



**ENVIRONMENT
PARK** Parco Scientifico
Tecnologico per l'Ambiente

HYDROGEN TECHNOLOGIES

Hydrogen Knowledge Exchange Program ready, set, go.

H2 value chain in Piedmont

SMART4ENERGY WEBINAR

Hydrogen value chain and perspectives in Piemonte region

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Environment Park

February, 17th 2021



Environment Park - Cleantech technology Park

Environment Park [ENVIPARK] is the cleantech technopark based in Torino, active since 2000 in the domain of clean innovation, providing location and support services to companies and research institutions.

The Park offers 30.000 sqm to host **70+ companies and research institutions**

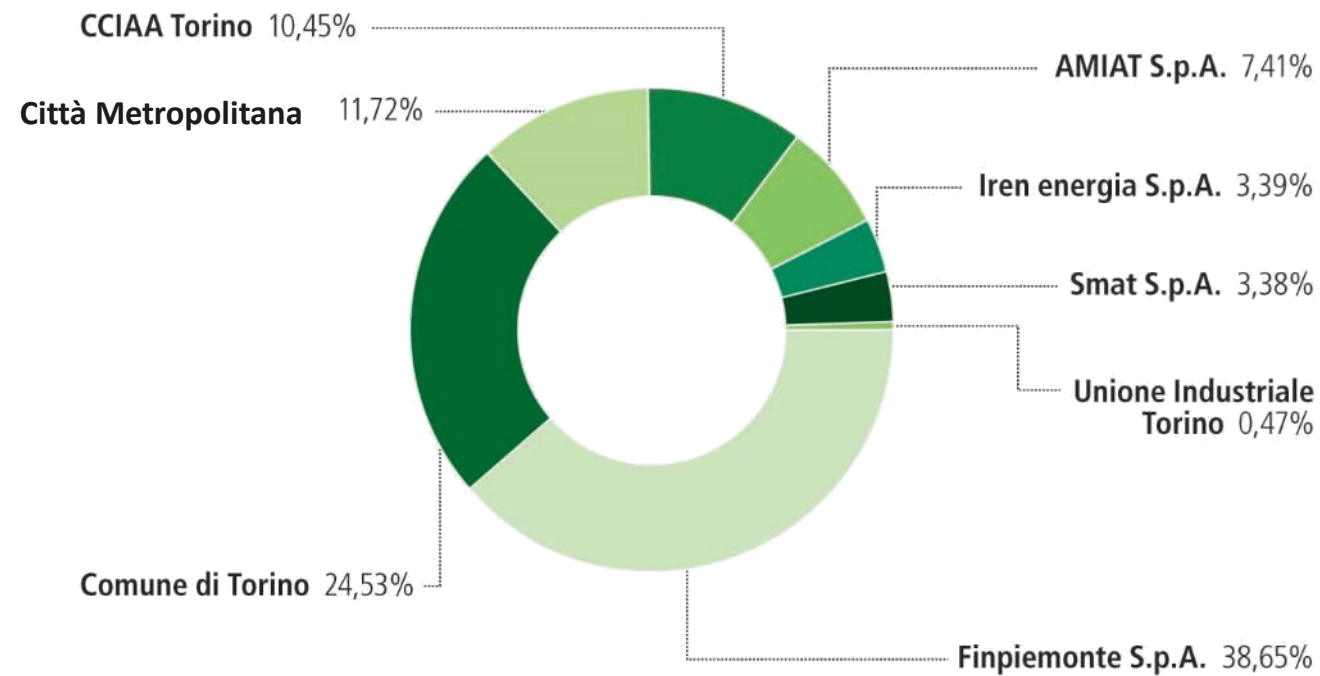


20+ years experience
in eco-innovation

100+ yearly contracts
for innovation services

Availability of open lab
facilities

The company managing the Park - Environment Park S.p.A.



Infrastructures

- ✓ 30.000+ mq for tenants (firms and R&D centres)
- ✓ Portfolio of services for tenants
- ✓ A community counting 70+ entities
- ✓ A conference center
- ✓ A mini-hydropower plant providing clean power
- ✓ Technological infrastructures available for demo projects



Innovation services

- ✓ Consultancy
- ✓ Project design e management
- ✓ Open laboratory facilities for experimental activities
- ✓ Management of the **Cleantech Regional Innovation Cluster (CLEVER)**, a 150+ companies network cooperating on industrial research



Experience with hydrogen...

2005

R&D Lab

Test facility



Training lab

Competence centre

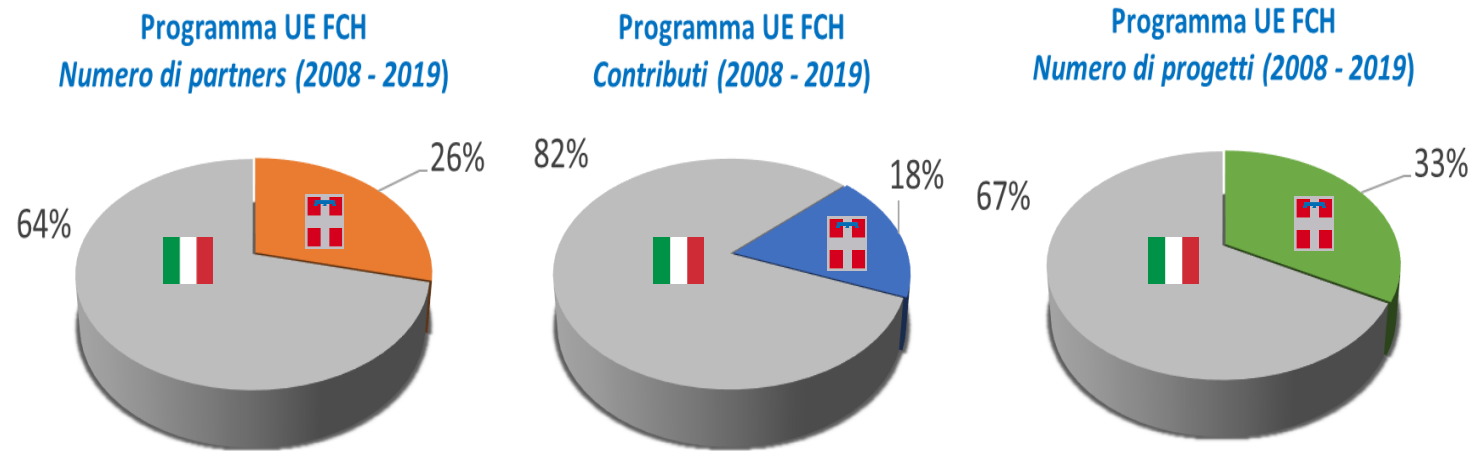


2006 - 2013 Some results



The regional hydrogen eco-system...

FCH JU 2 (2014-2018)

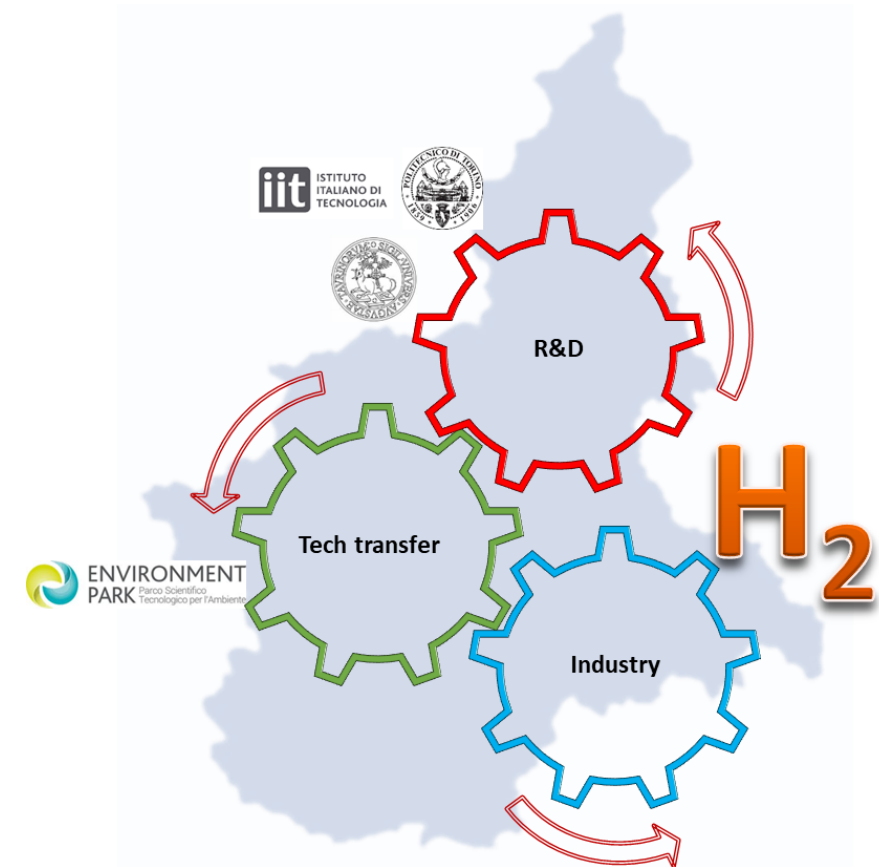


H2: a long term vision supporting industrial growth

The Piedmont Region is among the few in Italy to have supported the creation of an hydrogen industrial supply chain through:

- The HYSYLAB R&D lab in Environment Park (2003)
- Joint efforts by the local research institutions
- A dedicated R&D industrial cluster (“CLEVER”, 2009)
- R&D funding programme “Innovation Clusters” for industries and SMEs (2009 – 2020)
- EU and International partnership advocacy, promotion supporting action (i.e. Hydrogen Valleys, S3, FCH-JU...)

Thank to these supports, today regional companies and research centers are able to respond to new challenges on hydrogen technologies launched by international markets



H2 in Piemonte - Industrial chains

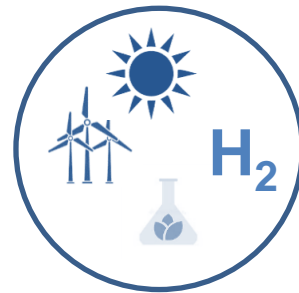
H₂ Mobility



Energy



Upstream



- Several industrial players/**head of chains**
- **SMEs with experience** and vision in the sector
- Presence of **utilities** interested in integrating H2 in their processes
- Availability of infrastructures viable to support **pilot initiatives**

H2 in Piemonte - Research and TT



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TECNOLOGIA



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- Several research groups with **15+ years experience** in the sector
- Coordination of several **EU funded projects**
- Availability of **lab infrastructures to organize services** (tests and demo)
- Strong **international networks**

A significant background to attract investment in this sector

H2@POLITO

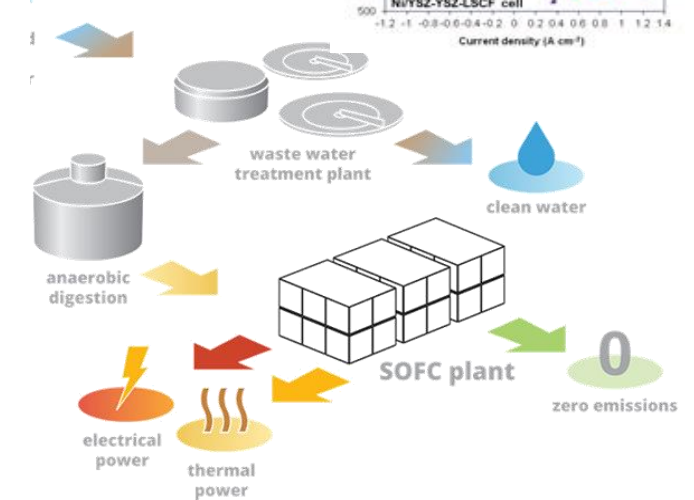
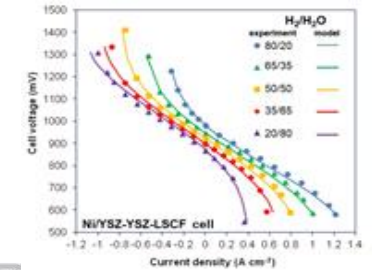
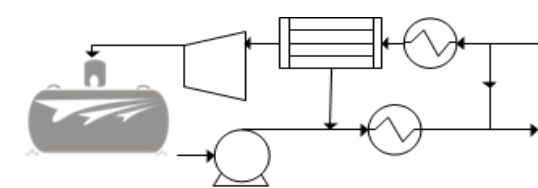


The research activities are focused on:

- **electrolysis from renewable sources**
- **new pathways for green hydrogen production (chemical looping, photo-catalysis, biochemical routes)**
- **hydrogen mobility (storage and HRS)**
- **fuel cells LT and HT**
- **generation of synthetic chemicals with CO2 capture**
- **system integration (e.g. with batteries)**

In these areas the activities develop from test and modeling to the creation of prototypes and technological demonstrators.

Founding member of Hydrogen Research Europe (2007) and member of H2IT, it is the coordinator of around 10 projects in the European FCH-JU Platform and partner of about 30 projects in the same Platform.



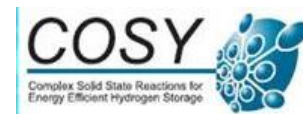
H2@UNITO



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- **Materials science and technology** (metallurgy, chemical synthesis)
- **Hydrogen production from biomasses**
- **Hydrogen storage** (HP, metal hydrides)
- **Polymeric ion-exchange membranes**
- **Chemical modeling**
- **CO2 reduction**
- **Chemical and biochemica, catalysis**

University of Torino is actively participating to research networks in Italy and Europe as well as to several Research projects in the EU framework



H2@IIT



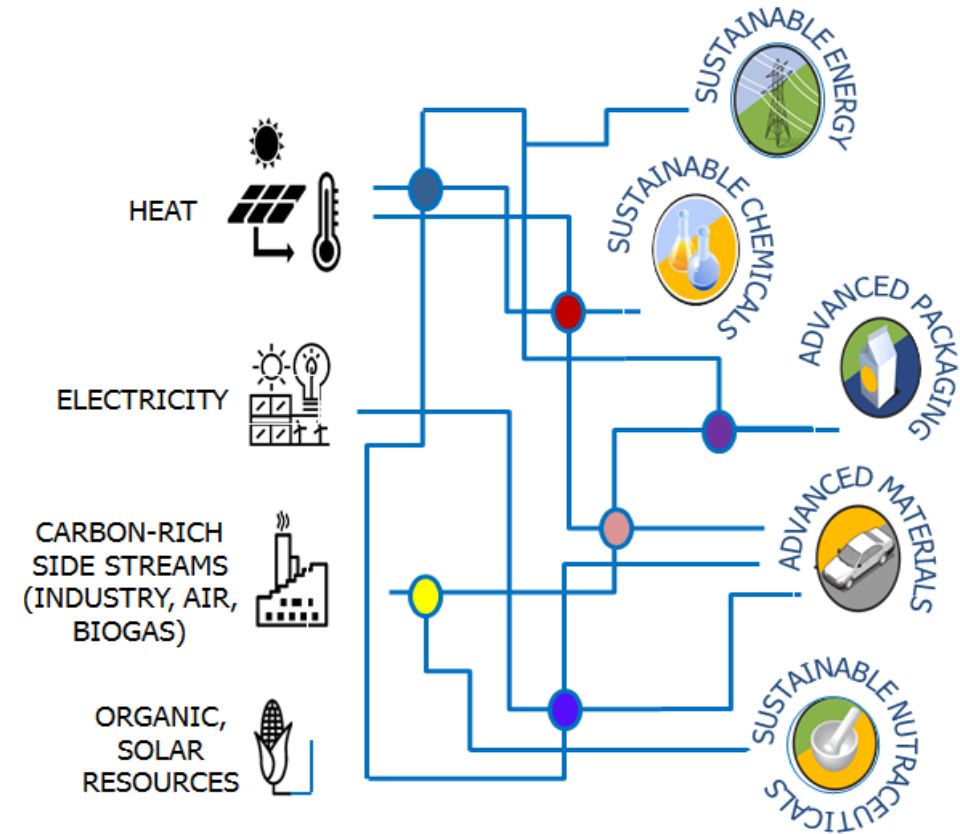
The Italian Institute of Technology operates in Torino (at Envipark) its Centre for Sustainable Future Technologies (CSFT) .

In cooperation with POLITO, IIT runs the – **CO₂ CIRCLE LAB** – with research focus on H₂ use as a feedstock to reduce captured CO₂ to produce chemicals.

Furthermore the centre is operating research activities about underground hydrogen storage

Main topics are:

- «**Synthetic biology**»
- **CO₂ capture and storage**
- **Hydrogen underground storage**
- **Electrochemical CO₂ reduction**
- **Thermocatalytic Co₂ reduction**



H2@ENVIPARK

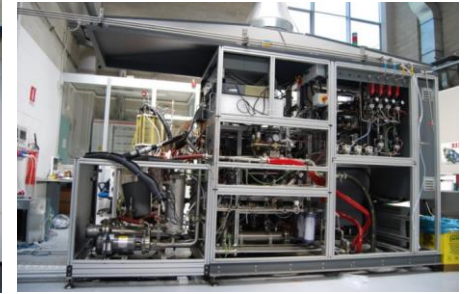


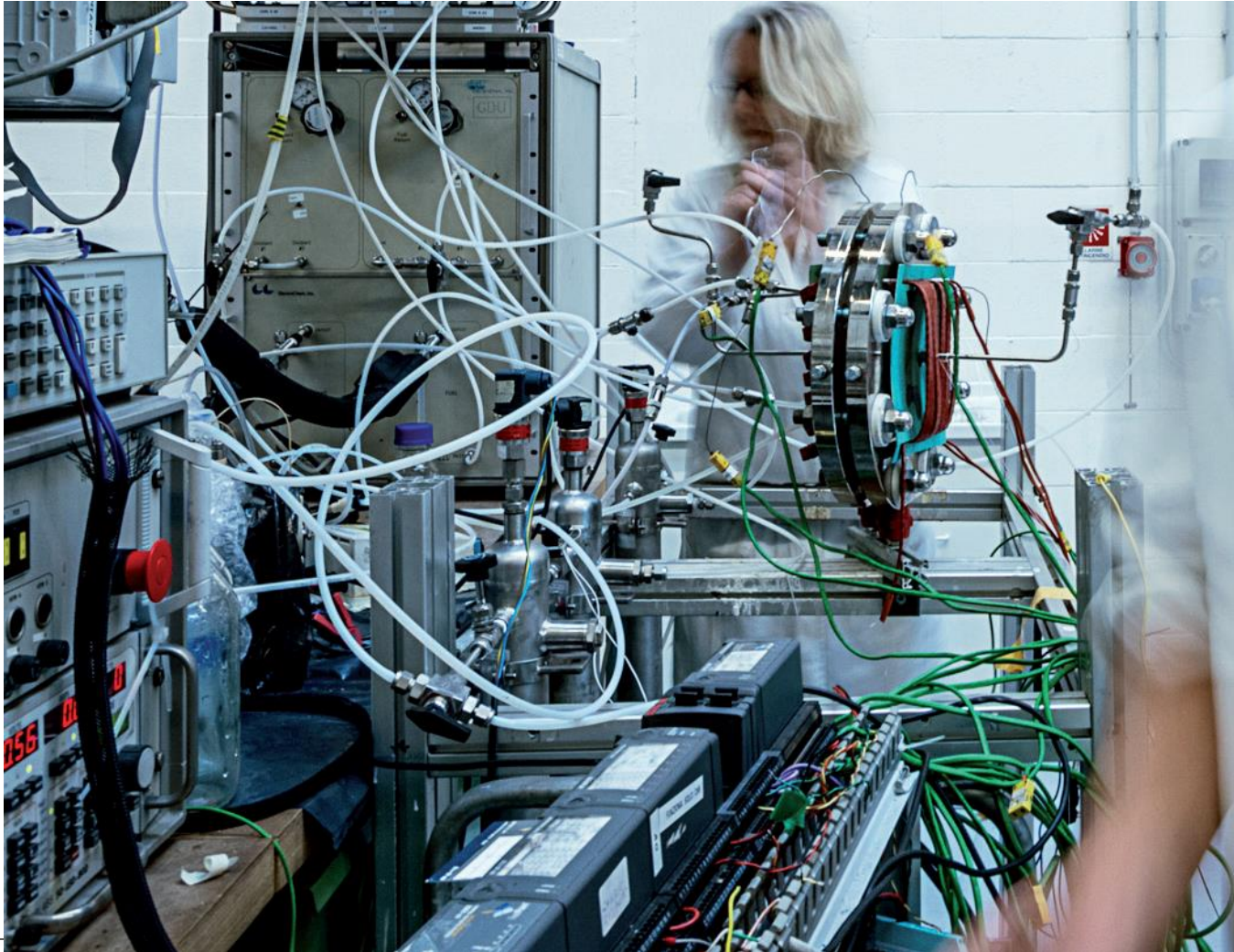
Since 2002 the techno-park is offering **TT support services** in the hydrogen and fuel cells sector, through a dedicated laboratory: since 2019 the lab facilities are operated **in partnership with Politecnico di Torino and IIT**.

Envipark provides customers and partners with **technology intelligence** activities in the hydrogen and fuel cells value chain.

Envipark is the managing authority of the **regional cleantech innovation cluster (CLEVER)** having hydrogen among the main topics and grouping 150 enterprises in the network

Along the last 15 years **Envipark served 100+ companies** including manufacturers and utility companies, has granted with **more than 10 EU funded R&D projects** and joins the main networks at national and EU level in hydrogen sector.





- ✓ **Safe area for components test with hydrogen sensors and active protection system**
- ✓ **Dedicated test benches for several activities in H₂/FC domain**
 - PEM single cells
 - FC stacks
 - Electrolysers
 - BOP components
- ✓ **Dedicated test areas for CO₂/H₂ processes**
 - CO₂ capture
 - Chemical looping
 - CO₂ reduction
 - CO₂ and H₂ storage

OPERATED IN COOPERATION WITH POLITECNICO DI TORINO AND IIT

H2 Mobility



- **Lead industrial partners** in mobility sector (automotive, heavy transport, railway, aerospace)
- More than 30 SMEs experienced in H2 **able to contribute to the realization of subsystems and components for the Hydrogen Power Train**
- Integration in the transition toward electrification and zero emission mobility

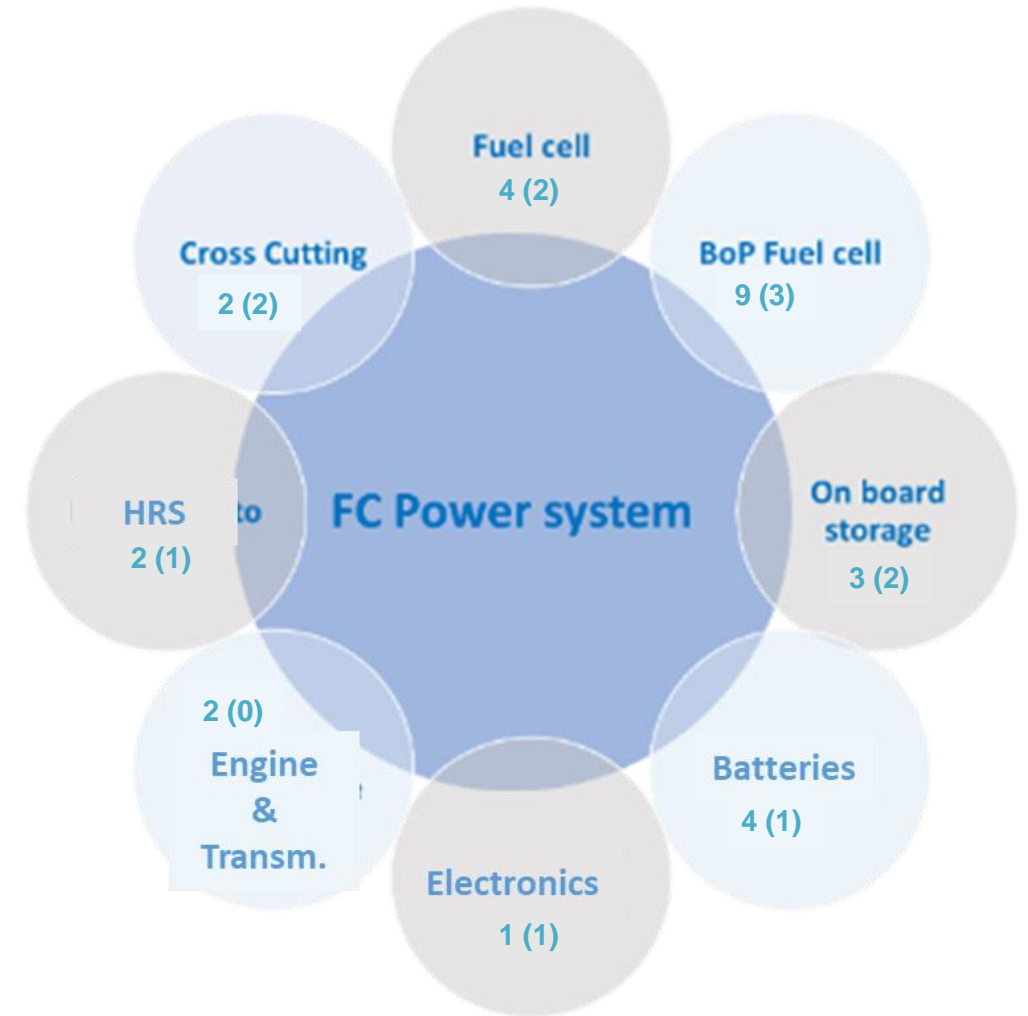


Significant participation of regional actors in **IPCEI initiatives on batteries and hydrogen**

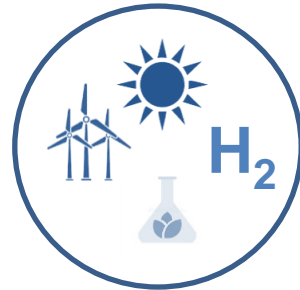
H2 Mobility - SMEs



- **Continuous auditing** action in order to check SMEs potential in the new hydrogen value chains
- Availability of **open test facilities** with infrastructures and competences able to facilitate the early stage approach
- Availability of **financial support for R&D initiatives**



H2 Upstream



- Active **utilities as head of chain for H2 production** and distribution
- Innovative SMEs with **high level experiences in SMR plants with related CO2 management** units
- Active SMEs in the **value chain of H2 distribution** from components to systems
- **Available infrastructures** for experimental tests



H2 Energy



- Utilities as head of chain for H2 application in energy sector
- Micro-CHP for residential applications
- Exploitation of H2 as an **industrial by-product**
- Hosting of important **demo projects on industrial CHP**



In progress...

➤ Strategic actions

- Setting the hydrogen role in a **long term strategy**
- Maximizing the integration of R&D and competence centres in the **development of the industrial chains**;
- Establishing strategic collaborations among **hydrogen valleys** and other EU regions sharing the same vision

➤ Specific initiatives

- **Permanent thematic workgroup** involving regional administration directions and technical support structures to monitor opportunities and set up projects
- Elaboration of initiatives following two main schemes:
 - **Hydrogen deployment** (H2 infrastructures implementation and uses)
 - **Hydrogen as a competitiveness factor** (incentives to R&D industrial investments)





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