

SOME OF OUR INDUSTRIAL PARTNERS:



Air Liquide



Empowering a sustainable world



ONE CONTRACT MANAGEMENT ORGANIZATION:



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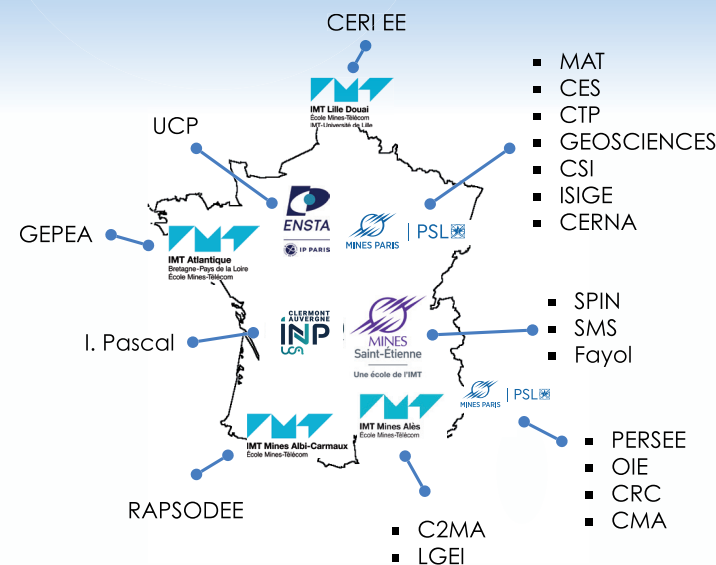
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OUR NETWORK FOR THE H₂ ENERGY SECTOR

RESEARCH & DEVELOPMENT | EDUCATION

Carnot M.I.N.E.S. research centres involved in H₂MINES



www.carnot-mines.eu/fr

H₂MINES TAKES PART IN:

NETWORKS

- Hydrogen Europe Research
- EERA
- France Hydrogène
- GDR (Solar Fuels, Thermod. moléc. et proc.)
- FRH2 (CNRS)
- Géodénergies
- SFGP
- SFT
- SEE
- Mission H₂ Pays de Loire
- Climate KIC

CLUSTERS

- CAPENERGIES
- AXELERA
- TENERRDIS
- DERBI
- EMC2
- MOVEO
- ASTECH

PROJECTS (ANR, EU, PIA...)

- FluidStory, Rostock-H, Waveincore, Stopil-H2, Citeph20, Comehte, Anima, Ingopint-Pacos, Moise, Pretzel, Pegasus, Comet, Momentom, Minerve, Endemat, HyCOMP, FiBreMoD, Osirhys, Chaire industrielle Messiah... & HyTREND (AMI Carnot)

TECHNOLOGICAL PLATFORMS

- Fuel Cell test benches
- H₂ storage, purification test benches
- Gas sensors test benches
- Burners, flash pyrolyzers, gasifiers, HP reactors, methanation...
- Materials synthesis and characterization
- Shaping processes
- Fluids thermophysical properties
- Rock geomechanical characterization
- Power to gas

EDUCATION PROGRAMS

- Conferences, courses and student projects in the framework of the different education programs of the partner schools.

PRODUCTION

STORAGE/DISTRIBUTION

END USES

TRANSVERSE



- Biomass gasification
- Biogas reforming

RAPSODEE

- Compression and distribution: simulation

RAPSODEE

- Fisher-Tropsch synthesis
- Methanation

RAPSODEE



- PEMFC membrane materials: functionalization of clays

C2MA

- Biological methanation

LGEI/EUREQUA

- Risk analysis
- Eco-industrial synergy

LGEI/EUREQUA/ERT



- Purification (PSA, membrane, absorption)

GEPEA

- Porous materials
- Solid storage tank

GEPEA

- Power to gas: methanation, CO₂ capture

GEPEA



- Modeling & Optimization: Porous media, adsorption, storage, topology optimization

CERI EE



- Electrolysis (LT PEMWE, AEM)
- Plasma cracking, reforming
- Electrochemical purification (LT)
- Photocatalysis

PERSEE

- Electrochemical compression
- Porous materials

PERSEE

- PEMFC: MEA materials (catalysts and composite membranes), system studies (Mobility, H₂ recirculation, modeling...)
- CO₂ reduction
- Renewable Energy coupling
- Multi-energy systems

PERSEE

- Future energy systems and markets

PERSEE

- Prospective & optimization of energy systems

CMA

- Life cycle assessment

OIE

- Socio-technical controversies

CSI

- Process economics

CES

- The economics of H₂ (cost benefit analysis, public policy assessment, innovation and competition)

CERNA

- Territorial planning and public policies in energy transition

ISIGE

- Safety and reliability assessment, public perception of safety

CRC

- Underground storage environmental impact

GÉOSCIENCES

- HP composite tanks: tests/calculations
- Pipeline protection: cold spray coating

MAT

- Salt caverns: integrity/reactivity

GÉOSCIENCES

- Gas sensors: CO, H₂, safety/process control

SPIN

- Electrode material: modeling /simulation (image analysis)

SPIN

- Pipeline integrity and durability

SMS

- SOFC single chamber

SPIN

- Environmental analysis: qualitative assessment and absolute sustainability evaluation

- Decision aid support for territorial planning

FAYOL



- Biomass flash pyrolysis

UCP

- Doped MOFs (C, metal, metal+C)
- Liquid carriers (LOHC)
- Hydrides

UCP

- Combustion
- Reactivity/Risk

UCP

- Tech-eco evaluation of the distribution chain

UCP



- Solar photoreactive processes

I. PASCAL