

Italian H2 Parks and Projects:

Towards an inter-regional “Light-house” action plan

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H2 Italian Vision and Strategy

- Italy developed a Vision on H2 Economy aiming at stimulating a H2 demand and users commitment
- The H2 Italian Vision has different components:
 - Research and Innovation Technology
 - Demonstration plants and users commitment
 - Fields test and H2 Parks at local level
- The purpose of this presentation is to provide an overview of the activities at local level: Italian H2 Parks



Development of a H2 vector in Italy

- **Italian Regions show priority interest in H2 as a tool for creating sustainable energy and transport policies:**
 - **Need for cooperation with institutions specialized on H2 and FC in Italy and abroad**
- **Various Regions have already started financing initiatives to support demonstrative projects:**
 - **National funding is also available**
- **Scientific and technological parks to be used for research labs on H2 technologies**



H2 Technological Parks

Summary of the main areas of activity

- **R&D of innovative technologies for the exploitation of hydrogen, produced from different energy sources (renewable and not)**
- **Integrated projects for stationary and automotive applications**
 - **Civil and industrial sectors**
 - **Transportation: use of H2 as alternative motor fuel and integration into urban transport system through distribution facilities for bus and car transport**
- **Socio-economic analysis:**
 - **Social acceptability**
 - **Economic analysis**
 - **Cost-cut potential**
 - **Rule/cost interaction**



H2 Parks in Italy

Hydrogen System Laboratory, Turin – Piedmont

- **Bicocca Project, Milan – Lombardy**
- **Zero Regio Project, Mantova – Lombardy**
- **Arese Project, Arese – Lombardy**
- **Hydrogen Park, Marghera (Venice) – Veneto**
- **HBUS, Florence – Tuscany**
- **Arezzo Project, Arezzo – Tuscany**
- **HighValley, Abruzzo**



Hydrogen System Laboratory, (HySy_LAB) Turin, Piedmont

ENVIRONMENT
PARK



PROVINCIA DI TORINO



CITTA' DI TORINO



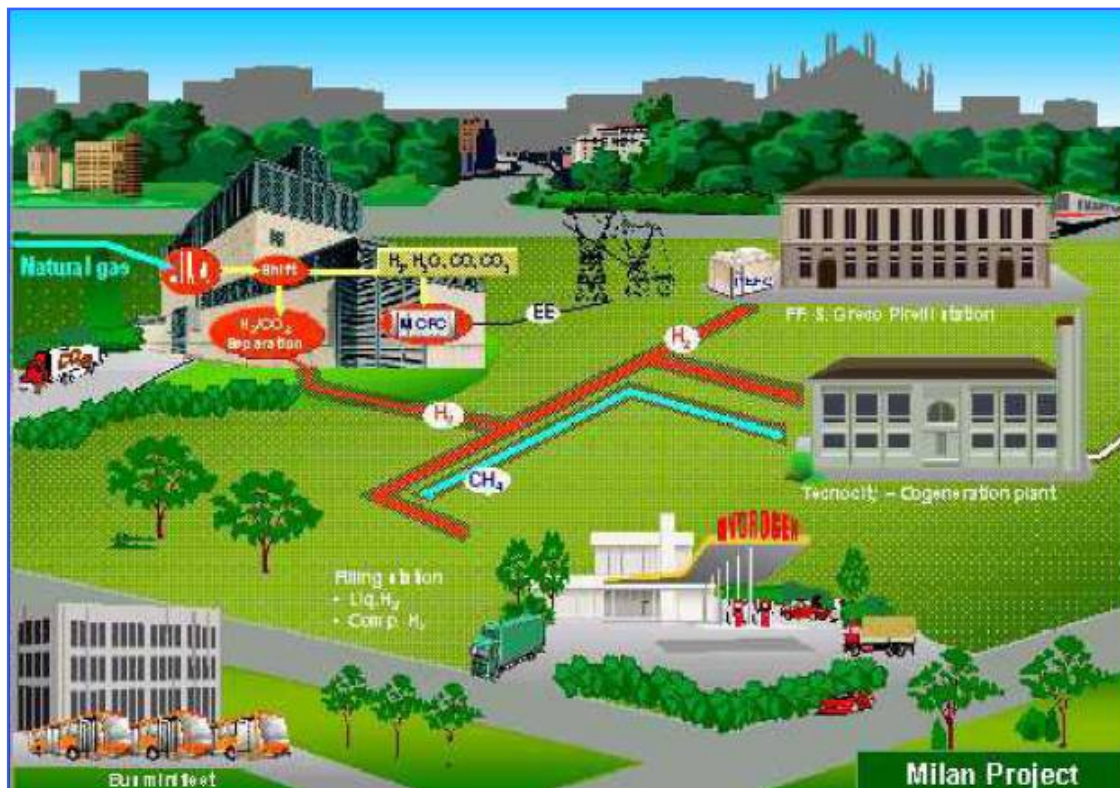
Hysy_LAB – Main activities

HySy_LAB activity develops on the entire H2 drawplate:

- H2 PRODUCTION → Electrolysis generation from renewables, Natural gas and LPG auto-thermal reforming, Photovoltaic generator (18 kW)
- H2 STORAGE → Comparison with carbon Comparison of traditional vessels (metal vessels) with semi-composite (available) and composite (under development), Comparison with carbon fiber and nanostructure matrixes, Development and characterization of metal hydrides
- H2 APPLICATIONS → Fuel cell based cogeneration systems, Basic research for the synthesis of other MEAs, of metal hydrides, nanotubes and carbon fiber for hydrogen storage, Laboratory test bench for fuel cell stacks (1-10 kW), Small fuel cells (< 100 W) test systems
- ENVIRONMENTAL MODELLING → Reliability, safety and lifecycles (LCA) analysis



Bicozza Project Milan, Lombardy



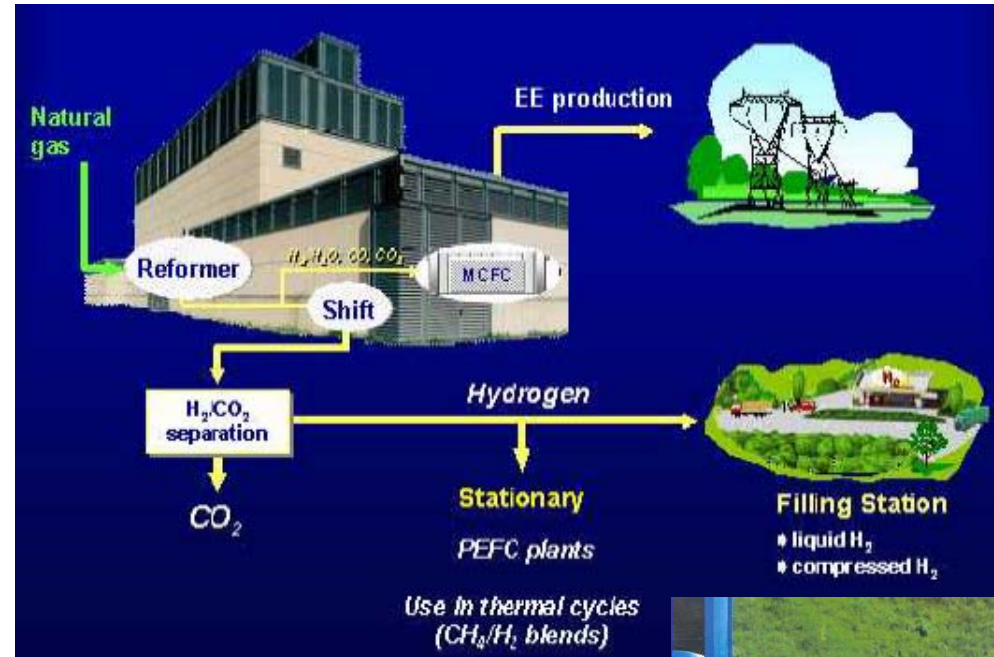
- Comune di Milano
- AEM
- ENEA
- Ansaldo Fuel Cells
- BMW Italia
- SOL S.p.A.
- Italian Ministry of Environment



BicoCCA Project – Main activities

Production and utilization of hydrogen for both stationary and transport applications:

- Design, installation and management of a 1.3 MWe phosphoric-acid fuel cell plant
- Installation of a H₂ production facility (gas reforming)
- Installation of a CO₂ capture and storage facility
- Building of a H₂ transport pipeline
- Set up of a H₂ distribution facility for bus and car transport (Filling Station)





Zero Regio Project Mantova, Lombardy



- Daimler-Chrysler, Germany
- Agip Deutschland, Germany
- Centro Ricerche Fiat, Italy
- City of Mantova, Italy
- EC-JRC, Ispra, Italy
- Eni Tecnologie, Italy
- Fraport AG, Germany
- IEFE, Bocconi University, Italy
- Infracore GmbH & Co. Hoechst KG, Germany
- Linde AG, Germany
- Lund University, Sweden
- Regione Lombardia, Italy
- Roskilde University, Denmark
- Sapio, Italy
- Saviko Consultants, Denmark
- Verkehrsgesellschaft Frankfurt, Germany



Zero Regio: an integrated automotive project

Development of H2 infrastructure systems; integration of these in conventional refueling stations:

- On-site H2 production by ENI innovative reformer
- H2 pipeline transport and storage from centralized source to refueling station
- Filler equipment at 350 bar
- H2 refueling into a multi-energy station:
 - CH4, LPG, low sulphur diesel fuel, gasoline
 - Compressed H2 (350 bar)
- 4 FC – fully monitored – 30 kW city cars
- Training
- Field tests
- Local management





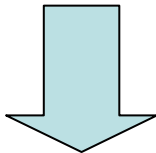
H2 Project in Arese - Lombardy

“Sustainable mobility pole”

Partners: Lombardy Region - Centro Ricerche Fiat - Politecnico di Milano

An integrated project New conditions for a H2 + FC
and High Tech “market oriented” district for:

- Industrial market
- Transportation
- Domestic market

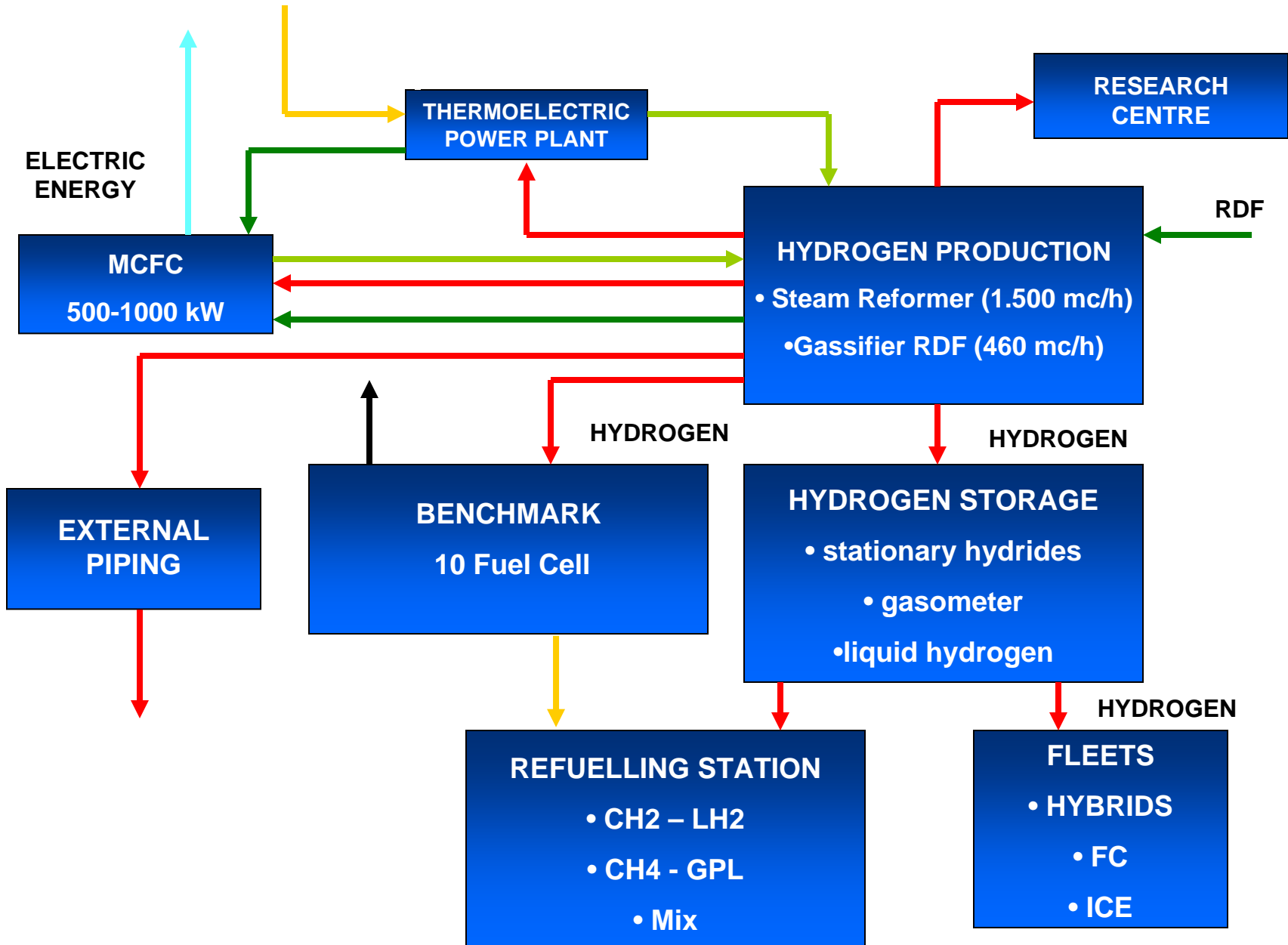


- New products exhibition (Show Rooms)
- Technological Benchmarking:
comparative criteria and validation





Arese: the H2 Project





HYDROGEN PARK PROJECT

Marghera (Venice) - Veneto



- EVC ITALIA
- SAE IMPIANTI
- SAPIO
- VENEZIA TECNOLOGIE
- VEGA
- UNIINDUSTRIA VE
- APRILIA
- BERENGO
- ENEL
- DOW POLIURETANI

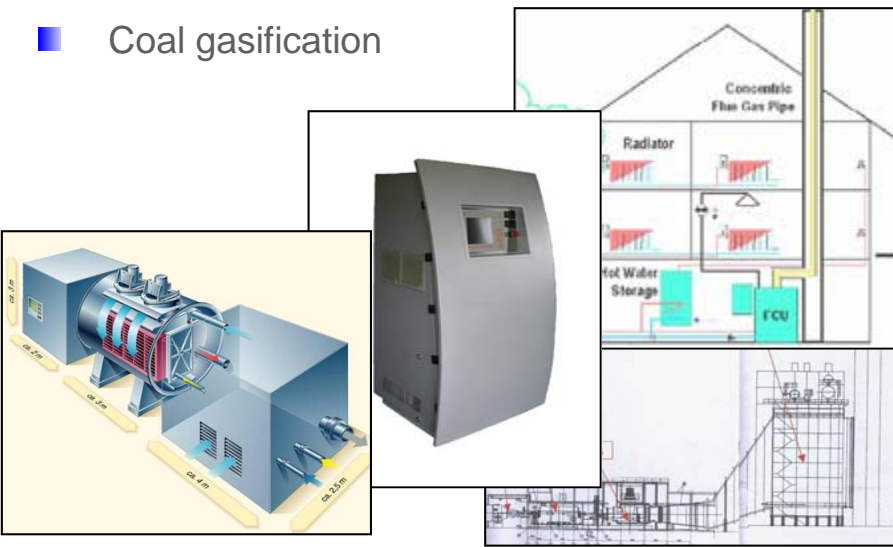


Hydrogen Park: main activities

- 6.000 – 7.000 Nm³/h available from Chlorine process and used for heat production
- Integrated project for stationary and automotive applications

- MCFC (500 kWe) integrated with cogeneration plant
- Hydrogen pipeline in urban area
- Micro CHP (PEM) for small buildings
- Coal gasification

- Hydrogen Vaporetto
- Hydrogen – Methane Mixtures
- Daily FC
- Refueling station





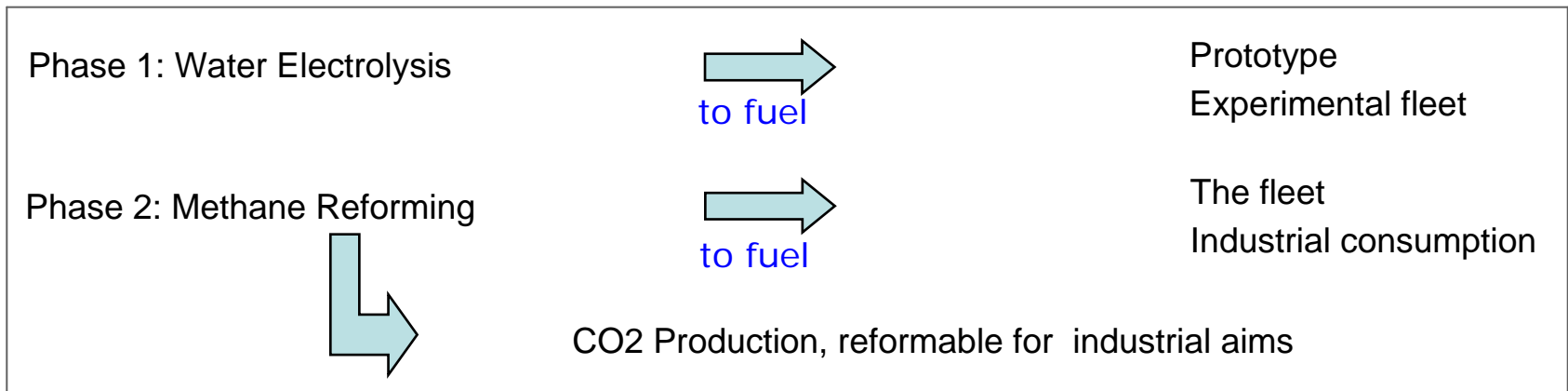
HBUS Project

Florence, Tuscany



- **Partners:** SOL GROUP - Comune di Firenze - I2T3 - Nuvera Fuel Cells - Comune di Bologna – Enea - Compagnia Trasporti Pubblici Napoli – Ataf - Istituto Motori CNR – Autodromo – Thecla – ST - Rerum Causam Cognoscere – ITAE

- A complete system of production / refuelling of H₂: production on the ground and storage on board
- A hybrid traction system for the optimal energetic consumption





AREZZO Project Tuscany

- About 700 Goldsmiths located in the industrial area, already using hydrogen
- Existing consumptions: about 500.000 mc/year (about 0,1 % of the merchant)
- Cylinders, packs and tube trailers
- Three different industrial areas
- Centralization of Hydrogen storages and distribution through pipelines network
 - research project funded by the industrial savings
- Greenfield test for several CHP units (5 kW)
- Monitoring of public acceptance





HighValley Project - Abruzzo

- Air Liquide
- ARAEN/RA
- COSIV
- Ferrara University
- Bari University
- L'Aquila University
- Pescara University
- Western & Co

Coordinated by Abruzzo Region

Main activities: renewable energy system installations in combination with hydrogen production and fuel cell application:

- Production of hydrogen from solar energy (Cupello plant) and utilization in tri-generation;
- Production of a fuel cell powered support vehicle.



HighValley

Present Situation in Abruzzo

EDUCATION PROJECT

