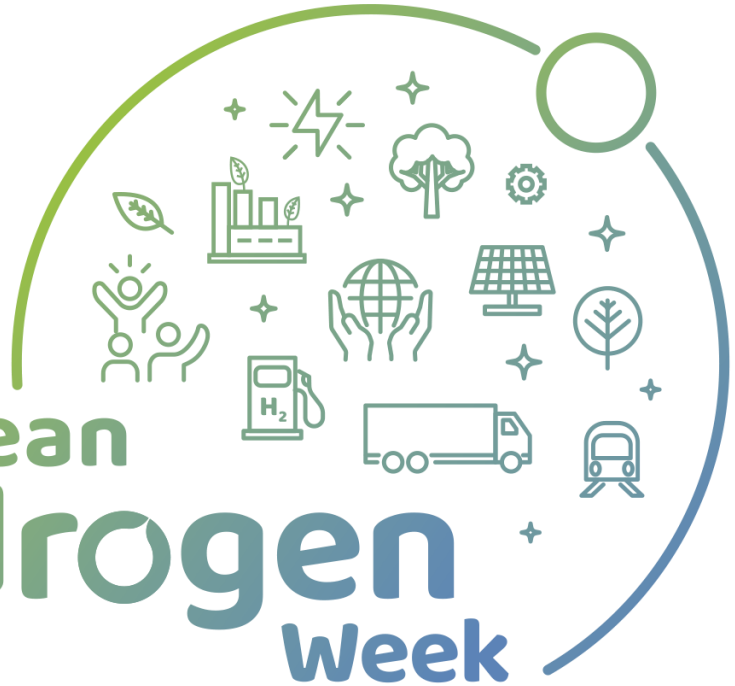
HySTOC

Hydrogen supply and transportation using liquid organic hydrogen carriers



Ott, Ralf

Hydrogenious LOHC Technologies GmbH

https://www.fch.europa.eu/
ralf.ott@hydrogenious.net
vinzent.ruf@hydrogenious.net

#PRD2020
#CleanHydrogen

FCH

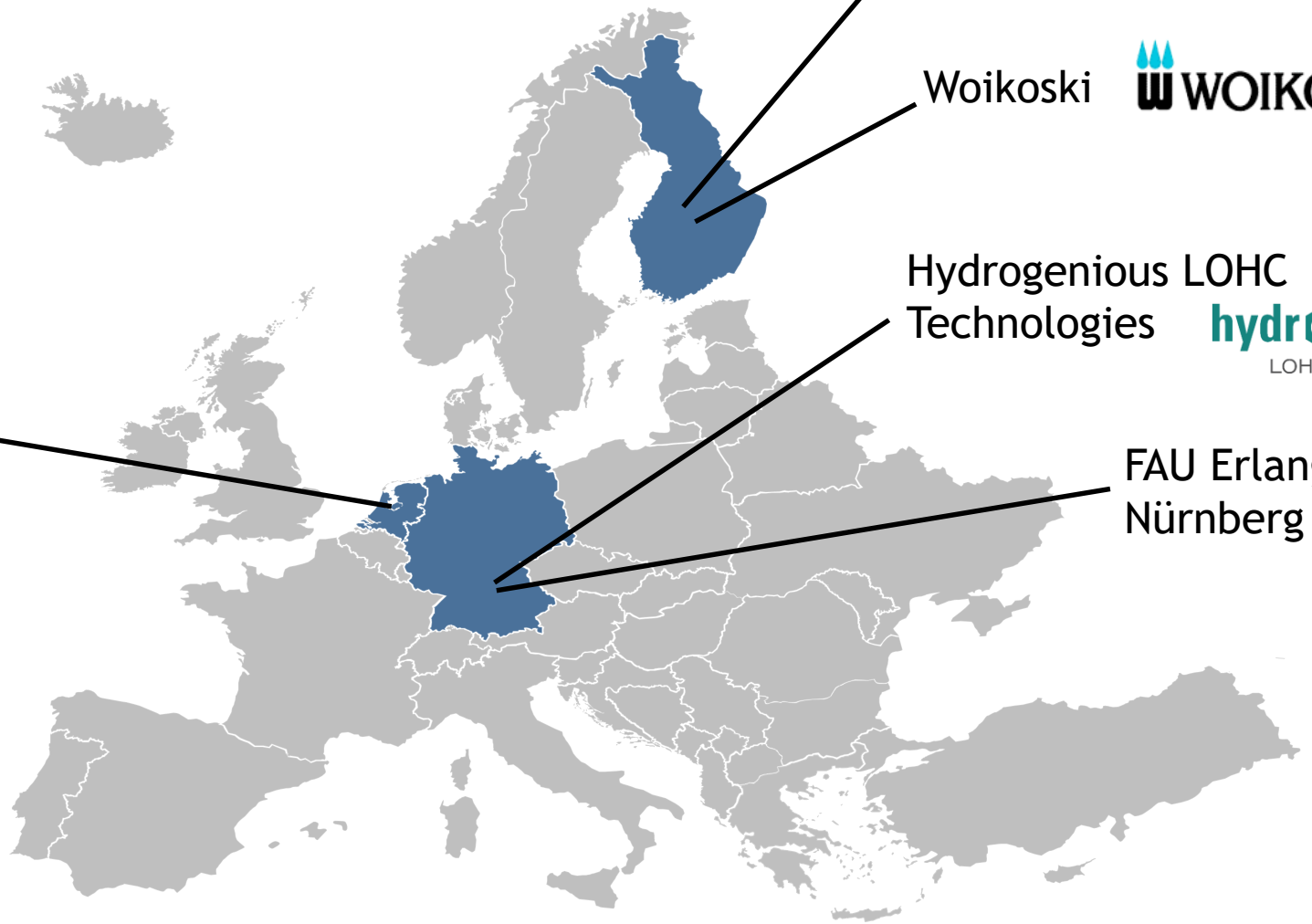
European Commission

PROJECT OVERVIEW

- Call year: 2017
- Call topic: HySTOC H2020-JTI-FCH-2017-1
- Project dates: 01.01.2018 – 31.12.2020 (+15 months of project extension requested)
- % stage of implementation 01/11/2020: 70% (project months)
- Total project budget: 2,499,921.25 €
- FCH JU max. contribution: 100%
- Other financial contribution: n.a.

European Hydrogen Week

PARTNERS



VTT Technical Research Centre

Woikoski

Hydrogenious LOHC Technologies

Hygear

FAU Erlangen Nürnberg

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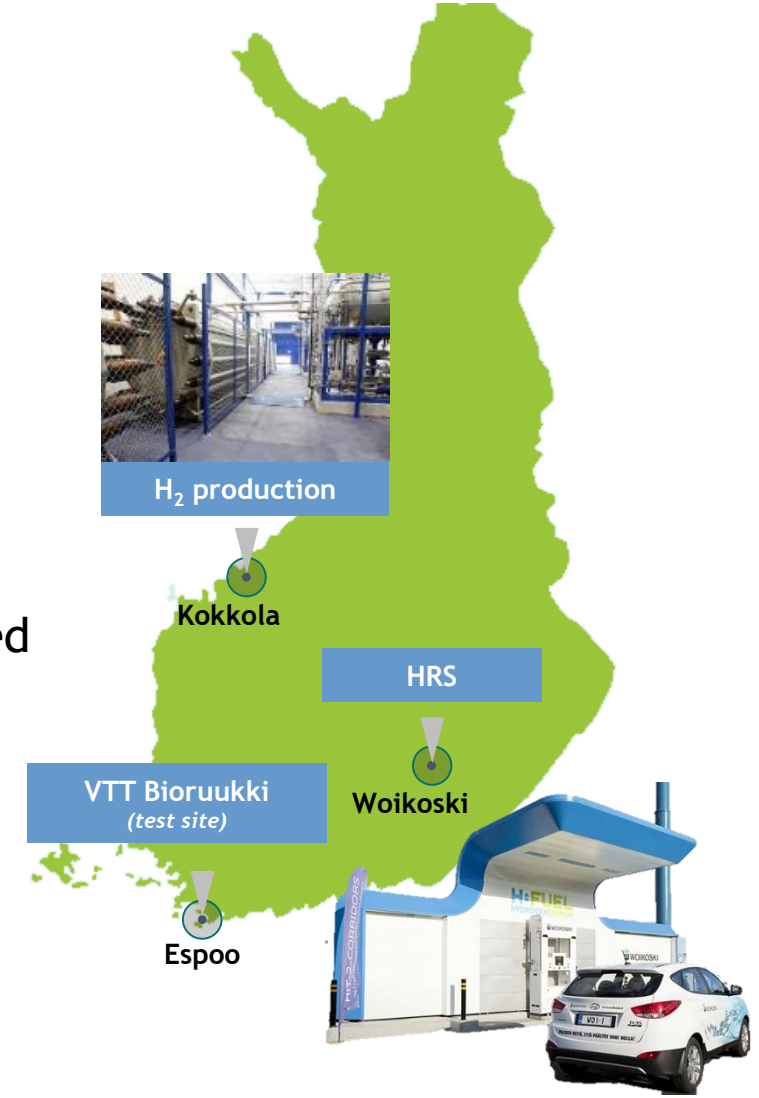
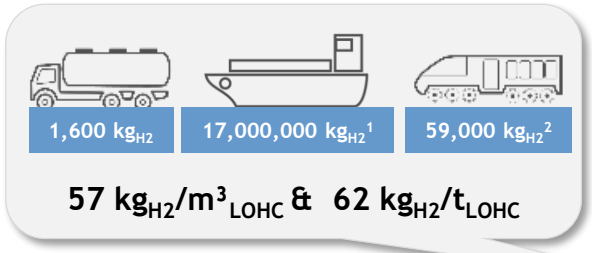
European Commission

PROJECT SUMMARY

- Hydrogen production and hydrogenation in Kokkola, Finland
- Transportation of the loaded LOHC to VTT and subsequent dehydrogenation for gas quality measurement
- After 6 months of testing at VTT the ReleaseBOX will be transported to Woikoski supplying a hydrogen refuelling station
- Main objectives:
  - Development of a cost efficient, fully automated LOHC hydrogen storage and release system
  - Demonstration of LOHC suitability for commercial roll out
  - Reduction of CAPEX and OPEX for storage and transport

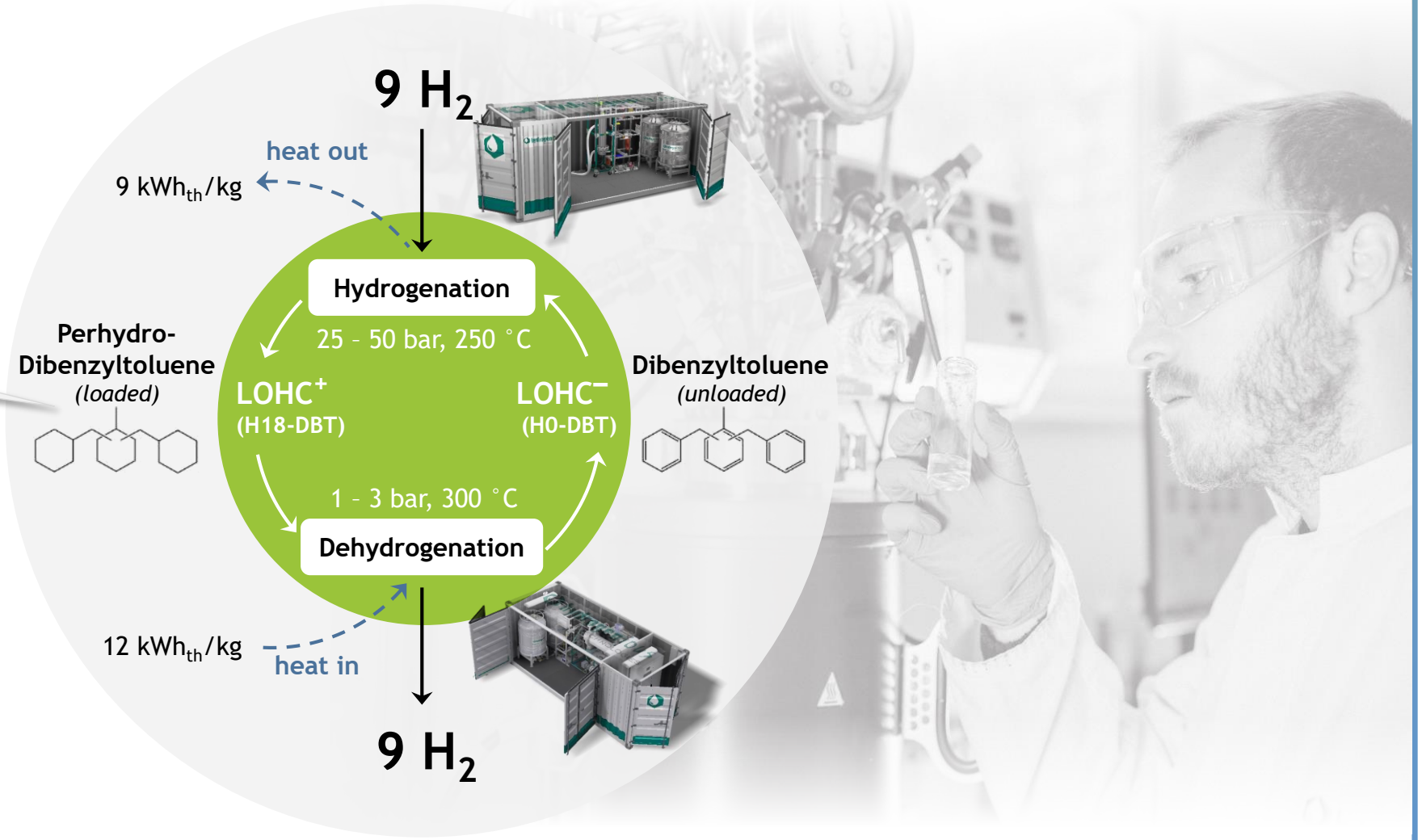


LOHC INSIGHTS



(Perhydro-)Dibenzyltoluene

- Non-explosive
- Diesel-like liquid
- Hardly flammable
- Liquid state until -39 °C
- Stored at ambient conditions
- Commercial heat transfer oil



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STATUS: STORAGE SYSTEM

Achievement to-date

PROJECT START

25% 50% 75%

TARGET: FINALIZED STORAGEBOX[1)]

- The Storage Box...
  - ... was successfully commissioned and tested in Erlangen
  - ... Is approved by the Notified Body TÜV SÜD
  - ... has been shipped to Woikoski (Kokkola) six months ago

- The assembly of the tank system has been completed
- At the moment the commissioning of the Storage Box is being finalized in Kokkola
- The Storage Box can produce hydrated material for the ReleaseBox by the end of November

1) No specific KPIs were defined for this project

STATUS: RELEASE SYSTEM

Achievement to-date

PROJECT START → 25% → 50% → 75% → TARGET: FINALIZED RELEASEBOX[1)]

- Preparation of the test site at VTT in October 2020
- The assembly of the tank system has been finished this October
- Finalizing the in-house commissioning of the ReleaseBox in November 2020
- The ReleaseBox will be shipped to VTT on 20.11.2020
- The on-site commissioning in Finland will be finished in January 2021
- The quality measurement of the H2 at VTT can start in January 2021

1) No specific KPIs were defined for this project

GENERAL STATUS

Achievement to-date

PROJECT START → PROJECT TARGET[1)]

25% 50% 75%

- Alternative gas cleaning work and Life Cycle Assessment work progresses as planned
- A steering committee meeting took place in October 2020
- Project extension of 15 months is requested at the EU, work packages / deliverables have been updated

Recent achievements

- hydrogenious LOHC TECHNOLOGIES — D5.3: Report on completion of the release system
- HYGEAR — D6.3: Testing of the PSA unit
- WOIKOSKI — D4.6[2)]: Storage tanks & systems installed and ready for operations
- VTT — D8.7: LCA of transport technologies

1) No specific KPIs were defined for this project
2) The report will be finalized in 02/21

RISK, CHALLENGES AND LESSONS LEARNED

Covid-19

- Covid-19 pandemic, lockdown, travel restrictions, unclear future
- Slowing down of the project progress. Travel restrictions delayed and may further delay the shipping and commissioning of the ReleaseBOX.

Technical non-conformities

- Technical inconsistencies due to specifications of several suppliers.
- Severe impact on the overall project schedule. Especially the H2-compressor as necessary part of the ReleaseBOX could only be repaired by the supplier after 2 months in November 2020. The aim is to define standard suppliers for package units.

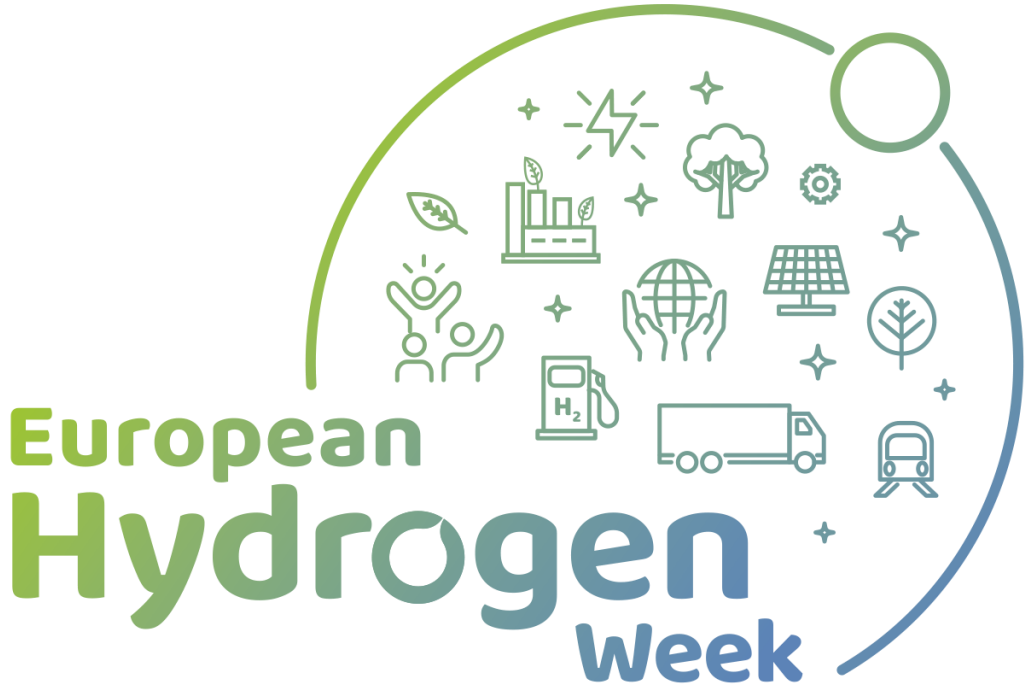
EXPLOITATION PLAN/EXPECTED IMPACT

Exploitation

- The project findings/results are described in detail in the individual deliverables
- Deliverables will be uploaded in the EU-Portal and are differentiated by confidentiality (internal use for further development, public)
- Status and results are discussed in regular project meetings
- Results of gas quality measurement by VTT are particularly important to all partners; VTT will regularly share the measurement results with the project partners, which may result in technical adjustments

Impact

- Further technical development and commercialization of the LOHC technology
- Results give a basis for a possible upscaling of future systems
- Further development of LOHC logistics
- Further technical development of hydrogen purification
- Gain experience regarding the use of LOHC technology with hydrogen refueling station applications



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PARTNERS AND ROLES

hydrogenious LOHC TECHNOLOGIES

- StorageBOX
- ReleaseBOX
- Coordination

HYGEAR

- H_2-Purification
- Technical management

WOIKOSKI

- H_2-Logistics
- Installation and field tests

FAU

- Research on different topics
- Dissemination, communication

VTT

- FC-research
- LCA
- Testing
- H_2-Analytics