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Le programme européen pour la recherche et l'innovation

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List of pitches

1. Armor Smart Films	Antoine Maufroy	Armor Group	antoine.maufroy@armor-group.com	HORIZON-JTI-CLEANH2-2024-01-02, HORIZON-JTI-CLEANH2-2024-01-03, HORIZON-JTI-CLEANH2-2024-05-02
2. Institut de la Corrosion	Bertrand Noharet	Institut de la Corrosion	bertrand.noharet@institut-corrosion.fr	HORIZON-JTI-CLEANH2-2024-01-02, HORIZON-JTI-CLEANH2-2024-02-01, HORIZON-JTI-CLEANH2-2024-03-03
3. IMT Alès	Antoine Martin	Institut Mines-Télécom	antoine.martin@imt.fr	HORIZON-JTI-CLEANH2-2024-02-01
4. IFPEN	Nicolas Ferrando	IFP Energies Nouvelles	nicolas.ferrando@ifpen.fr	HORIZON-JTI-CLEANH2-2024-02-01, HORIZON-JTI-CLEANH2-2024-02-02
5. HSL Technologies	Belén Moreno	HSL Technologies	bmoreno@hysilabs.com	HORIZON-JTI-CLEANH2-2024-02-02, HORIZON-JTI-CLEANH2-2024-03-03
6. CETIM	Girardin Gouenou	CETIM	Gouenou.Girardin@cetim.fr	HORIZON-JTI-CLEANH2-20/24-02-05, HORIZON-JTI-CLEANH2-2024-05-01
7. Aerospace Valley	Laurent Bizieau	Aerospace Valley	bizieau@aerospace-valley.com	HORIZON-JTI-CLEANH2-2024 -02-02, HORIZON-JTI-CLEANH2-2024 -02-04, HORIZON-JTI-CLEANH2-2024 -02-05, HORIZON-JTI-CLEANH2-2024 -03-01, HORIZON-JTI-CLEANH2-2024 -03-02, HORIZON-JTI-CLEANH2-2024 -04-02
8. INERIS	Franz Lahaie	INERIS	Franz.Lahaie@ineris.fr	HORIZON-JTI-CLEANH2-2024-02-01, HORIZON-JTI-CLEANH2-2024-02-05, HORIZON-JTI-CLEANH2-2024-03-03, HORIZON-JTI-CLEANH2-2024-02-02,HORIZON-JTI-CLEANH2-2024-05-01
9. ArianeGroup	Sébastien Veyry	ArianeGroup	sebastien.veyry@ariane.group	HORIZON-JTI-CLEANH2-2024-02-04, HORIZON-JTI-CLEANH2-2024-02-05, HORIZON-JTI-CLEANH2-2024-03-03, HORIZON-JTI-CLEANH2-2024-03-04, HORIZON-JTI-CLEANH2-2024-04-02
10. ENSAM	Michaël Deligant	ENSAM	Michael.DELIGANT@ensam.eu	HORIZON-JTI-CLEANH2-2024-03-01, HORIZON-JTI-CLEANH2-2024-03-02
11. GRTGaz	Cristina Lopez	GRTGAZ RICE	cristina.lopez@grtgaz.com	HORIZON-JTI-CLEANH2-2024-02-03, HORIZON-JTI-CLEANH2-2024-06-01, HORIZON-JTI-CLEANH2-2024-06-02
12. BRGM	Francis Claret	BRGM	f.claret@brgm.fr	HORIZON-JTI-CLEANH2-2024-02-01, HORIZON-JTI-CLEANH2-2024-05-01, HORIZON-JTI-CLEANH2-2024-06-01, HORIZON-JTI-CLEANH2-2024-06-02
13. Central Nantes	Frédéric Grondin	Ecole Centrale de Nantes	frederic.grondin@ec-nantes.fr	HORIZON-JTI-CLEANH2-2024-06-01, HORIZON-JTI-CLEANH2-2024-06-02
14. Inocel	Jessica Horn	INOCEL	Jessica.horn@inocel.com	NA
15. AFNOR	Alexandre Colombier	AFNOR ASSOCIATION	alexandre.colombier@afnor.org	NA
16. INRAE	Clément Likiliki	INRAE	clement.likiliki@inrae.fr	NA
17. CNR	Céline Pagnard	CNR	c.pagnard@cnr.tm.fr	NA
18. UTAC	Hanaâ Er-Rbib	UTAC	hanaa.er-rbib@utac.com	NA
19. Moteurs Bernard	Xavier Bernard	sapaic industries	xfbernard@sapaic.com	NA

ARMOR GROUP - ARMOR SMART FILMS

ARMOR GROUP

ARMOR SMART FILMS

Industrial partner expert in **Chemistry**:

- Ink **Formulation**
- High precision **Coating**
- Physico-chemical **characterization**

6 participation in H2020/HE projects

Contact: Antoine Maufroy, Innovation funding Manager (antoine.maufroy@armor-group.com; +33(0)2 51 79 53 70)

https://www.armor-group.com/

ARMOR GROUP

ARMOR SMART FILMS

H_2 related expertise:

- **Pilot and industrial** scale formulation
- Precision **coating on flexible substrate**
- Materials **scale-up**
- **Membrane** characterization
- **R&D** iteration

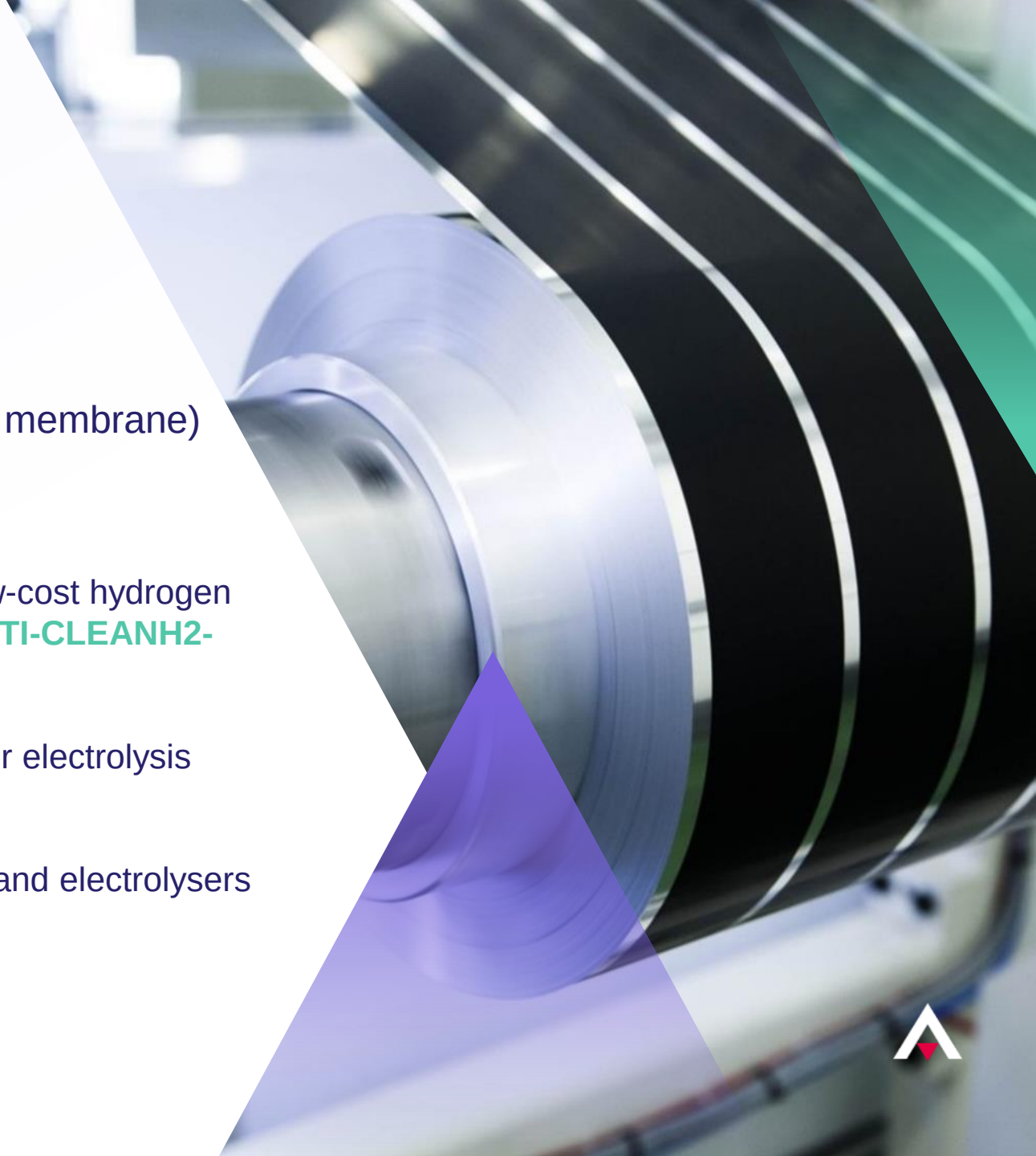
ARMOR GROUP

ARMOR SMART FILMS

Topics of interest :
Membrane, **PEM**, fuel cells, polymers, non-fluorinated membrane)

Identified calls:

- Advanced anion exchange membrane electrolysers for low-cost hydrogen production for high power range applications (**HORIZON-JTI-CLEANH2-2024-01-02**)
- Development of innovative technologies for direct seawater electrolysis (**HORIZON-JTI-CLEANH2-2024-01-03**)
- Development of non-fluorinated components for fuel cells and electrolysers (**HORIZON-JTI-CLEANH2-2024-05-02**)



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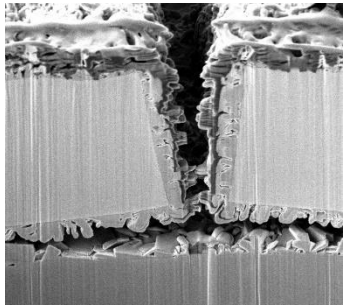
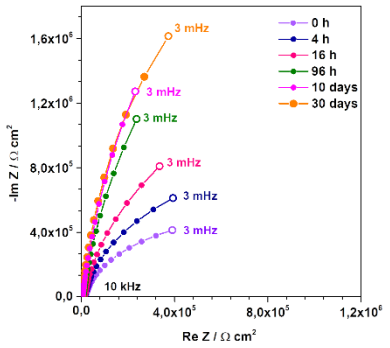
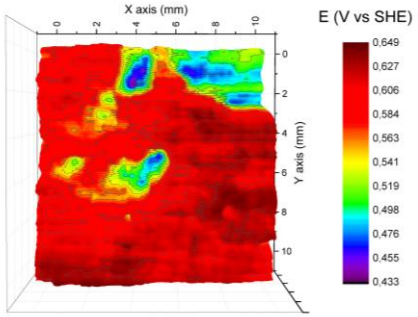
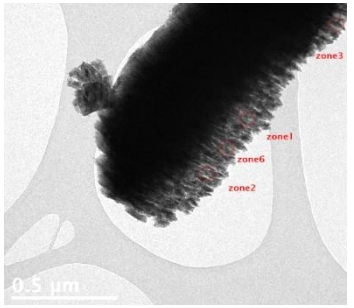
Institut de la Corrosion

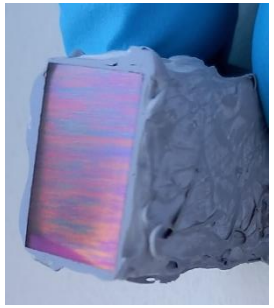
- **French Corrosion Institute (Institut de la Corrosion, IC)** non-profit private research organization founded in 2002 (RTO)
- 56 coworkers (60% Ph.D. and engineers), 3 sites: Brest, Saint-Etienne and Lyon.
- Industrial and academic research in many industrial sectors, including hydrogen technologies.
- **Extensive expertise in European projects** spanning from low to intermediate TRL.
- Site of Brest (headquarters): R&D activities on corrosion and corrosion protection in water electrolysis systems.
- Site of Saint-Etienne: R&D activities on hydrogen material compatibility (transport and storage).

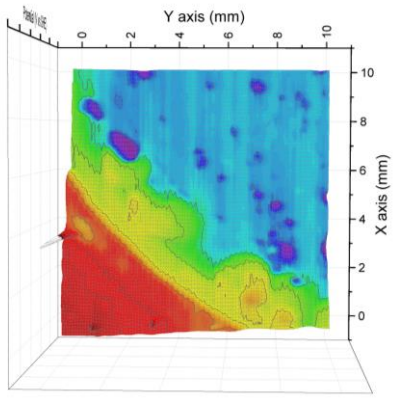


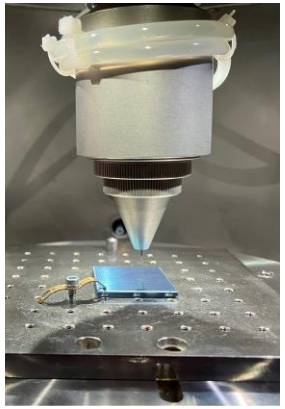












Competence offer: Corrosion and durability testing of BPP and PTL

TC01-02: *Advanced anion exchange membrane electrolysers for low-cost hydrogen production for high power range applications*

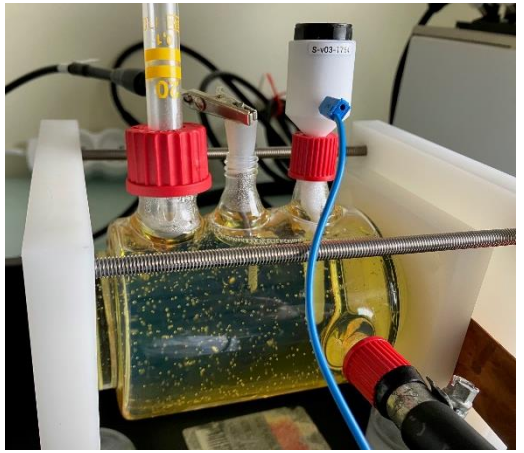
Contact**: Michel Prestat**, michel.prestat@institut-corrosion.fr

French-Swiss project "**PROTIS**" (2023-2026, 3 partners) **TRL 1-3,** Novel porous transport layers (PTL) based on stainless steels and cost-effective PGM-free coatings.

European Project "**UNICORN**" (CETP, 2023-2026, 7 partners) **TRL 3-6,** Development of the next generation of more cost-effective, more environmental-friendly PEM water electrolyzers.

Site of Brest: R&D activities on corrosion in water electrolysis (PEM / AEM)

- Fully equipped electrochemistry laboratory: impedance spectroscopy, scanning Kelvin probe, …
- Expertise in **corrosion/durability tests for Bipolar Plates, Porous Transports Layers, Coatings**
- **Long-term corrosion testing (>1000 h)**
- Development of accelerated stress tests
- Interfacial Contact Resistance (ICR) measurements
- Advanced physico-chemical methods for materials characterisation: SEM, EDX/WDX, Raman…



Competence offer: Hydrogen material compatibility

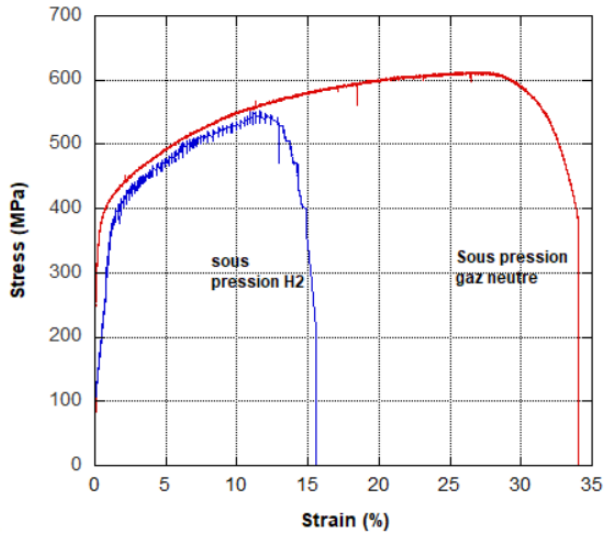
TC02-1: *Investigation of microbial interaction for underground hydrogen porous media storage*

TC03-3: *Next generation on-board storage solutions for hydrogen-powered maritime applications*

Contacts:
Christophe Mendibide christophe.mendibide@institut-corrosion.fr
Laura Moli Sanchez laura.moli.sanchez@institut-corrosion.fr

Site of Saint-Etienne : Testing capabilities

- Constant load (250 kN / 150 bar / 120°C)
- SSRT & Ripple load (100 kN / 150 bar / 120°C)
- Static autoclave exposure (350 bar/300°C)
- **Fatigue, fracture mechanics and tensile test (100 kN / 700 bar / -20°C + 185°C)**
- **Gas permeability (400 bar / 300°C)**
- Thermo-desorption spectroscopy
- **Environments: H_2, H_2S, NH_3, CO_2**



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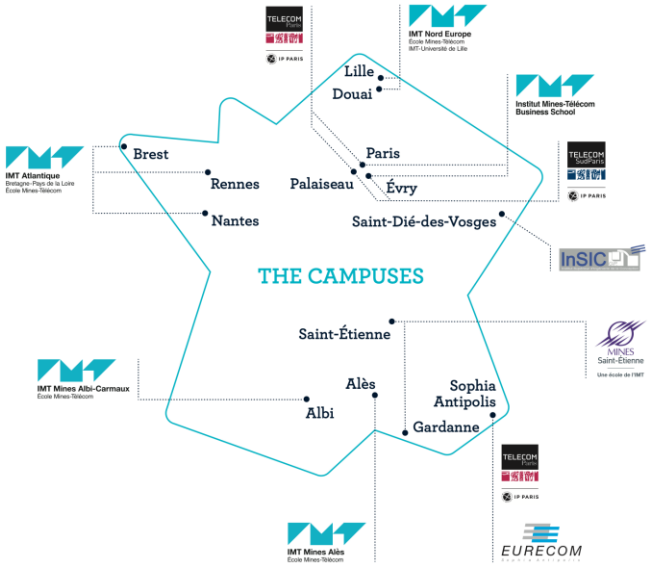
Institut Mines-Télécom – Alès

Institut Mines-Télécom: the 1st Institute of Technology in France

- An academic key player in the 4 main societal challenges:
  - Digital Transition ;
  - Energy and Environmental Transition ;
  - Industrial Transition;
  - Health Transition.
- Involved within the *HyTrend project* tackling all the building block of the hydrogen value chain (Carnot M.I.N.E.S, lien)



Luc Malhautier, IMT Alès: Environmental biotechnology & management of complex microbial ecosystems

- Ecosystem management (natural/anthropized), characterization of microbial activities, interactions between micro-organisms and the surrounding environment
- Hydrogen interest: biological process (methanation); microbial interaction for storage

Contact:
- luc.malhautier@mines-ales.fr
- pauline.rousseau@imt.fr / antoine.martin@imt.fr

https://www.imt.fr/

Investigation of microbial interaction for underground hydrogen porous media storage

HORIZON-JTI-CLEANH2-2024-02-01

Expertise on understanding environmental ecosystems; control, diagnostic and prevision tools for process monitoring

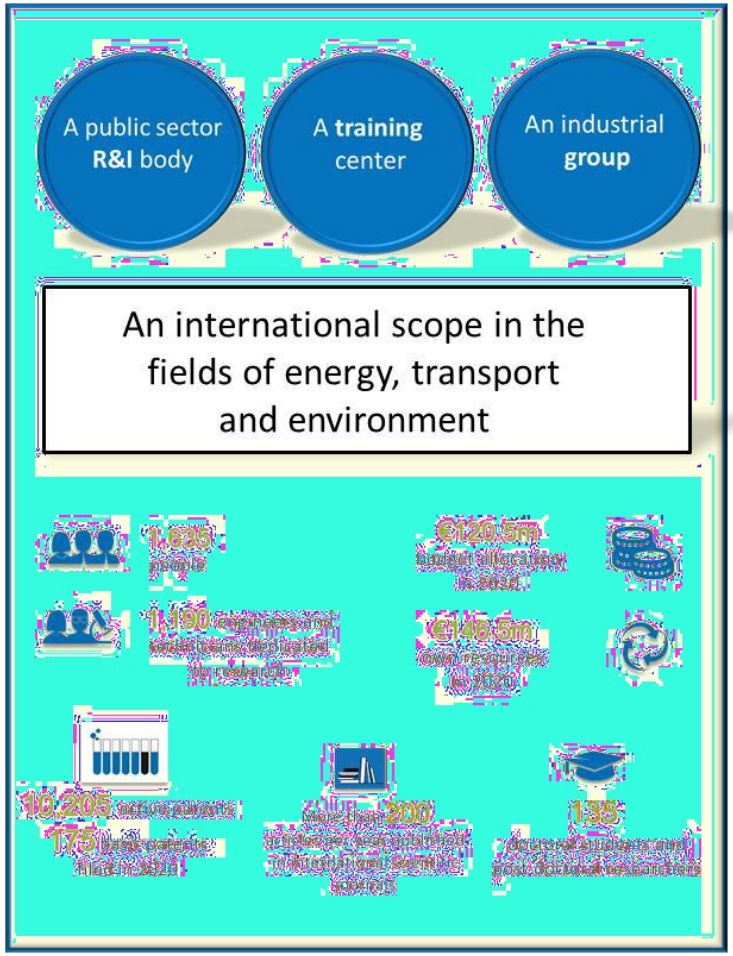
- Experimental sampling strategy;
- Microbial communities characterization: density, diversity, structure and activity;
- Biodiversity ecosystem function relationship investigation.

- *« Taxonomic and functional characterisation of indigenous microbial populations present in the different European porous media geological formation »*
- *« Assess the microbial and geochemical reactions and their interactions between the two to clearly distinguish the reactions of hydrogen (and eventually considering also the impurities due to conversion of depleted natural gas storage to hydrogen storage) within each specific site »*

Possibility to combine with IMT Alès expertise on environmental and technological risk management (hydrogen storage, use and distribution)

IFP ENERGIES NOUVELLES

IFP Energies nouvelles (RTO)



Hydrogen: 2 main R&D axis

- **Hydrogen & Subsurface:**
  Natural H_2 and Underground H_2 Storage
- **Hydrogen & Materials**
  Compatibility of metals & polymers under H_2 environment

Calls for Proposals targeted:

HORIZON-JTI-CLEANH2-2024-02-01: Investigation of microbial interaction for underground hydrogen porous media storage

HORIZON-JTI-CLEANH2-2024-02-02: Novel large-scale aboveground storage solutions for demand-optimised supply of hydrogen

Call of tender: Potential of natural/geologic hydrogen in Europe

VISIT OUR BOOTH: 6F14

Contacts

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Tel: +33 1 47 52 69 60

Nicolas FERRANDO
nicolas.ferrando@ifpen.fr
Tel: +33 1 47 52 66 24

COMPETENCE OFFER 1: H_2 AND SUBSURFACE

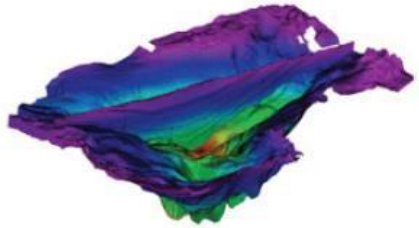
Natural H_2 & Underground H_2 Storage

EXPERIMENTAL SETUPS

- Sampling campaign, field studies
- Gas analyses (noble gases, isotopes, dissolved gas)
- Geochemical & geological survey
  - H_2 and microbial activity
  - Reactional mechanisms
- Characterization of metabolisms
- Batch/core flood experimental facilities

MODELING TOOLS

- Bassin scale modeling
  - H_2 migration in complex basin
- Reservoir scale modeling
  - Geochemistry
  - Bioreactivity



Underground H_2 Storage experiences

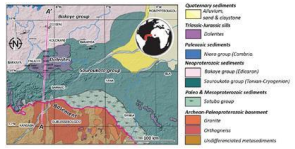
HYSTOREN
ANR Project
2023-2026
Derisking a hydrogen storage in a shallow aquifer

FrHyGe
UE –HORIZON CLEANH2 Project
18 participants
2024-2028
Operate two full-scale demonstrators for H_2 storage in salt cavern

Natural H_2 exploration: field trips & surveys

Kansas

Mali



New-Caledonia

Djibouti

Oman

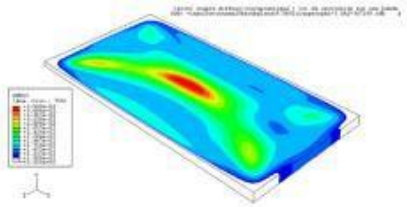
COMPETENCE OFFER 2: H_2 AND MATERIALS

EXPERIMENTAL SETUPS

- Permeation across polymer or metal membrane
- Blistering
- Gas and aqueous H-charging
- Thermal desorption
- High-resolution imaging

MODELING TOOLS

- Atomic and molecular simulations
- Multiscale & multiphysic models
- Mechanical modeling (finite element analysis, FAD)
- Economic and life-cycle analysis



HyPerStock

PEPR-H2 Project
2022-2027

Main objective:

- To develop innovative material (polymer & metals) for high- pressure hydrogen storage
- Blistering & permeation experiments

MRC H_2

Member Research Consortium on interactions between materials and Hydrogen

Institut de la Corrosion
French Corrosion Institute

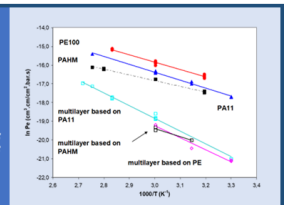
- An annual fee of 6.5 keuros per member
- A minimum commitment of 3 years
- All funding allocated to R&D
- Working topic defined by MRC's members
- Started 2022 but possibility to join any time

PolHYtube

ANR Project 2007-2010

Coordinator:

Partners:



Klopffer, M. H.; et al. (2012) Materials Development & Technico-Economic Benchmark - Defect and Diffusion Forum, 323-325, p. 407–412.

Main objective:

- To develop new material for hydrogen distribution networks
- Permeation experiments and modeling

HSL Technologies

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Belén MORENO

Business Department

- Creating partnerships
- Applying for financing
- Building projects

HSL TECHNOLOGIES

Deeptech startup (SME)

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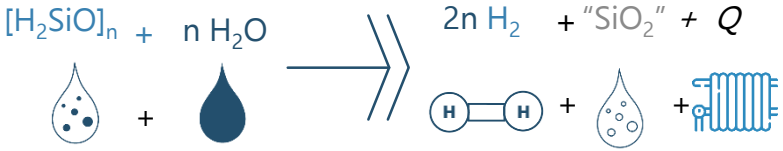
HSL TECHNOLOGIES — HYDROGEN STORED AS LIQUID

Thanks to the technology that HSL Technologies has developed, H_2 can be released from a stable carrier with no energy input needed.

H_2 is released from HydroSil on demand without energy

Release reactor



The release reactor is to be settled at the import countries, at low cost.

Topics foreseen:

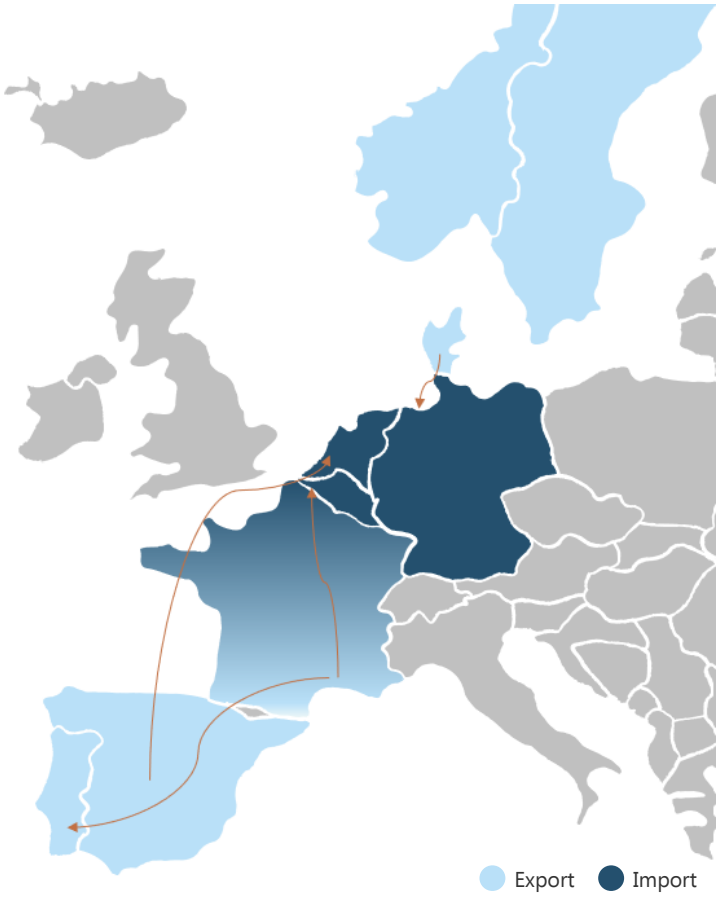
- Transport/storage of H_2
- H_2 import/export strategy
- Deployment of H_2 industry
- Clean H2 Partnership AWP:
  - TC2-02
  - TC3-03

THE PROJECT: RHY EU

Release **Hy**drogen in **EU**rope

- A release pilot to import H2
- TRL6 > TRL7-8
- Few inputs needed
- Replicable in different countries

RHYB	RHYD	PRHYSM



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HSL TECHNOLOGIES | HYDROGEN STORED AS LIQUID

Thanks to the technology that HSL Technologies has developed, H_2 can be released from a stable carrier with no energy input needed.

DIFFERENT INITIATIVES

RHYD
Proving the import of H_2 via Hydrosil and inland truck distribution

SHIP - 0
Demonstration of a zero-emission ship
TC3-03

RHYB
Design, installation and commissioning of a release reactor pilot in the Port of Antwerp Bruges

PRHYSM
Testing the connection between HSL technologies and an Hydrogen Refueling Station
TC2-02

Topics of interest:
- H_2 regulation framework
- H_2 handling expertise
- H_2 for mobility, industry

Our expertise: HYDROSIL

- ✓Liquid, stable, safe
- ✓Earth friendly
- ✓No energy needed to release H_2
- ✓Cost competitive
- ✓Use of conventional infrastructures

TYPE OF PARTNERS SOUGHT

EPC companies
H_2 producer
Institutions for permitting

TRANSPORT INFRASTRUCTURE

Maritime logistics
Port close to the charging reactor
Truck logistics
Stockist

PLACES WITH RELEASE PILOTS

H2 hubs
On-board applications
Strategic storage

CETIM (Technical Centre for Mechanical Industry): a Mechanical Centre of excellence to support the development of Hydrogen sector

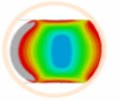
Gouenou GIRARDIN – Technical Manager Hydrogen Strategic Project

gouenou.girardin@cetim.fr – +33 (0)6 70 24 15 98

A dedicated R&D Roadmap

Material expertise, characterisation and testing

- Mechanical & fatigue
- Physico-chemical characterisation
- Permeation and diffusion
- Tribological behavior
- Sealing properties



Design & Modelling

- Failure analysis & Modelling
- Pressure Equipment design

Towards the massification of production

- TP composite design and manufacturing
- Welding
- Stack manufacturing & design
- Technical cleanless
- Specific Manufacturing

Equipment control and qualification

- Test engineering for system qualification
- Sensors evaluation and instrumentation
- Installation monitoring SHM
- LH_2 / LHe environment

H_2 associated developpements

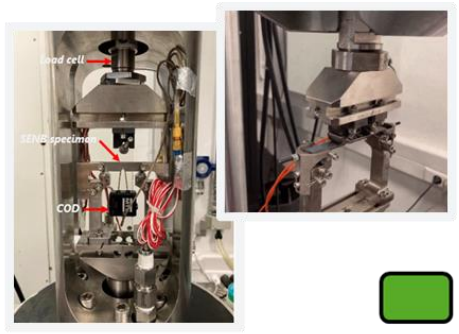
- NH3
- CCUS

Standardisation & Knowledge dissemination

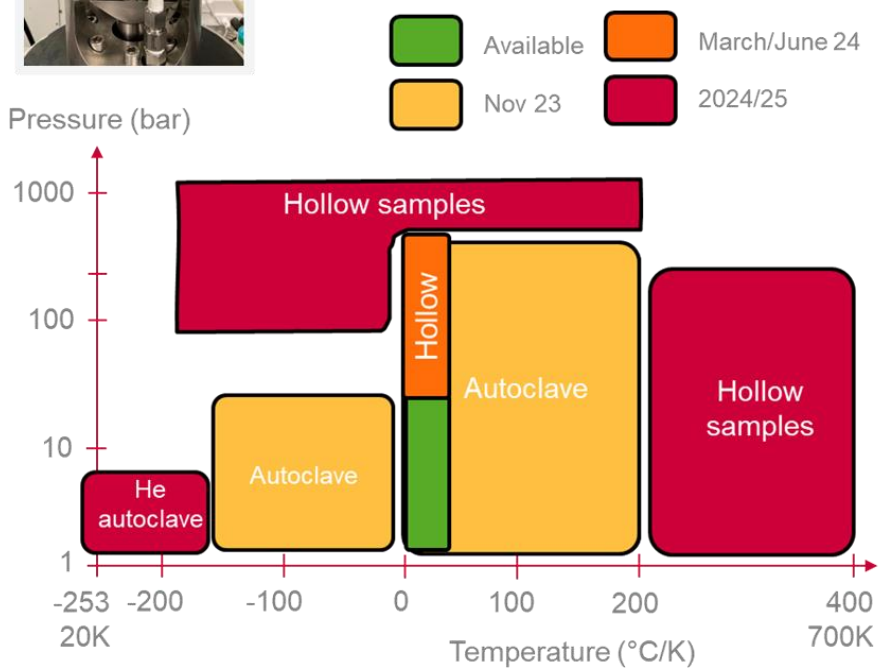
A will to be partner:

- **HORIZON-JTI-CLEANH2-20/24-02-05:** *Demonstration and deployment of multi-purpose Hydrogen Refuelling Stations combining road and airport, railway, and/or harbour applications*
- **HORIZON-JTI-CLEANH2-2024-05-01:** *Guidelines for sustainable-by-design systems across the hydrogen value chain*

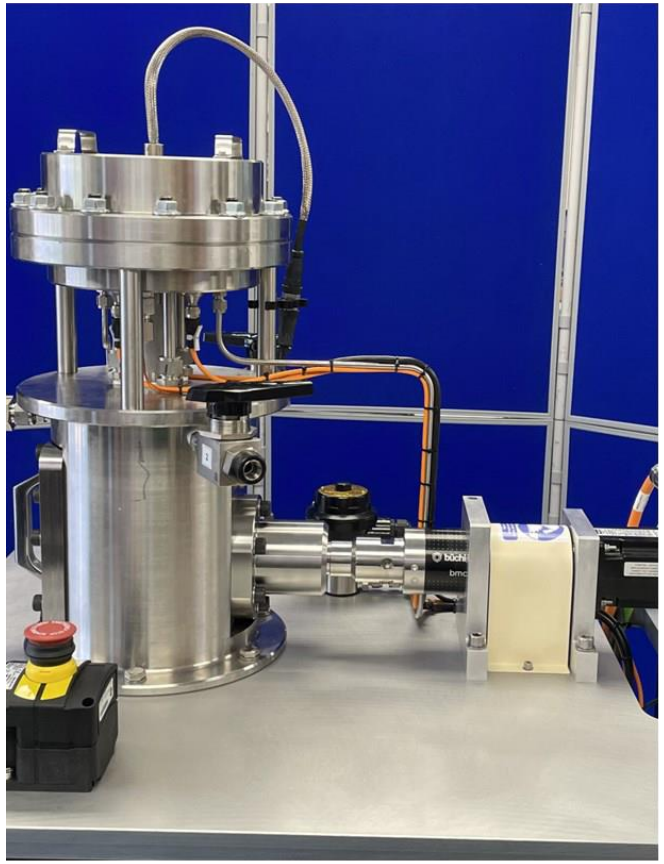
Dedicated tools to perform mechanical testing under H_2 environment



- Environment: H_2, N_2, He, CH_4 and blends
- Temperature: from 20K to 700K
- In addition, pressure vessel for static ageing/uptaking until 350°C & 1000 bars

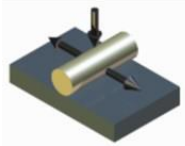


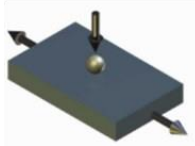
Dedicated tools to perform tribological testing

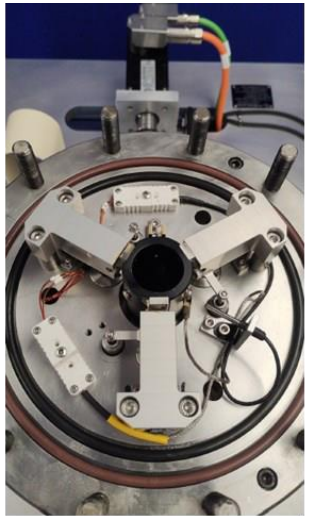


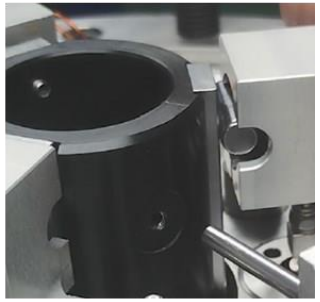
Reciprocating Tribometer

- **3 Workstations**
- **Max Pressure: 80 bar**
- **Operating Conditions**
  - Stroke: 0 to 20 mm
  - Frequency: 0 to 5 Hz
  - Normal Load: 5 to 50 N
  - Temperature: -55 to 150°C









Dedicated tools to evaluate sealing performances

Leak rate measurement expertise, Characterization, Sealing mechanism

- Rapid gas decompression 1000bar & 70bar/min
- Material ageing
- Permeation tests & fugitive emissions
- Leakage monitoring
- Modelling

Ageing

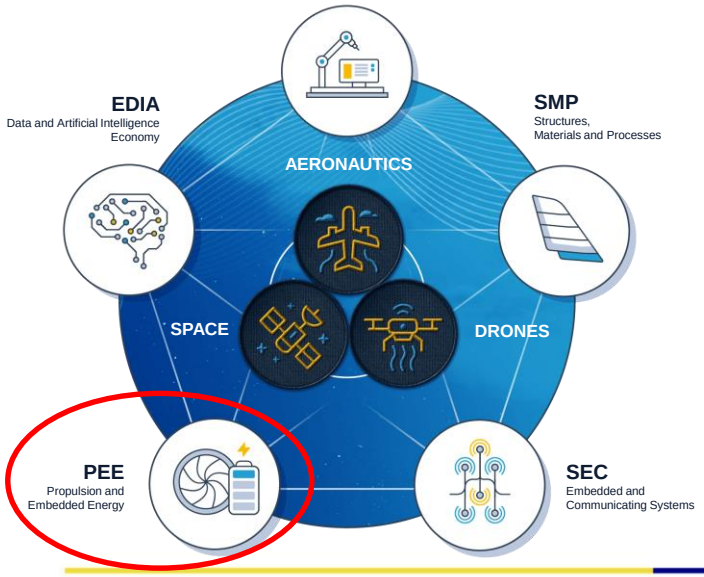
H_2 rapid gas decompression

Permeation

2000 kN load capacity, up to 200 bar

Aerospace Valley

Introduction



Laurent Bizieau – Energy Systems Engineer

- In charge of Propulsion & Embedded Energy Ecosystems
- Skills : embedded energy systems, propulsive architectures, new energy sources, energy logistics
- Areas : Aeronautic, Space and Drones applications – On-ground energy systems

https://www.aerospace-valley.com
bizieau@aerospace-valley.com
+33 6 86 37 87 87

europe@aerospace-valley.com

Aerospace Valley – 1st European Aerospace Cluster

LEADING
AN INTERNATIONALLY RENOWNED DYNAMIC NETWORK

+830 Members (including more than 560 SMEs)
+15 000 Contacts
+200 Events per year

INNOVATING
AND ACCESSING FUNDING

739 R&T funded projects
1.9 billion € combined cost of projects
712 million € Public funding received

DEVELOPING
AND ACCELERATING THE GROWTH OF OUR MEMBERS

4 key areas
- Environmental transition
- Digital transformation
- International development
- Competencies and skills

+100 SMEs and Start-ups collectively or individually benefiting from support (on average per year)
+300 companies visited by Cluster teams (on average per year)

Aerospace Valley Hydrogen Ecosystem

Fuel Cells

LIEBHERR
H3Dynamics
Pragma industries
SAFRAN
AIRBUS

H2 Production

GENVIA
Qair
MGH energy
Elyse
sakowin GREENenergy

Academics

Laplace
IMT Mines Albi-Carmaux
CERFACS
IMFT
ONERA
GROUPE isae
ICA
INSTITUT P'
cea
ifp Energies nouvelles
INSTITUT CARNOT CIRIMAT

Propulsive systems / Equipments

AIRBUS
ZEROAVIA
SAFRAN
Universal Hydrogen
FACT
Pragma industries
BLUE SPIRIT AERO
Elixir Aircraft
beyond AERO
MAUBOUSSIN

Storage / Logistics

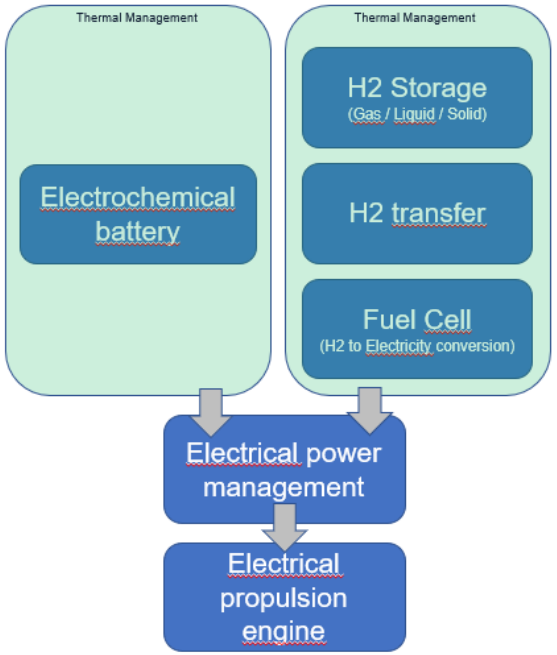
CMP COMPOSITES
NEXEYA
ABSOLUT Hydrogen
TERĒGA

Tests

FEV
H2PULSE
AKIRA
AVL
EMITECH GROUPE
SERMA GROUP

Hydrogen uses

Hydrogen as a “Battery”



Hydrogen Electric propulsion

HORIZON-JTI-CLEANH2-2024 -03-01
HORIZON-JTI-CLEANH2-2024 -03-02

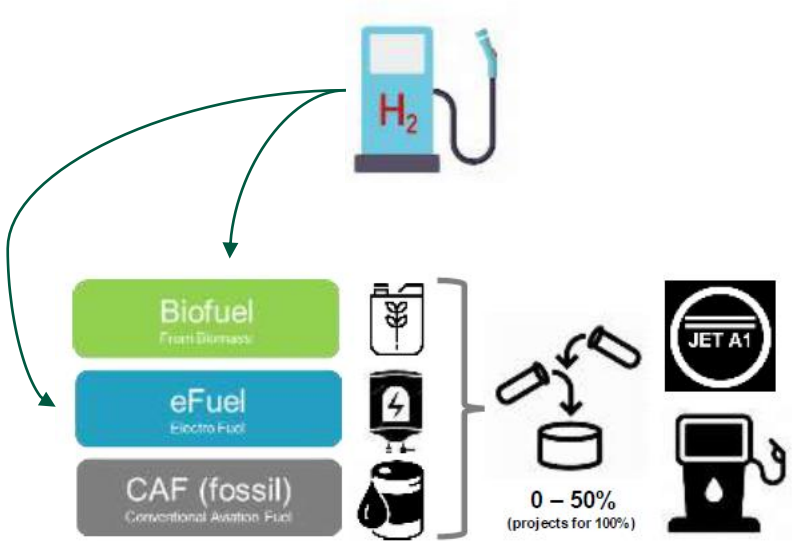
Hydrogen as a “Fuel”

Commercial aviation (CS25)

Light aviation (CS23)

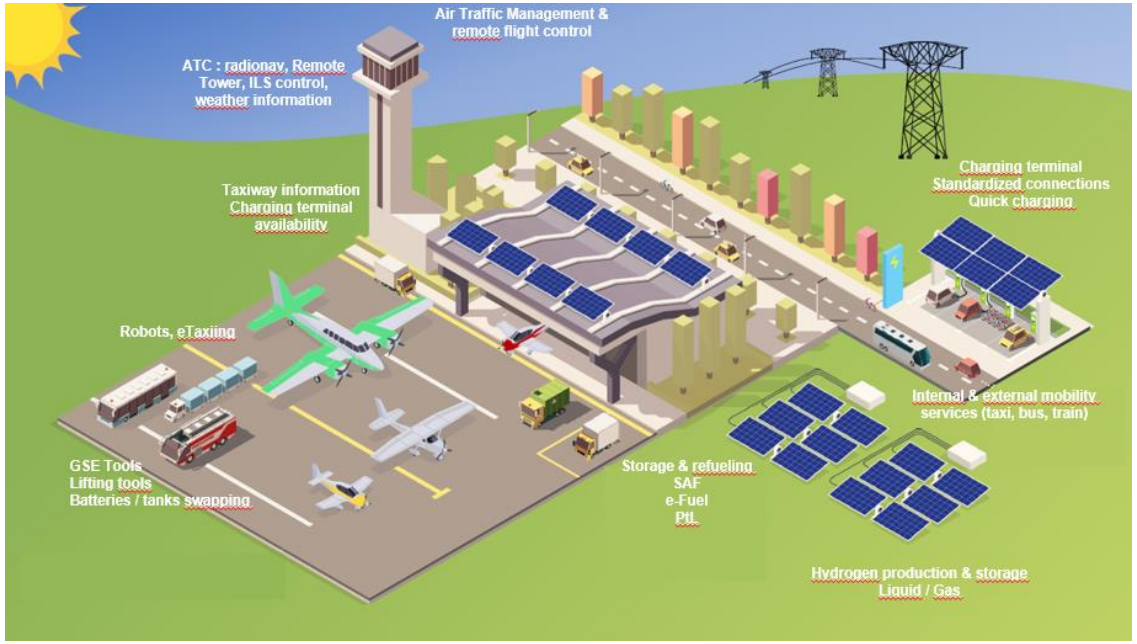
HORIZON-JTI-CLEANH2-2024 -04-02

Hydrogen as a “chemical component”



SAF : Sustainable Aviation Fuel

Hydrogen Infrastructures



Airports : energy hubs for various mobility sectors

- H2 production + distribution
- SAF distribution
- Electricity charging points

Clean Hydrogen Partnership

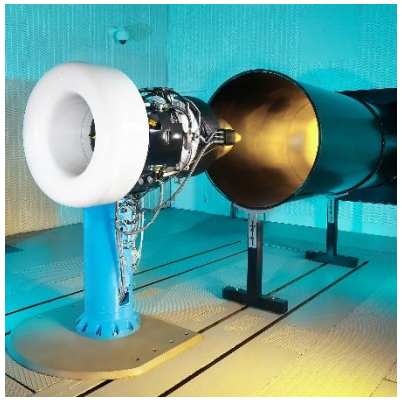
HORIZON-JTI-CLEANH2-2024 -02-02
HORIZON-JTI-CLEANH2-2024 -02-04
HORIZON-JTI-CLEANH2-2024 -02-05

Clean Hydrogen Partnership

HORIZON-JTI-CLEANH2-2024-05-01

Open Hydrogen Platforms :

- For **Industrial** support (tests, development, certification)
- For Academic **Research** activities
- For **Training** / Schools



TURBOLAB (Bayonne)

TECHNOCAMPUS (Toulouse)

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INERIS

INERIS

- National Institute of Industrial Environment and Risks (Non-Profit organization)
- Public body under the aegis of the French Ministry of Environment
- Our mission : **prevention and management of risks** associated with economic activities
  - Flammable, toxic and ecotoxic substances
  - Batteries
  - Air, soil & water pollution
  - Mining and underground storage
  - CCS/CCU
- 530 people (350 engineers & researchers) – Main offices 60 km north of Paris

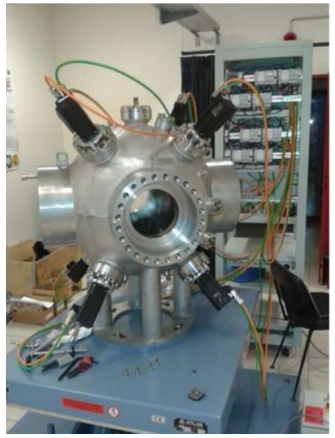
Contact:

- Franz LAHAIE
- Hydrogen project manager
- Strategy, science policy and communication department
- Franz.Lahaie@ineris.fr - Mob: +33 6 20 86 81 85

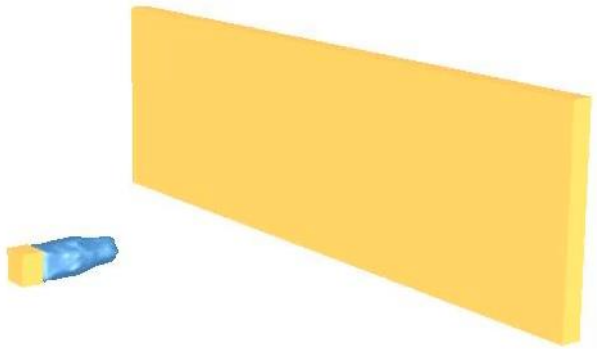
25 years of experience on safety of H_2 and derived molecules (NH_3, CH_3OH…)

- **Competences in a large of variety of disciplines**
  - Risk Analysis
  - Process safety
  - Fluid mechanics
  - Numerical modelling
  - Test engineering
  - Chemistry
  - Geomechanics
  - Economics
  - Sociology

Laboratories



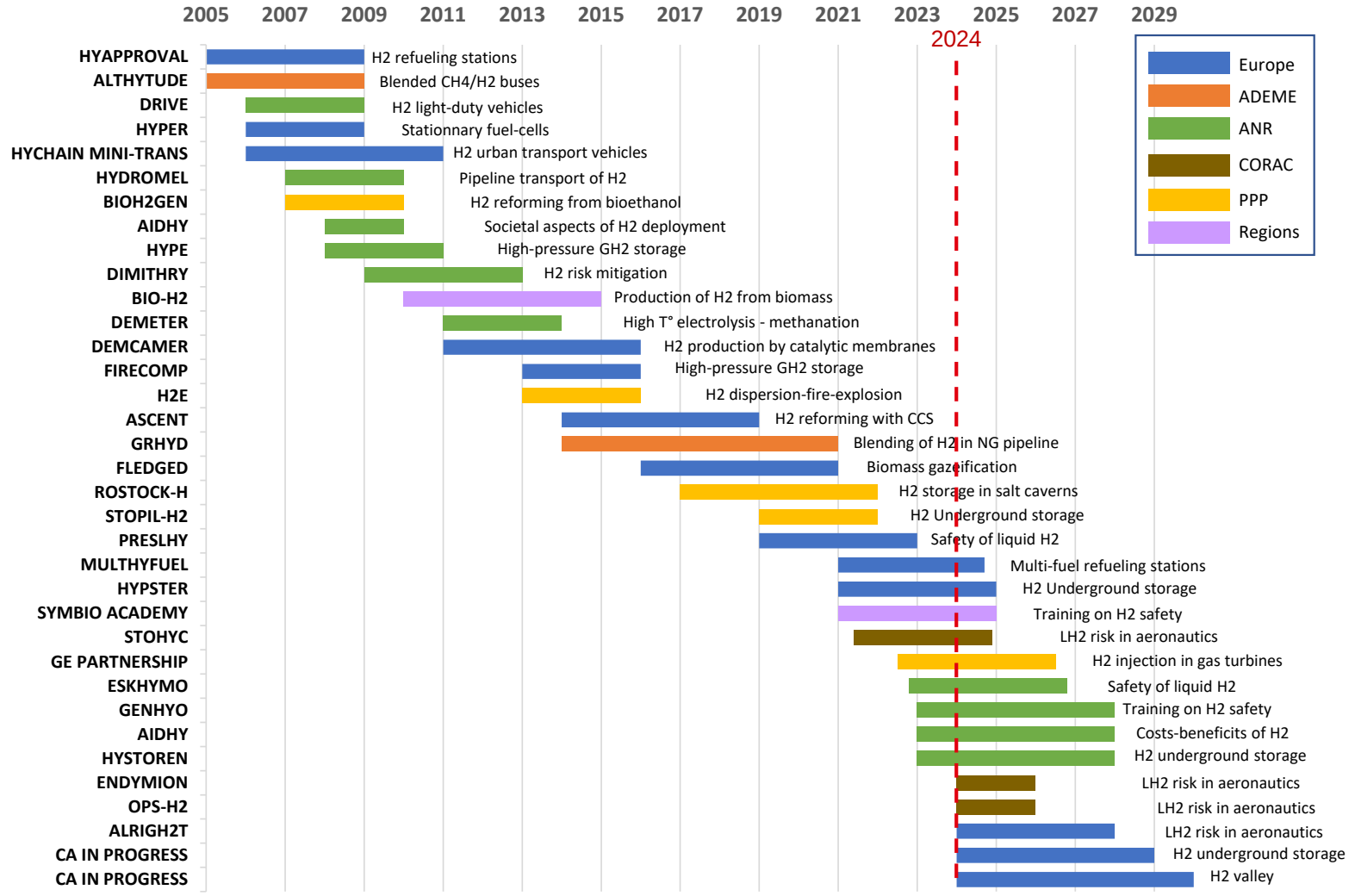
Numerical tools



Large-scale testing facilities

More than 35 research projects on H_2 safety in recent years

- Projects in course:
  - **MULTHYFUEL** (FCH JU2)
  - **HYPSTER** (FCH J2)
  - **SYMBIO ACADEMY** (AURA Region)
  - **STOHYC** (CORAC)
  - **GENERAL ELECTRIC** (Partnership)
  - **ESHYMO** (PEPR H2)
  - **AIDHY** (PEPR H2)
  - **GENHYO** (CMA)
  - **HYSTOREN** (ANR)
- Projects starting:
  - **ENDYMION** (CORAC)
  - **OPHS-H2** (CORAC)
  - **ALRIGH2T** (Horizon Europe)
  - **NEW PROJECT 1** (Clean H_2 JU)
  - **NEW PROJECT 2** (Clean H_2 JU)



Ineris potential interest in 2024 Clean H2 calls:

- **HORIZON-JTI-CLEANH2-2024-02-01**: Investigation of microbial interaction for underground hydrogen porous media storage
- **HORIZON-JTI-CLEANH2-2024-02-05**: Demonstration and deployment of multi-purpose Hydrogen Refuelling Stations combining road and airport, railway, and/or harbour applications
- **HORIZON-JTI-CLEANH2-2024-03-03**: Next generation on-board storage solutions for hydrogen-powered maritime applications
- **HORIZON-JTI-CLEANH2-2024-02-02**: Novel large-scale aboveground storage solutions for demand-optimised supply of hydrogen
- **HORIZON-JTI-CLEANH2-2024-05-01**: Guidelines for sustainable-by-design systems across the hydrogen value chain

If you need an experienced partner in safety issues, do not hesitate to contact us !

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ArianeGroup

- Speaker : **Sebastien Veyry – Strategy & Innovation Manager**
- Company ID : **ArianeGroup SAS (Industry)**
- Department : **Hydrogen Programmes**
  Heavy mobility & associated infrastructures
- The Expertise of the Company : **Ground infrastructures, LH2 equipment and systems onboard, engineering, tests and services**

Contacts :

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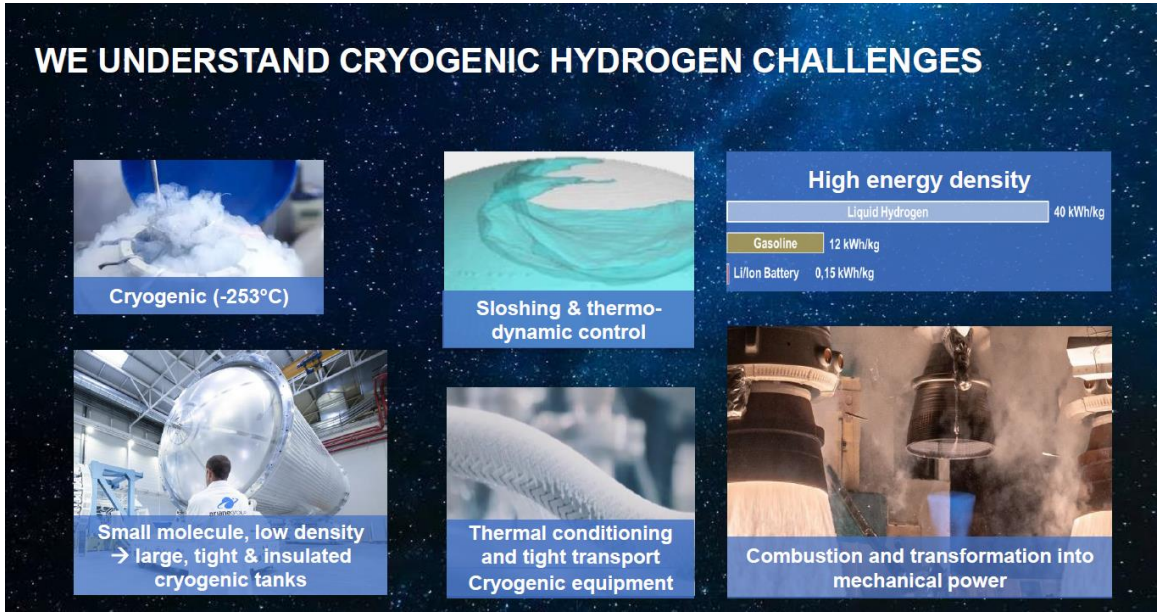
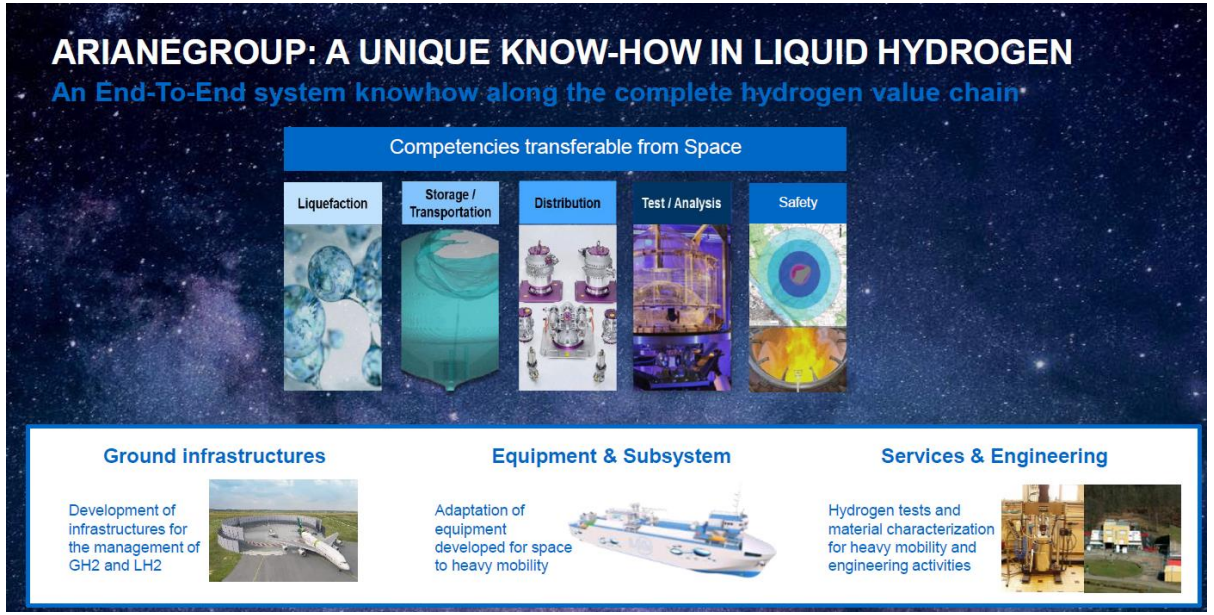
Head of Hydrogen Programmes
T : +33 (0)7 87 14 54 93
nadege.vissiere@ariane.group

Bruno Mangin
Sales & Contracts Manager
T : +33 (0)6 87 18 27 87
bruno.mangin@ariane.group





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ARIANEGROUP

Competencies Offer (application deadline - 17th April 2024)

Topics	Expertise / Competencies	Previous / Current participation in similar project	ArianeGroup Role
HORIZON-JTI-CLEANH2-2024-03-03 Next generation on-board storage solutions for hydrogen-powered maritime applications	• Design, development and test of safe LH2 storage systems for space launchers • Design of distribution architectures • Studies on LH2 tanks for heavy mobility • Hydrogen test benches	• Works with partner on design and test of LH2 containment for shipping • Works and expertise on Hydrogen architectures for maritime applications • Works with European shipyards	Engineering and/or design and/or integration and test
HORIZON-JTI-CLEANH2-2024-02-04 Demonstration of innovative solutions for high-capacity, reliable, flexible, and sustainable hydrogen compression technologies in commercial applications	• Design, development and test of turbomachinery • Handling of GH2/LH2 systems and subsystems • Test bed adapted for H2 environment	• Works with energy providers • Works with safety and certification entities regarding management of H2	Engineering and/or design and/or test
HORIZON-JTI-CLEANH2-2024-02-05 Demonstration and deployment of multi-purpose Hydrogen Refueling Stations combining road and airport, railway, and/or harbor applications	• Experience in ground refuelling equipment and bunkering systems • Management of GH2 high pressure • Test bed adapted for H2 environment	• Works on refuelling solution for aeronautic ground demonstration • Works on EU project for high-rate refuelling station	Engineering and/or design and/or integration and test
HORIZON-JTI-CLEANH2-2024-03-04 Demonstration of hydrogen fuel cell-powered inland or short sea shipping	• Design, development of GH2/LH2 systems and subsystems and equipments • Test bed adapted for H2 environment	• Works with design office, shipyard, ships owners, regions, certification entities in Seine river for inland waterways vessels	Design and/or integration and test
HORIZON-JTI-CLEANH2-2024-04-02 Improved characterization, prediction and optimization of flame stabilization in high-pressure premixed hydrogen combustion at gas-turbine conditions	• Experience in hydrogen combustion and turbomachinery • Development of simulation and modelisation tools for injection / combustion	• Works with academics and industries in developement of models to characterize and predict behaviour	Expertise and calculation

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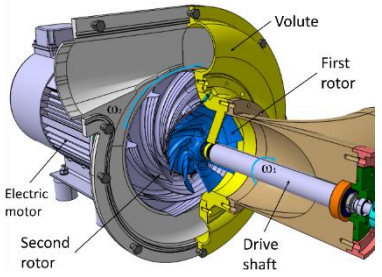
ENSAM

Michael DELIGANT, Associate Professor
Arts et Métiers Sciences et Technologies, Paris Campus
Fluid Engineering and Energy Systems lab (Academic)
michael.deligant@ensam.eu, https://lifse.artsetmétiers.fr

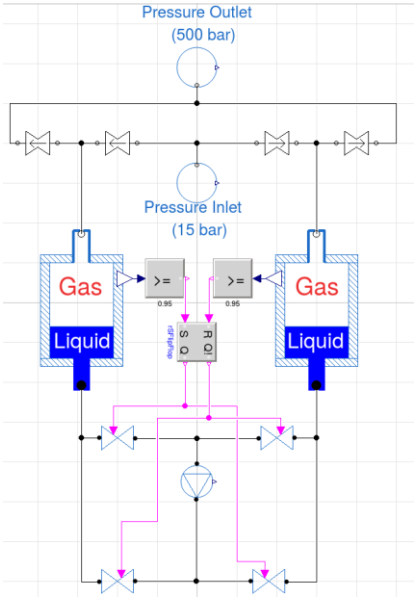
Proposed expertise

- Turbomachines
  - compressor, blower, turbine, pump, fan, turbocharger
  - design, simulation, prototyping, experimental characterization
  - Stability, optimization, surge, cavitation
- Fluid flows with heat and mass transfer, two-phase flows
- Thermal Management
- Computational Fluid Dynamic
- System modeling, component interactions
- Balance of Plant for fuel cell system

ORC Loop – 1MWth



Counter rotating compressor



Liquid piston compressor

The topics we are interested in:

Calls:

- Balance of plant components, architectures and operation strategies for improved PEMFC system efficiency and lifetime
  HORIZON-JTI-CLEANH2-2024-03-01
- Scaling-up Balance of Plant components for efficient high power heavy duty applications
  HORIZON-JTI-CLEANH2-2024-03-02

Focus on auxiliary components:

- Air loop: compressor, valve, system interactions
- Thermal management: pumps, fan, heat exchangers, system interactions
- For multi stacks coupling
- Approaches: CFD, system modelling

Ready to :

- Join a consortium or coordinate a proposal

Looking for

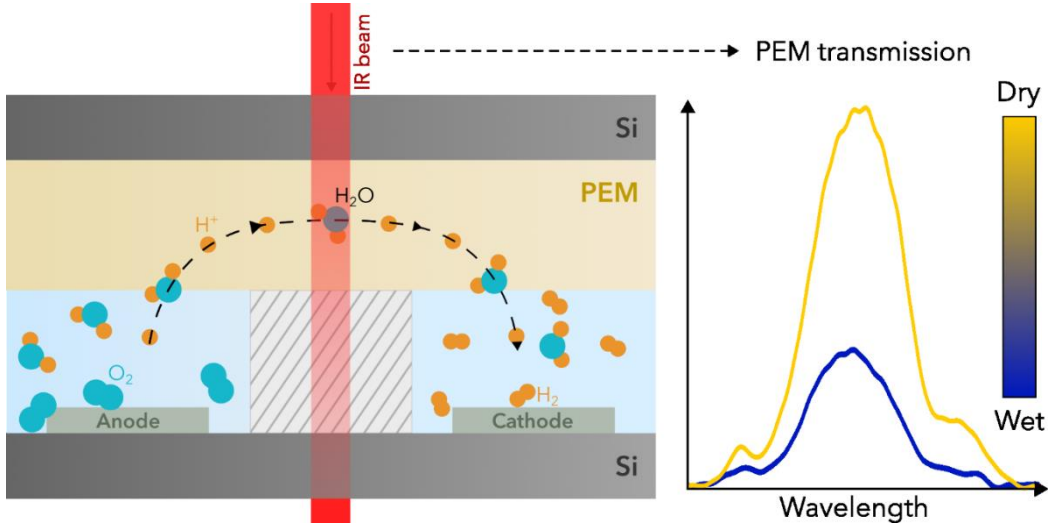
- Industrial partners
- Academics with complementarity expertise, i.e: electrochemical, electrotechnical, power electronics, control,

Who we are

- CHEVALIER Stéphane
- Arts et Métiers (academic, engineering school)
- Energetics
- Infrared imaging, EIS for fuel cells and electrolyzers

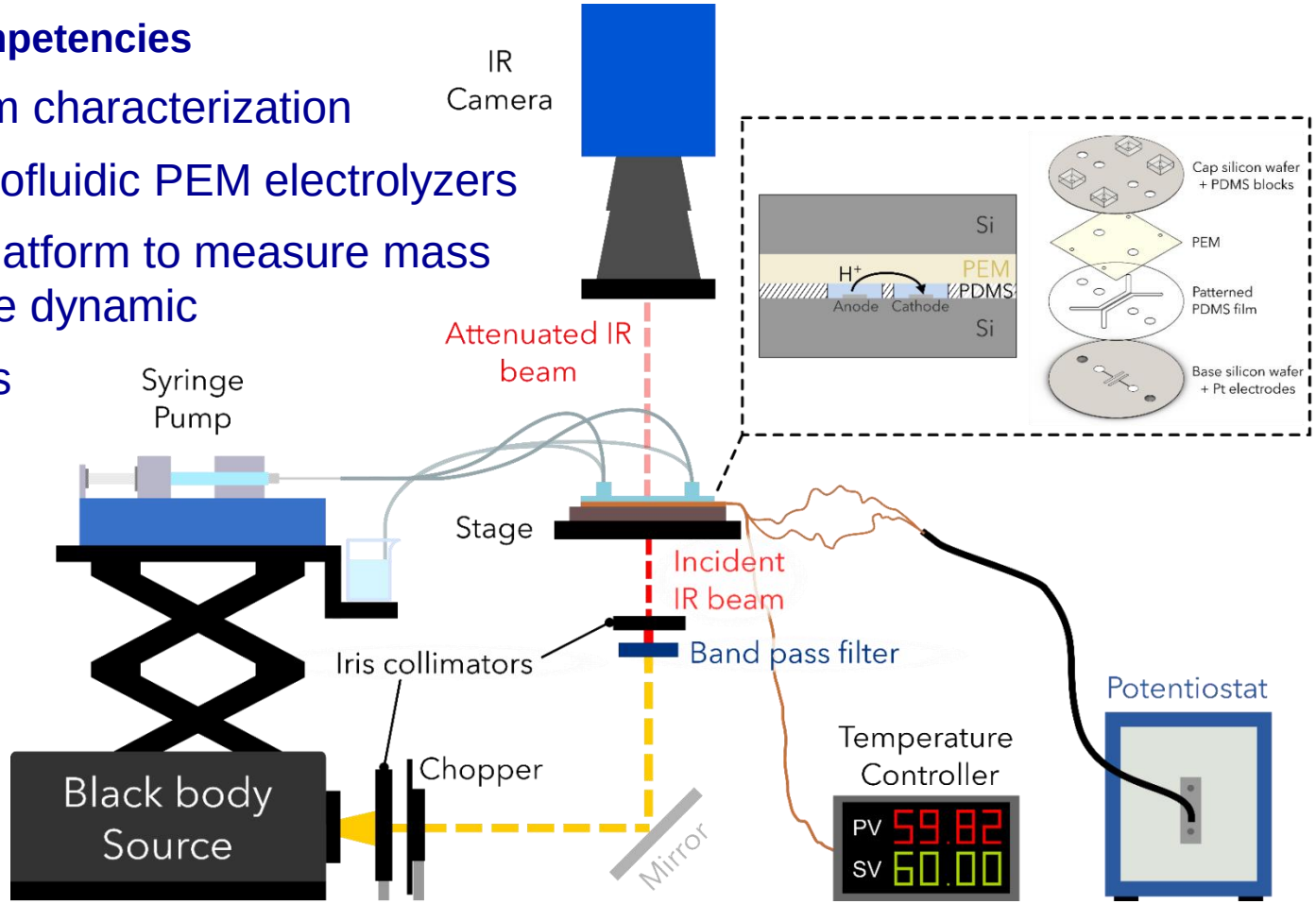
Contact information

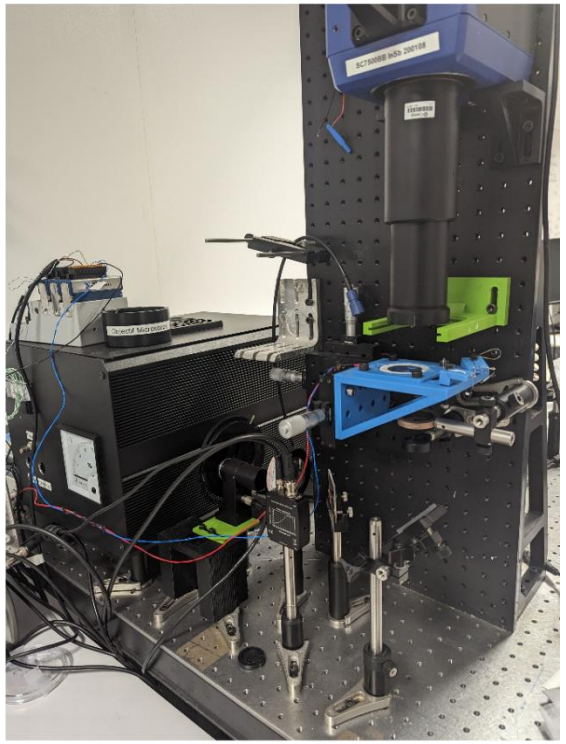
- stephane.chevalier@u-bordeaux.fr
- http://chevalierstephane.fr/



Our expertise and competencies

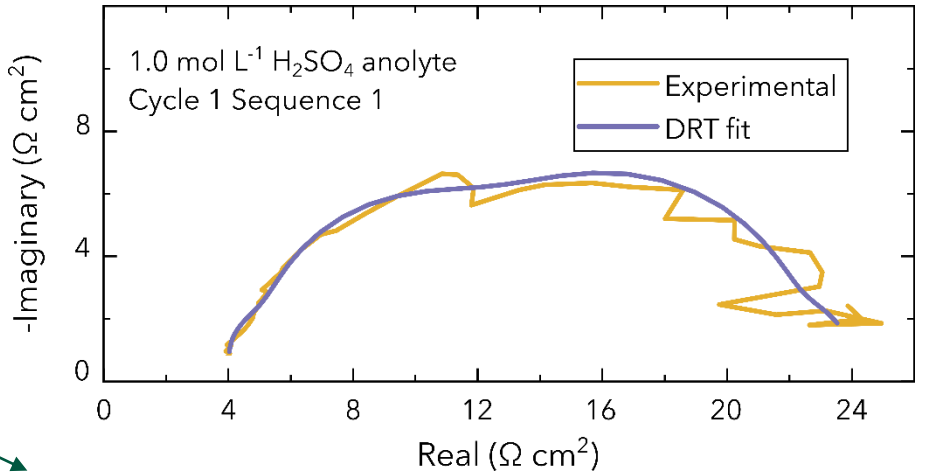
- Electrolyzer system characterization
- Fabrication of microfluidic PEM electrolyzers
- Infrared imaging platform to measure mass transfer and bubble dynamic
- EIS measurements

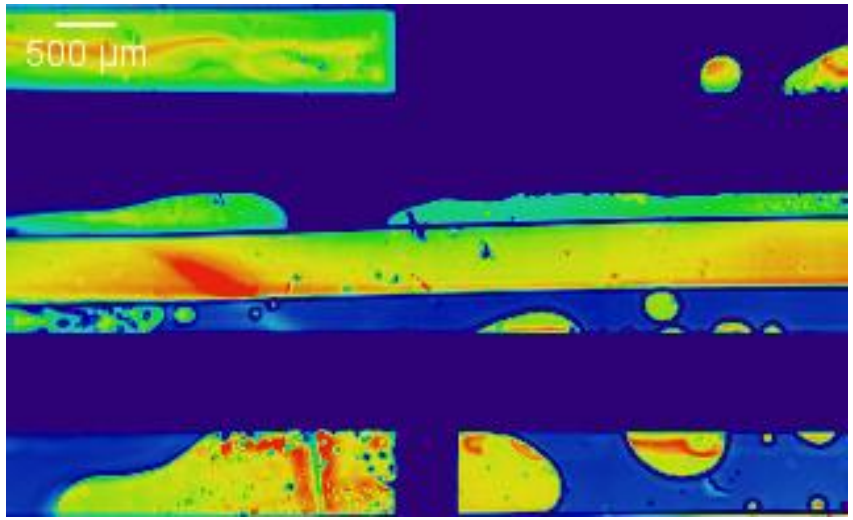


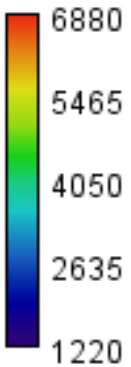


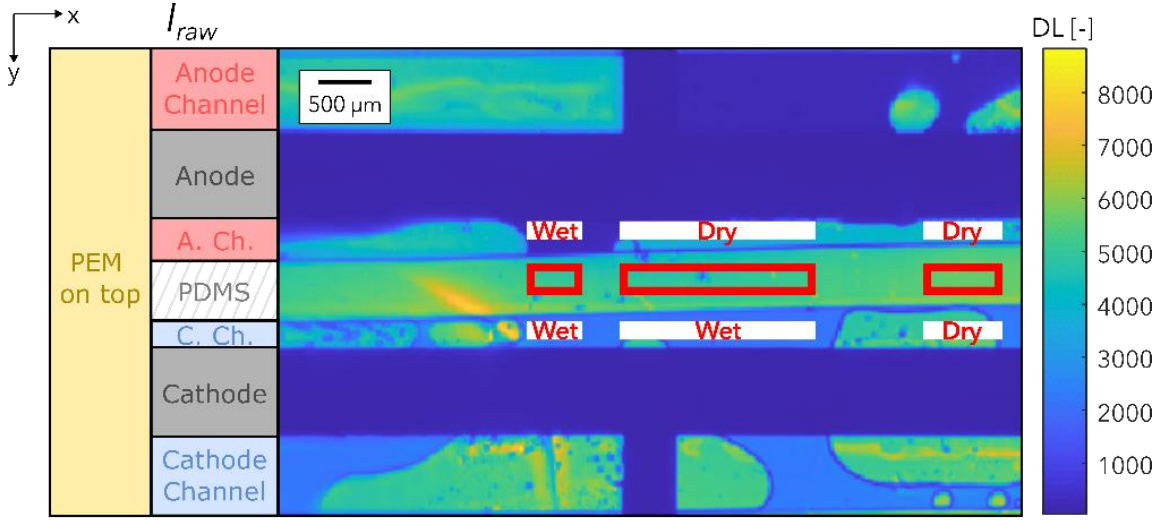
Our expertise and competencies :

- DRT analysis of fuel cell and electrolyzers system
- PEM hydration measurements
- Operando Gas transport dynamics in PEM electrolyzers









The topics we are interested in:

- Characterization of new PEM material, catalyst and electrolyzers design
- Electrolyzer material durability
- EIS analysis of PEM and fuel cell systems

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GRT GAZ – RICE

Cristina Lopez Lazaro

Research Engineer at RICE GRTgaz

Fields of expertise: gas analysis, gas leakage detection, hydrogen, LCA

WP leader of an ongoing European project OPTHYCS funded under Clean Hydrogen Partnership*

Contact: cristina.lopez@grtgaz.com

RICE web page: https://researchbyrice.com/

The OPTHYCS project has received funding from the Clean Hydrogen Partnership under Grant Agreement No 101101415. This Partnership receives support from the European Union's Horizon Europe Research and Innovation program, Hydrogen Europe and Hydrogen Europe Research.

RICE – GRTgaz's Research & Innovation Center for Energy

Our positioning at the crossroads of industry and the research world makes us a key player and facilitator of operational and applied research on gas infrastructures

77

Inventions in the transport, storage and distribution of gases

110

Men and Women: doctors, engineers, project leaders, technicians

26

Test benches

€32 M

GRTgaz R&D&I budget

8

Theses underway, with 3 being supervised in the French program of Industrial Agreement for Training through Research

7

Ongoing European projects +2 granted European projects under signature

*Figures from end of 2022

RICE – GRTgaz's Research & Innovation Center for Energy

Our fields of expertise to respond to global challenges

Gas Characterization

Production and usage processes of new gases & carbon reduction

Gas detection and emissions quantification

Integrity of metallic and non-metallic pipelines

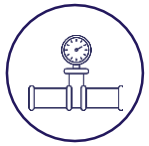
Corrosion protection and management

Industrial safety and studies of dangerous phenomena

Construction and damage prevention techniques

Systems Management and Optimization

Prospective modeling of energy system



Design and qualification of gas measuring and equipment

We are part of several European consortiums granted under Clean Hydrogen Partnership

Project	Consortium	GRTgaz' role	Project lifetime	Project budget
OPTHYCS Optic fibre-based hydrogen leak control systems	Consortium: 7 partners Coordinator: Enagas (Spain)	RICE WP leader	36 months from 1/01/2023 to 31/12/2025	Budget : 2,5 M€
THOTH2 Novel methods of testing for measurement of natural gas and hydrogen mixtures	Consortium: 13 partners Coordinator: SNAM (Italy)	RICE WP leader	30 months from 1/02/2023 to 31/07/2025	Budget : 2,16 M€
CANDHY Compatibility Assessment of Non-steel metallic Distribution gas grid materials with Hydrogen	Consortium: 8 partners Coordinator: Hydrogen Aragon (FHa) (Spain)	RICE Task leader	36 months from 1/09/2023 to 31/08/2026	Budget : 2,6 M€
PilgrHYm Pre-normative research on integrity assessment protocols of gas pipes repurposed to hydrogen and mitigation guidelines	Consortium: 12 partners **Coordinator: RICE (France)**	**RICE Coordinator**	48 months from 1/01/2024 to 31/12/2027	Budget : 4 M€
IMAGHyNE Investment to maximise the ambition for green hydrogen in Europe	Consortium: 45 partners Coordinator: region AURA (France)	GRTgaz contributor	72 months from 1/01/2024 to 31/12/2029	Budget : 203 M€
FrHyGe *Grant agreement under signature*		RICE contributor		

In addition to that, we are member of Advisory Board of 3 others ongoing European projects funded under Clean Hydrogen Partnership

Theses projects have received funding from the Clean Hydrogen Partnership. This Partnership receives support from the European Union's Horizon Europe Research and Innovation program, Hydrogen Europe and Hydrogen Europe Research.

AWP 2024

GRT borate on the following topics:

- **HORIZON-JTI-CLEANH2-2024-02-03: Demonstration of hydrogen purification and separation systems for renewable hydrogen-containing streams in industrial applications**
- **HORIZON-JTI-CLEANH2-2024-06-01: Large-scale Hydrogen Valley**
- **HORIZON-JTI-CLEANH2-2024-06-02: Small-scale Hydrogen Valley**

Thank you for your attention

RICE – Research & Innovation Center for Energy
1-3, rue du Commandant d'Estienne d'Orves
92390 Villeneuve-la-Garenne, France

researchbyrice.com

Linkedin
https://www.linkedin.com/company/rice-research-innovation-center-for-energy/

Twitter
https://twitter.com/RICE_Energy

Your contacts:

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R&D Project Manager
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Cristina LOPEZ LAZARO
Research Engineer
Email: cristina.lopez@grtgaz.com

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BRGM

BRGM, French Geological Survey

- **Public institution**
- **Multi-disciplinary experiences:** Geology, critical raw materials, geochemistry, geophysics, geo-mechanics, energetics, hydrogeology, microbiology, environmental issues, monitoring, decision making, uncertainties, social sciences…
- **Activities:**
  - R&D projects (European and French programs, Industrial partners)
  - Expert for the French Government and local administrations
  - International cooperation
- **H_2 positioning:**
  - **Native H_2** : exploration, generation mechanisms, migration / biotic and abiotic reactions. Orange H_2, co-production of native H_2 with geothermal brines (Not clear when the "Potential of natural/geologic hydrogen in Europe" will be open)
  - **Underground storages of H_2 (NH_3?)**: Porous media, cavities
  - H_2 chain requirements: **Critical Raw materials / Water resources**

Contacts

- Francis Claret - Director of scientific program " Energy transition and underground space"

- Contacts for 2024-CleanH2-calls: Francis Claret f.claret@brgm.fr ; Annick Loschetter a.loschetter@brgm.fr

Role of underground solutions for H_2 storage

- **Call HORIZON-JTI-CLEANH2-2024-02-01**: Investigation of microbial interaction for underground hydrogen porous media storage
  - →**Experimental platforms: BIOREP** (Link) **and MIMAROC** (Link)
  - →**Partner of HYLIFE** https://hylife-cetp.com/ - HYLIFE will sample, analyze and characterize many different potential storage sites all over Europe with a focus on the microbial effects at the different sites)
  - →**Involved in Hystories** *https://hystories.eu/* - Hystories has delivered technical developments applicable to a vast range of future aquifer or depleted field sites
  - →**PhD Sabrine Ben Rhouma**, Underground Hydrogen storage with CO2 cushion gas in aquifers – Numerical modeling

→ **Ongoing discussion with possible partners**

Considering the underground for Hydrogen Valleys

- **Calls: HORIZON-JTI-CLEANH2-2024-06-01** (Large-scale Hydrogen Valley) and **HORIZON-JTI-CLEANH2-2024-06-02** (Small-scale Hydrogen Valley)
  - →**BRGM can accompany any French territory** for these calls (regional offices all over Frnce)
  - →**BRGM can investigate the possible underground storage solutions**, considering the geological conditions and the H2 chain
  - →**BRGM can give insights in the water resources** and their suitability for electrolysers performance, and discharge of water from electrolysers
  - →**BRGM can contribute to LCA**

Critical materials for H_2 chain

- **OFREMI**: securing supplies of critical metals, this observatory combines the knowledge and experience of the main French players in analysing the value chains of strategic metals and critical raw materials
- BRGM is a partner of **SCRREEN projects** (https://scrreen.eu/the-project/)
- Calls:
  - **HORIZON-JTI-CLEANH2-2024-05-01: Guidelines for sustainable-by-design systems across the hydrogen value chain**
    - **Possible task contribution in calls below**: BRGM can evaluate the trade-offs between the use of critical raw materials, and contribute to assessing the technologies regarding the raw materials required
      - *HORIZON-JTI-CLEANH2-2024-01-01*: Innovative proton conducting ceramic electrolysis cells and stacks for intermediate temperature hydrogen production
      - *HORIZON-JTI-CLEANH2-2024-01-02*: Advanced anion exchange membrane electrolysers for low-cost hydrogen production for high power range applications
      - *HORIZON-JTI-CLEANH2-2024-01-03*: Development of innovative technologies for direct seawater electrolysis
      - *HORIZON-JTI-CLEANH2-2024-02-02*: Novel large-scale aboveground storage solutions for demand-optimised supply of hydrogen
      - *HORIZON-JTI-CLEANH2-2024-02-03*: Demonstration of hydrogen purification and separation systems for renewable hydrogen-containing streams in industrial applications
      - *HORIZON-JTI-CLEANH2-2024-02-04*: Demonstration of innovative solutions for high-capacity, reliable, flexible, and sustainable hydrogen compression technologies in commercial applications

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Ecole Centrale de Nantes – Institut de Recherche en Génie Civil et Mécanique

Frédéric GRONDIN

Ecole Centrale de Nantes, Nantes Université

Institut de Recherche en Génie Civil et Mécanique, UMR CNRS 6183

Research topics: civil engineering, mechanics of materials, multiscale approaches

frederic.grondin@ec-nantes.fr, phone: +33 612209002

https://gem.ec-nantes.fr/en/utr-ingver-2/

Green H_2 Cycle

Topics foreseen: Green H_2, seawater electrolysis, H_2O reconstitution, gas transportation, water cycle

The extraction of H_2 from seawater will modify the water cycle.

More energy !

Really?

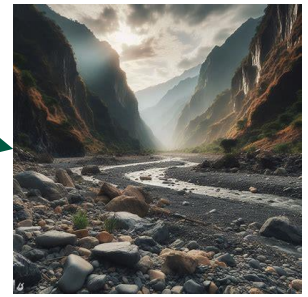
How to store massive H_2 volume?

Less CO_2 -> Ocean heat decrease
-> Less clouds?

More salt concentration
in the sea?

Less water in rivers?

And less source's water
in the sea?

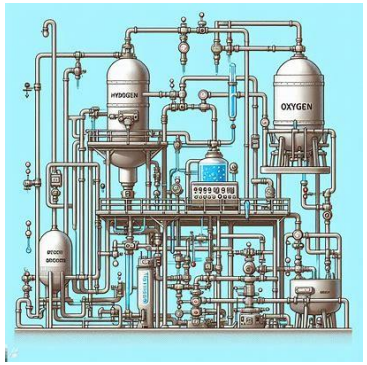


Could it be prevent?

Green H2 cycle

To have a complete water cycle, from the sea to the land, the idea is to keep a part of extracted H_2 from seawater to create H_2O injected into water sources.

We need to transport H_2 and O into pipeline from the electrolysis site in the sea to the land,



A part of pipelines are immerged in the seawater ; a part is underground.

Gas (H_2 and O) are under pressure into the pipeline.

H_2 molecules are very small and the leakage risk exists.

Green H2 cycle

What is the optimized distance for the gas transportation?

What type of materials for the pipeline?

What volumes of H_2 and O to maintain a good water cycle?

How to be sure that the H_2 consumption will not create a new environmental crisis?

Would like to be a partner and add this research topic in calls:
HORIZON-JTI-CLEANH2-2024-06-01: Large-scale Hydrogen Valley
HORIZON-JTI-CLEANH2-2024-06-02: Small-scale Hydrogen Valley

<u>Type of partners we search for have the skills in:</u>
Chemistry, specifically in water electrolysis
Pressure systems measurement
Gas transportation
Hydrology
Green economy

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INOCEL

Jessica Horn

Business Developer

INOCEL – SME

Sales & Partnerships Department

The expertise of our department is primarily focused on forging collaborative partnerships and tailoring our approach to align with varying market dynamics and national policies and regulations, which are crucial for fostering international growth.

jessica.horn@inocel.com | +33 6 28 47 12 22

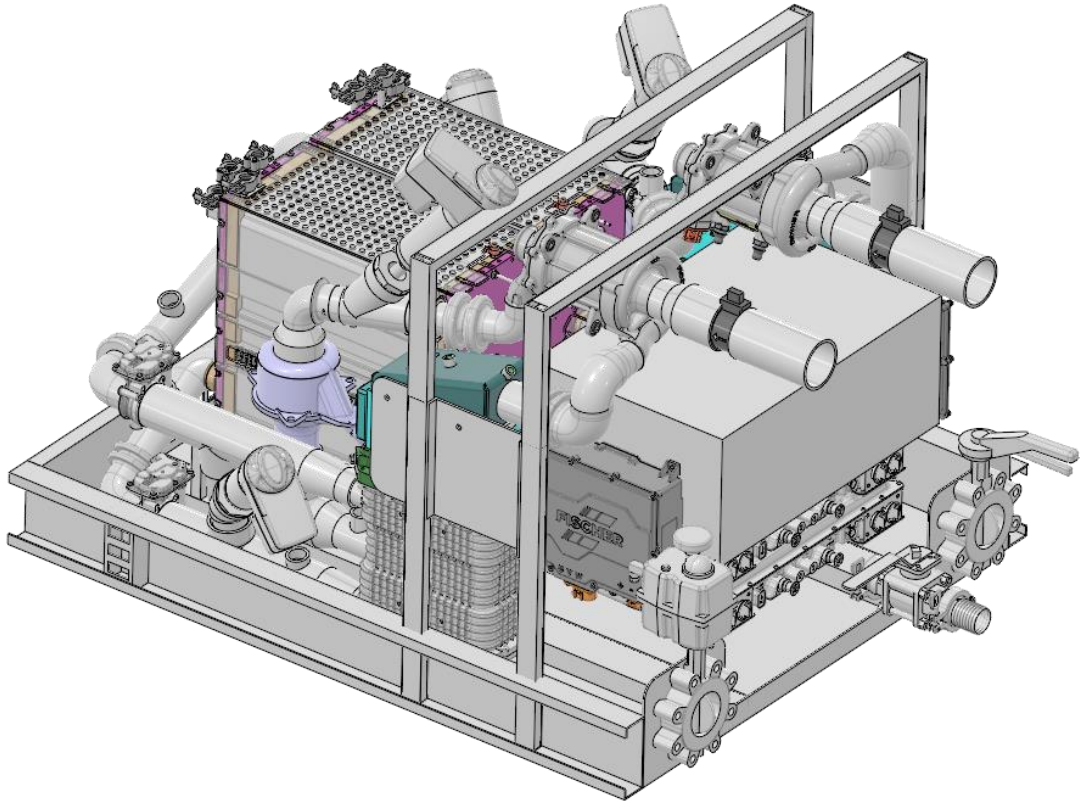
INOCEL – High power hydrogen fuel cells for stationary and mobility sectors

INOCEL designs, manufactures and markets high power, modular fuel cells for stationary, heavy ground mobility, and marine sectors. Its expertise includes the development of fuel cell technologies as well as the integration into a complete system. INOCEL also supports its customers with predictive maintenance, and advanced monitoring and control services.

Located in France, INOCEL has two strategic sites: an R&D center in Grenoble, a hub of innovation and technology, and a Giga factory in Belfort, an important location in the hydrogen industry. The factory will host a production line with state-of-the-art manufacturing technology, capable of producing thousands of units per year.

INOCEL masters the entire value chain of the fuel cell system, from the bipolar plate to the auxiliary components, which gives it a precise knowledge of the components and allows it to control its quality and cost chain.

INOCEL also participates in the development of future industry standards to stay one step ahead in the development of tomorrow's products and services.



Competence Offer

Our team excels in communication and relationship management, fostering enduring partnerships vital for business expansion. This proficiency, paired with a deep understanding of our industry and the pressing need for progress, has been instrumental in our company's strategic and rapid growth since its inception.

We select our expert competencies with care, ensuring alignment with our pragmatic approach. We focus on setting achievable goals that align with our broader aim to decarbonize hard-to-reach industries in both stationary and mobility sectors.

Our strategic foresight, technical expertise, and practical goal-setting distinctly position us as key contributors in advancing the company's mission and leading the industry's transition towards cleaner energy solutions.

Our team's emphasis on hydrogen fuel cell technology for decarbonizing key sectors underscores our eagerness to collaborate with a consortium. We strive to enhance the hydrogen ecosystem, concentrating our efforts on innovative research, promoting sustainable production methods, shaping favorable regulatory frameworks, and developing cooperative strategies for market growth.

AFNOR – French National Standardization Body

Alexandre COLOMBIER

+33 7 72 20 26 47 – alexandre.colombier@afnor.org

AFNOR, French National Standardization Body - NGO

Innovation and Development for Standardization in the Field of Energy Production and Efficiency

More information on https://normalisation.afnor.org/ and https://www.hsbooster.eu/

Unlocking the Potential: Practical Gains Standardization

- Enhanced safety measures and risk mitigation through standardized protocols in hydrogen production, storage, and transportation.
- Increased interoperability and market acceptance by adhering to common standards, promoting a more robust hydrogen ecosystem.
- Accelerated time-to-market for hydrogen technologies due to reduced barriers and streamlined regulatory compliance.

Innovation towards the market: Setting the frame

- Include standardization in your Horizon Europe call and benefit from the platform call “CEN Workshop Agreement” to define the outlines of the future standards based on the solution you have developed through research projects or innovation

More information on : https://www.hsbooster.eu/

In practice

HORIZON-CL5-2023-D1-01-03: Climate impacts of a hydrogen economy

- A rigorous assessment of the behaviour of hydrogen in the oxidizing cycles of the atmosphere related to methane, water vapour, carbon monoxide and ozone.
- A rigorous assessment of the ways in which large-scale production, distribution and use of hydrogen (e.g. as an energy carrier or industrial feedstock) can affect anthropogenic radiative forcing.
- Better monitoring tools (methodologies and instruments) for detecting and quantifying hydrogen leakage (in situ or through remote sensing).

CEN-CENELEC GUIDE 39

What are your needs?	What can standardization contribute?	What should you include in your R&I project?
Have a starting point for your project	Standards are state of the art for industrial and societal practices	
Ensure methodological robustness Improve the quality of your project's activities and outcomes Ensure broad applicability of your project results	Ensure compatibility of your results with what is already on the market	A task related to screening of existing standards
	Comply with recognized test methods, health and safety requirements	A standardization partner or subcontractor
Increase the impact of your project Long term dissemination of your results Ensure market acceptance of your project results	Give you access to discuss and promote your project outcomes with stakeholders and potential customers	Task(s) aimed at contributing to new standards
	Disseminate your results to a relevant range of European or world-wide stakeholders	
	Ensure that your project results are known and used by the market well beyond the duration of your project	A standardization partner or subcontractor

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INRAE

Hydrogen as a mean to close the sulfur cycle

Clément Likiliki, PhD – INRAE, French National Research Institute for Agriculture, food and Environment

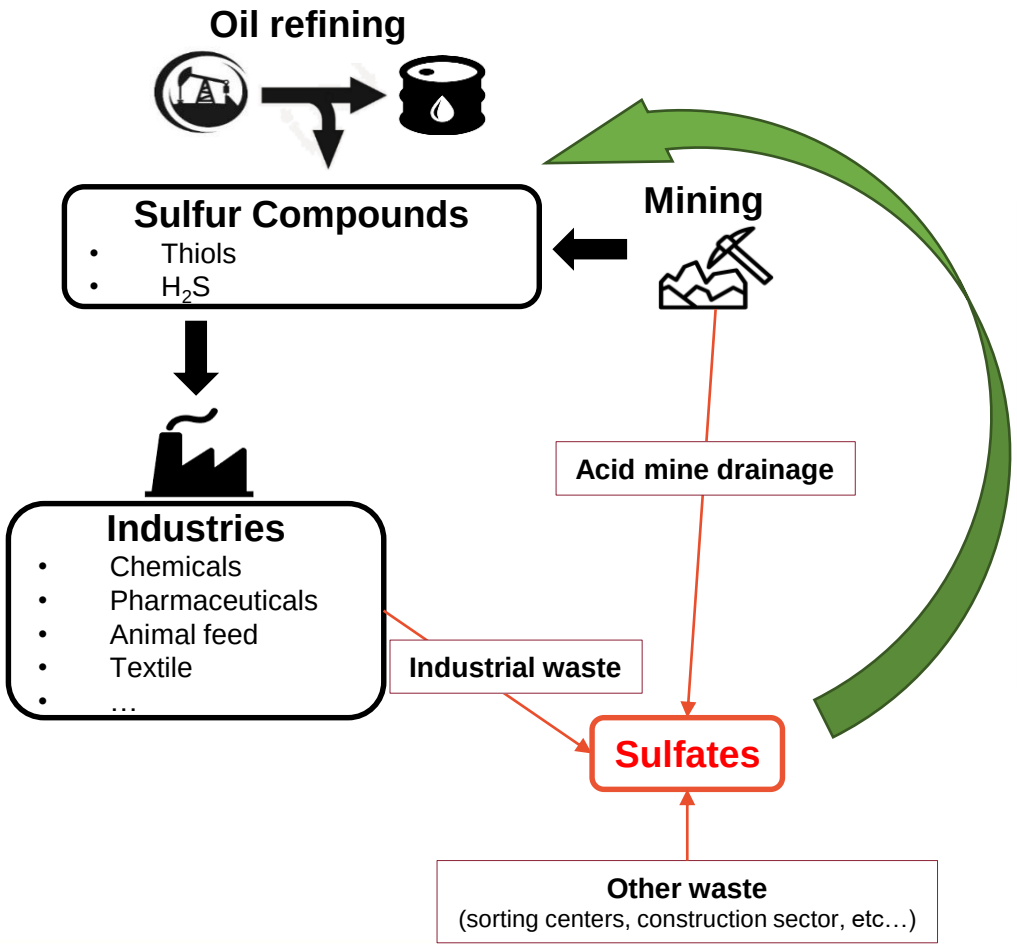
UR 1466 OPAALE : Process optimization in food, agriculture and environment

PANDOR team : Developing and optimizing processes and cascade of processes that improve the organic wastes and residues valorization channels by promoting the recycling and recovery of the various elements that comprise them

31/01/2024 – Journée d'information nationale sur les financements européens pour les projets hydrogène

Contact : clement.likiliki@inrae.fr - +33 (0)2 99 29 91 45

Hydrogen as a mean to close the sulfur cycle



1. **Using the biological process of hydrogenotrophic sulfate reduction to :**
   - Reduce the amount of sulfur coming from fossil sources
   - Recycle sulfates from waste or acid mine drainage
   - Sink hydrogen and carbon dioxide
2. **Using the Membrane BioFilm Reactor technology for an efficient hydrogen use**

- **Feasability of this technology is supported by :**
  - **A patent (FR2309497) filed recently**
  - **Many articles in the literature ; mainly regarding acid mine drainage**
- **But many questions remain concerning**
  - **Gas separation of H_2 and H_2S to maximize the hydrogen use**
  - **Membrane material to optimize the hydrogen transfer and bacterial growth**
  - **Impact of up-scaling (feasibility of the process demonstrated at lab-scale)**

- **What we're looking for :**
  - **Academic partners to tackle the "hydrogen production", "membrane material" and "gas separation" challenges**
  - **Industries looking for sulfur waste management**
  - **Industries looking for bio-sourced hydrogen sulfide**
- **What is our expertise :**
  - **Biological process engineering (anaerobic digestion, sulfate reduction, composting, etc..)**
  - **Waste management**
  - **Life Cycle Analysis**

CNR

The first slide must present:

Name : Céline PAGNARD
Organization : CNR (Industry)
Department : Port Development and 5Rhône Plans Department
Expertise in the department : Fundings

Please do not forget to add:

- **Contact details :**

Phone : +33 6 40 72 77 52
Address : 2 rue André Bonin - 69316 LYON CEDEX 04
Mail : c.pagnard@cnr.tm.fr

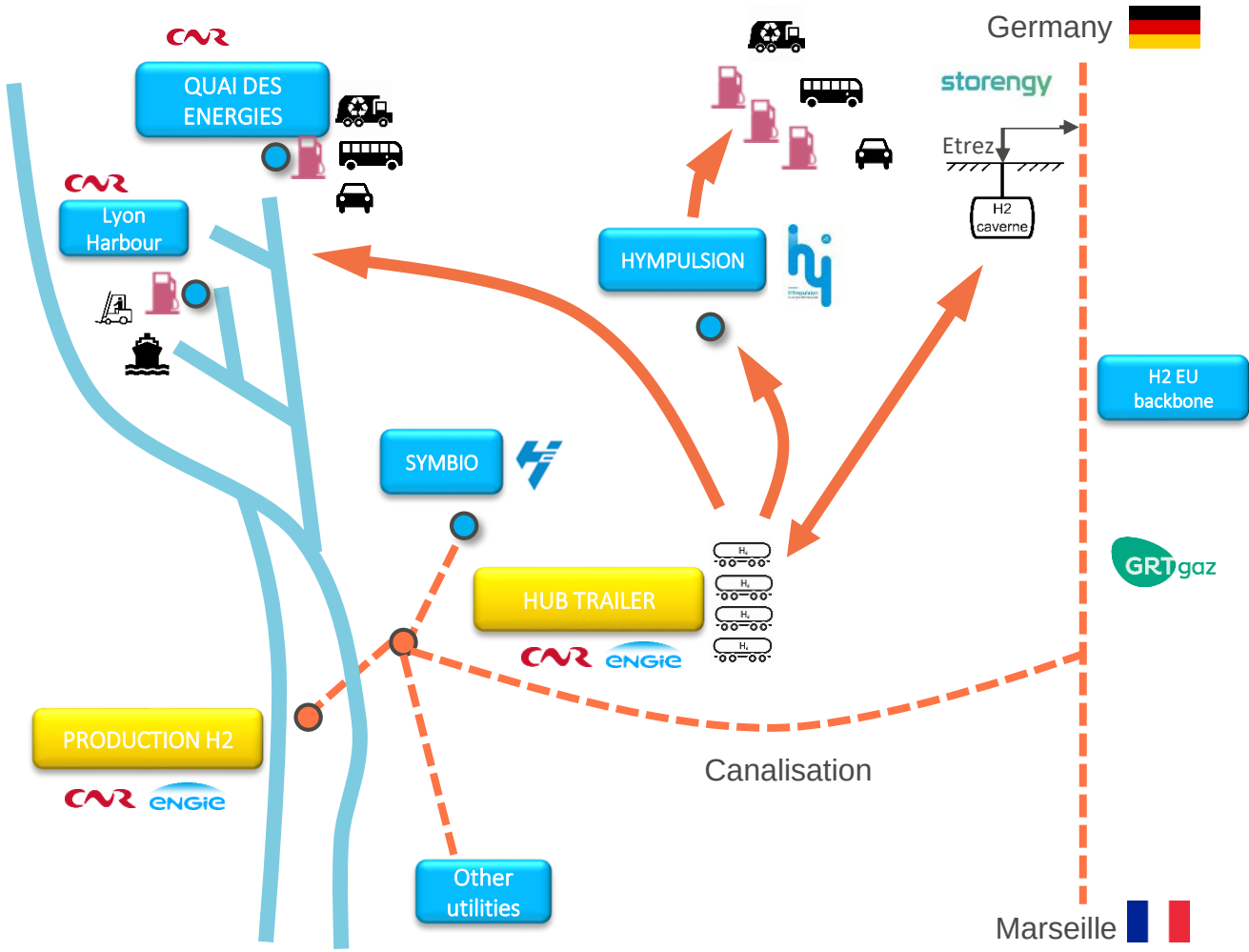
- **Webpage** : https://www.cnr.tm.fr/

Project idea:

- **Project title : OH2 Pierre Bénite**
- **Topic(s) foreseen :** renewable hydrogen production
- **Short description of the project :**

OH2 Pierre-Bénite has for target to create a hydrogen ecosystem to decarbonize the industrial and mobility sectors in Chemical Valley, using renewable energy from the Rhône.

- **Current consortium (if there is one) :** Co-development CNR/ENGIE. Involved in the ImagHyne consortium – see below
- **2024 calls foreseen:** EU Bank – Innovation fund auction 2024 or other EU or national calls which support hydrogen production



If you want to present a competence offer, on slide 2 and 3 please indicate:

- Your expertise and competencies and those of: your organisation /department /team : **production of renewable energy**
- The topics you are interested in (one or some topics) : **renewable hydrogen production – calls from the EU Hydrogen Bank**
- Your previous or current participations in projects in this field :
- Previous project:

- **Hyway** project: H2 station in the port of Lyon for trucks – funded by AURA region, EU (FEDER), ADEME, and other national fundings

- **Multienergy green station** (electricity, biogas, H2) – Port of Lyon – funded in the frame of the **H2ME2** project (Clean H2 Partnership)

- Current:

- **ImagHyne**, funded by the Clean H2 Partnership (large scale 2023) for a hydrogen Valley project in the AURA region.

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- UTAC
- Department of Energy/ Emission / Acoustics / Brake
- Testing for:
  - Electromagnetic Compatibility
  - Acoustics
  - Powertrain
  - Tyres
  - Brake

- hanaa.er-rbib@utac.com Mobile : +33 7 86 37 62 50
- https://www.utac.com

Expertise and Competencies:

Conventional Powertrain

Engine test cells

Light & heavy-duty chassis dynos

PEMS laboratories

Future Powertrain

2E, 3E & 4E powertrain rigs

12 battery pack test chambers

E-machine / EDU systems & test labs

Safety

EuroNCAP Active & passive safety labs

Component testing on Lighting, Tyres, CMS, Interior Systems, etc..

Indoor & outdoor winter testing

Comfort & Quality

EMC chambers

NVH chambers

NVH brake dyno

Reliability & Durability

Powertrain test systems

Structures lab

Shock and vibration test rigs

Connected Mobility

Simulation

5G CAV Village

TEQMO test centre / 5G

Regulations

Regulatory developments worldwide (UN-ECE, Geneva, Brussels)

European vehicle type approval : Monitoring and support

Regulatory evolution watch

Topics of interest to UTAC

- **Developing and improving test facilities to support the energy transition and adapt to new Technologies**
- **Sharing our experience and skills in testing and developing new test protocols**
- **Collaborate with the automotive industry to support the development and/or improvement of regulations to accelerate the field deployment of H2 vehicles**
- **Safety compliance testing**
- **Benchmark studies**

SAPAIC – MOTEURS BERNARD H2 LARGE NEW ENGINE FOR MARITIME AND STATIONNARY USE

moteurs bernard

- CONTACT — XAVIER BERNARD
  XFBERNARD@SAPAIC.COM
- ORGANISATION — INDUSTRY
  SAPAIC INDUSTRIES
  WWW.SAPAIC;COM
- THE DEPARTMENT — R&D ENGINEERING
- THE EXPERTISE — THERMODYNAMICS
  MECHANICAL ENGINEERING (STRUCTURAL THERMAL)

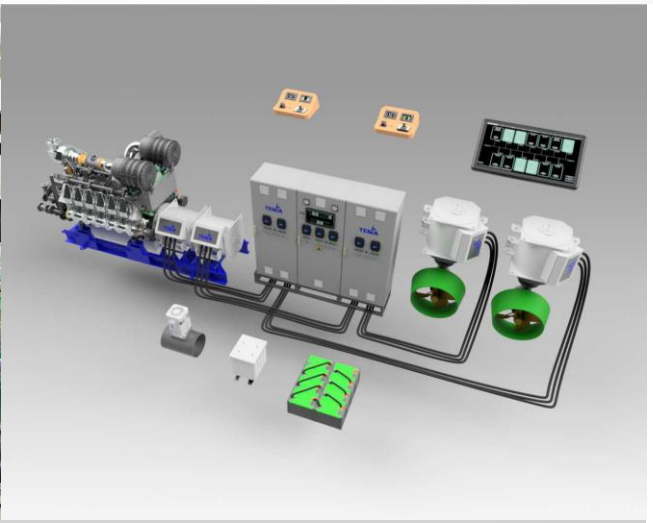
MEMBRE DE

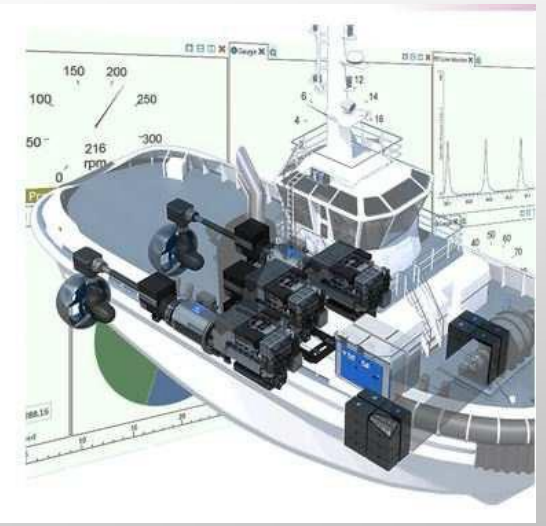
France Hydrogène
Engagée pour la transition écologique

moteurs bernard

MEMBRE DE
France Hydrogène
Engagée pour la transition écologique

- PROJECT TITLE — MOGAS3
- TOPIC(S) FORESEEN — DECARBONATION OF THE PROPULSION OF MARITIME AND RIVER TRANSPORT
  ELECTRFICATION OF THE PROPULSION





TRANSITIONAL H2 FUELLED ENGINE

MEMBRE DE
France Hydrogène
Engagée pour la transition écologique

- **SHORT DESCRIPTION OF THE PROJECT**
  - H2 IS SEEN AS GAME CHANGER IN THE MARITIME ECONOMY TO COME DUE TO ITS VERY LOW CO2 CONTENT
  - MOST EXISTING ENGINES BASED ON LIQUID DIESEL NEED TO ADAPT BY ADPOTING LIQUID METHANOL/AMONIA CREATING CHALLENGES FOR PRODUCTION, COSTS, AND ENGINE DESIGN SEVERE CHANGES
    - SCOPE IS VERY LARGE BOATS FOR TRANSOCEANIC DISTANCES
  - MOTEUR BERNARD HAS ACCUMULATED SIGNIFICANT KNOWLEDGE USING GASEOUS FUEL INSTEAD OF LIQUID;
  - WE ARE IN A VERY GOOD POSITION TO NOW OFFER HYDROGEN AS A FUEL FOR FURTHER DECARBONATION
  - BECAUSE MANY END USERS WANT TO ADOPT H2 AS A FUEL BECAUSE OF ITS DIRECT LOW COST FORSEEN AVAILABILITY THEY NEED A TRANSITIONAL AND FLEXIBLE ENGINE ALLOWING H2 MIXTURE BLENDS WITH CH4 IN BIO OR FOSSIL FORM
    - SCOPE IS MEDIUM RANGE SEA DISTANCE, COASTAL TRANSPORT, LARGE BARGING
  - DESIGN OF SPECIAL DEVICES FOR MIXING AND INJECTING H2 , TESTING THE DEVICES AND THE ENGINE BLENDING (15%; 35%, 75%) ON A 1MW TEST RIG AND COLLECT ALL ENGINE DATA FOR THE E.C.U. BUILD

- **CURRENT CONSORTIUM ENVISIONNED**
  - UNIVERSITY OF LME/NTUA IN ATHENS , OR IAV / ADAPT ENGINEERING . CERTAM FR
  - SHIPYARD FOR MEDIUM SIZE DISTANCE BOATS COASTAL TRANSPORT

- **TYPE OF PARTNERS YOU NEED**
  - H2 INJECTOR AND MIXER SUPPLIER
    - EXEMAPLE / BOSCH –SEITZ – DELPHI
  - ELECTRONIC ECU SPECAILIST
    - EXAMPLE / HEINZMAN – WOODWARD …

La FRENCH FAB
AUVERGNE RHÔNE-ALPES

Feel free to contact me at xfbernard@sapaic.com
Mobile is +33 6 2618 1147