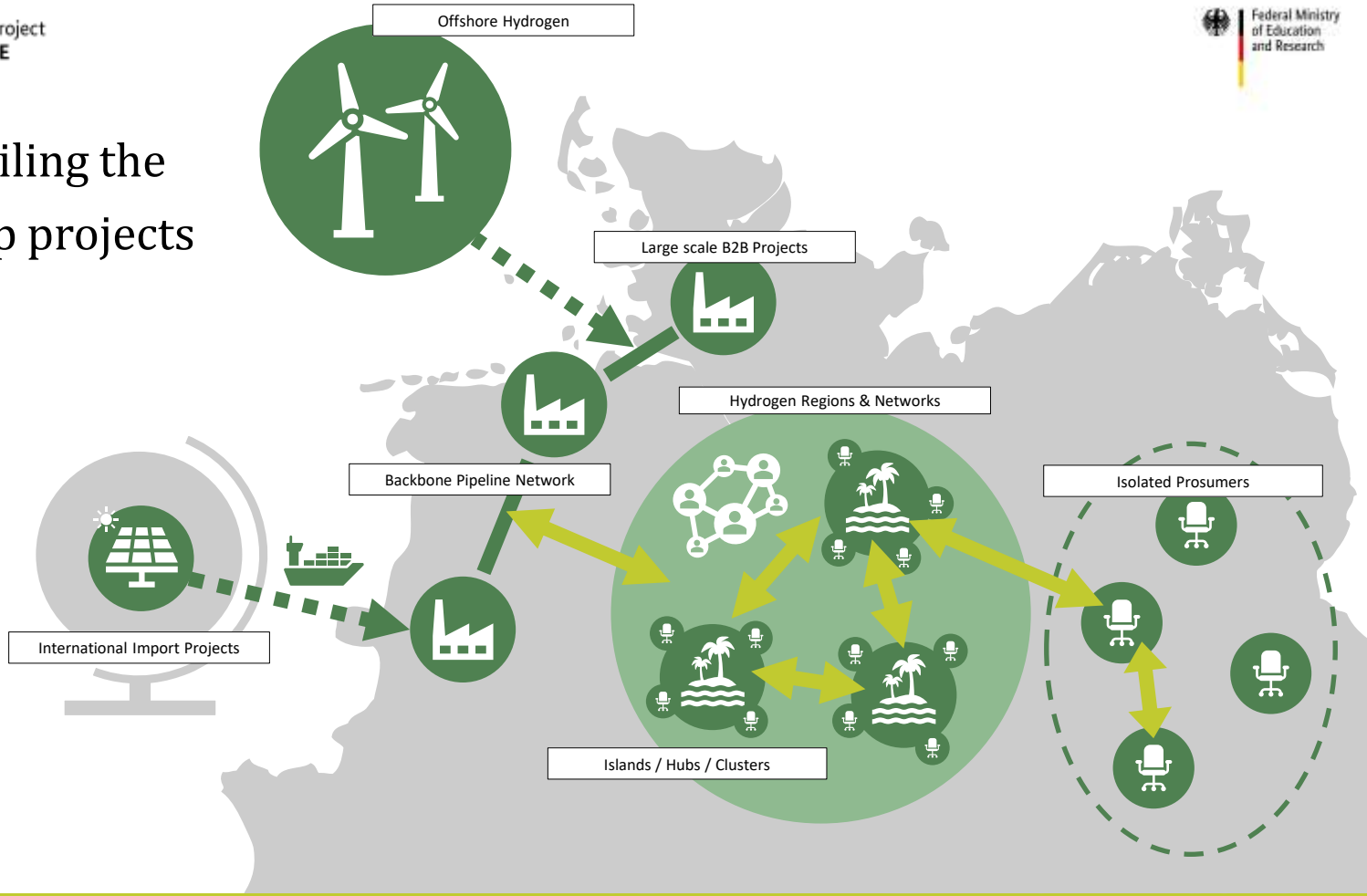
Dovetailing the flagship projects



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Thank you very much!

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