



Finanziato
dall'Unione europea
NextGenerationEU



Ministero
dell'Università
e della Ricerca



Italiadomani
PIANO NAZIONALE
DI RIPRESA E RESILIENZA



NODES
Nord Ovest Digitale E Sostenibile

Nord Ovest Digitale E Sostenibile, il progetto H2Mobility

Idrogeno verde per la nuova mobilità

Referenti scientifici:

Marzia Quaglio, DISAT, PoliT0

Fabrizio Pirri, DISAT, PoliT0

NODES | Nord Ovest Digitale E Sostenibile



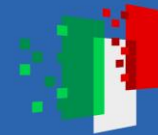
Spoke 1
Aerospazio e mobilità sostenibile



Finanziato
dall'Unione europea
NextGenerationEU



Ministero
dell'Università
e della Ricerca



Italiadomani
PIANO NAZIONALE
DI RIPRESA E RESILIENZA



NODES
Nord Ovest Digitale E Sostenibile

Partners



Politecnico
di Torino



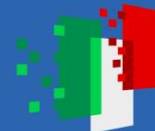
UNIVERSITÀ
DI TORINO



ENVIRONMENT
PARK Parco Scientifico
Tecnologico per l'Ambiente



Istituto per la Tecnologia
delle Membrane
Consiglio Nazionale delle Ricerche



H2Mobility

New Energy Vectors for a green mobility

The H2 Mobility project aims at the development of robust and reliable technologies and the related tech-transfer activities to support the transition of the regional supply-chain towards the integration of new systems for the distribution and use of low carbon and sustainable fuels. The H2 Mobility project aims to improve the technological readiness to the exploitation of H2 as the renewable energy vector for the future mobility system. This goal will determine a strong demand for new technologies, new components, and innovative services for green H2 storage (absorbing materials, chemical storage) and its subsequent distribution and use to provide energy on-demand (e.g. fuel cells, internal combustion engines).

Objectives

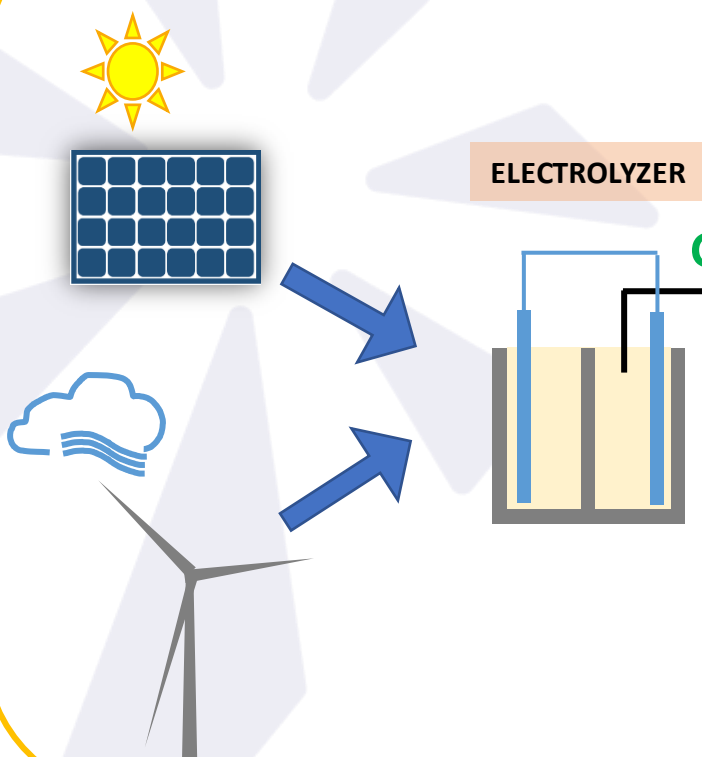
- Contribute to the development of technologies needed to promote the use of H2 as an energy carrier in mobility: from production and storage to its final conversion and use.
- Support the development of a regional supply chain toward the integration of new systems for the distribution and use of low-carbon and sustainable fuels.

<https://www.ecs-nodes.eu/flagship-projects>



GREEN H₂ VALUE CHAIN

Renewable energy storage into H₂

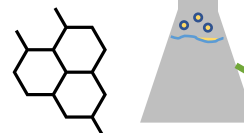


ELECTROLYZER

Green H₂

H₂ storage

H₂ CHEMICAL
STORAGE



H₂ GEOLOGICAL
STORAGE

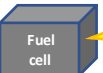


H₂

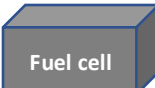
H₂

H₂

H₂ Recovery and Use

- Transport   
- Energy production 
- Industry 

On-site H₂ Use

- Transport   
- Energy production 
- Industry 



Finanziato
dall'Unione europea
NextGenerationEU



Ministero
dell'Università
e della Ricerca



Italiadomani
PIANO NAZIONALE
DI RIPRESA E RESILIENZA



NODES
Nord Ovest Digitale E Sostenibile

Applied research topics

The project aims to develop of **robust and reliable technologies** and the related tech-transfer activities to **support the transition of the regional supply-chain** towards the integration of new systems for the distribution and use of low-carbon and sustainable fuels. The project will also address E-Fuels, mainly on the development of components, technologies and systems for conversion of CO₂ and other vectors into RFNBO (Renewable Fuels of Non-Biological Origin).

The project is divided into five research modules covering several crucial elements of the hydrogen supply chain and related systems for mobility applications:

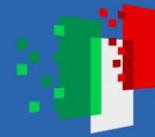
- **HYDROGEN PRODUCTION**
- **HYDROGEN STORAGE**
- **HYDROGEN DISTRIBUTION AND TRANSPORT**
- **E-FUELS: CO₂ RECOVERY AND CONVERSION**
- **TECHNOLOGIES, COMPONENTS AND APPLICATIONS FOR FC MOBILITY**



Finanziato
dall'Unione europea
NextGenerationEU



Ministero
dell'Università
e della Ricerca



Italiadomani
PIANO NAZIONALE
DI RIPRESA E RESILIENZA



NODES
Nord Ovest Digitale E Sostenibile

Applied research topics

Green Hydrogen generation by electrolysis

Modeling, Testing procedures and protocols for electrolyzers and components

Bio-based processes for H₂ production and aqueous phase reforming as alternative approaches of green H₂ production

Chemical Routes for H₂ storage

Aminoborane materials, Aromatic heteroatom compounds materials and metal hydrides

Hydrogen Distribution

Techno-economic analysis and system optimization for renewable infrastructure deployment, to develop a **general methodology for the optimal design of hybrid renewable energy systems** for green hydrogen production.
Hydrogen distribution via natural gas transport and distribution



E-FUELS: CO₂ recovery and conversion

Development of catalysts for hydrogenating CO₂ to methanol.

Technologies, components and applications for FC mobility

Design and development of nanostructured **ion exchange membranes** for sustainable energy conversion.

MEA fabrication and electrochemical characterization for fuel cells application.

Innovative technologies for FC manufacturing and analysis of automation processes in **stack packaging** and production
Test procedures/protocols for FC and components.

Fuel cells **stack modeling and BoP design**

FC powered small hydrogen electric propelled boat

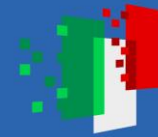
Model of gas bearings and realization of a demonstrator



Finanziato
dall'Unione europea
NextGenerationEU



Ministero
dell'Università
e della Ricerca



Italiadomani
PIANO NAZIONALE
DI RIPRESA E RESILIENZA



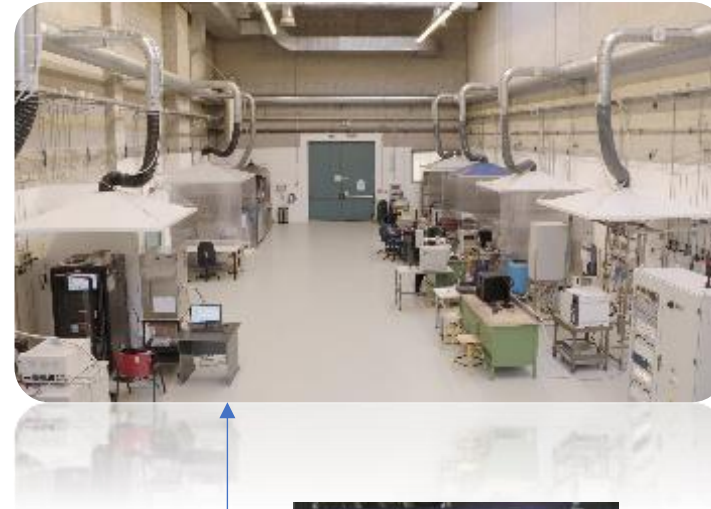
NODES
Nord Ovest Digitale E Sostenibile

Results and impact



H2Mobility means

- **Improved opportunities** for companies to develop PoCs in collaboration with the project's partners
- **Access to testing infrastructures** that are essential for the design of new systems and subsystems for the transition towards green hydrogen.
- The transitions and strengthening of the **Hydrogen supply chain**





Finanziato
dall'Unione europea
NextGenerationEU



Ministero
dell'Università
e della Ricerca



Italiadomani
PIANO NAZIONALE
DI RIPRESA E RESILIENZA



NODES
Nord Ovest Digitale E Sostenibile

Results and impact Business' PoC projects

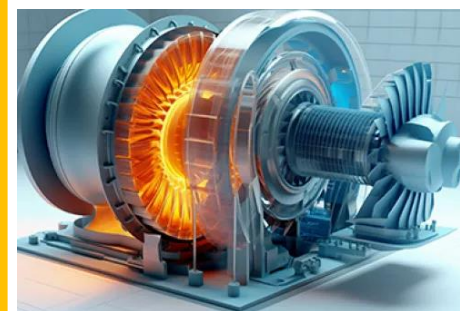
Projects and services funded by NODES cascade calls - Spoke 1

Spoke 1 used specific cascade calls to finance theme relevant projects and services presented by firms.

3 are directly related to
Hydrogen (CCCEL, SIRIH2 and EC2Hreg)



Spoke 1 industrial projects
Sustainable Mobility
(Scan or click)



CCCELL _ Centrifugal
Compressor for mobile
fuel CELL applications



SIRIH2 _ define, develop at the
prototype level, and validate a
transportable, multifunctional
H2 charging system capable of
meeting the charging needs of
drones, vehicles, motorcycles,
and electric boats.



E2CHreg _ Support the
implementation of
regulatory roadmap to be
applied to the development
of an experimental
hydrogen vehicle refueling
microstation



Finanziato
dall'Unione europea
NextGenerationEU



Ministero
dell'Università
e della Ricerca



Italiadomani
PIANO NAZIONALE
DI RIPRESA E RESILIENZA



NODES
Nord Ovest Digitale E Sostenibile

Results and impact

Boost your competence with NODES

Learning opportunities for researchers, professionals, employees and managers of business, public administration, citizens.

Entrepreneurship →

Acceleration →

Upskilling →

The courses are continuously updated and changing
All Spokes are keen to provide the best experiences,
and to receive suggestion to best respond to
industries and supply chains needs

All learning
opportunities:
(Scan or click)





Finanziato
dall'Unione europea
NextGenerationEU



Ministero
dell'Università
e della Ricerca



Italiadomani
PIANO NAZIONALE
DI RIPRESA E RESILIENZA



NODES
Nord Ovest Digitale E Sostenibile

ecs-nodes.eu

Thank you

This presentation is part of the project NODES which has received funding from the MUR – M4C2 1.5 of PNRR funded by the European Union - NextGenerationEU (Grant agreement no. ECS00000036)