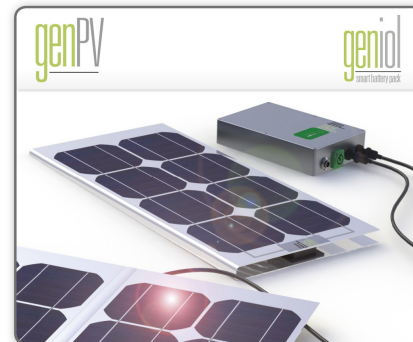


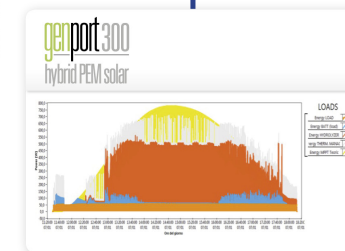
Resilient Hybrid Power Sources

Making Energy Available Any Time, Anywhere

genport
Power Solutions
we power



Oxygen for water purification



LE TECNOLOGIE DELL'IDROGENO PER
LA MOBILITA' E LO STOCCAGGIO

Milano – FAST – 1 Luglio 2016

Paolo Fracas – CEO

Advanced Power Sources



Lead Acid Batteries are Heavy, bulky, dirty, and require costly air conditioning



Gasoline and Diesel Generators are noisy & unreliable, with dangerous emissions

Mission

- **Maximize** energy density
- **Avoid** environmental impact
- **Provide** reliable power in extreme conditions
- **Reduce** cost of energy

Core Technology

Portable & Stationary Hybrid Power Sources

- Lithium Battery as short energy buffer system
- PEM Fuel Cell as runtime extension system
- H₂ as lightweight, safe energy storage system
- Dynamic Optimization and Prognostic Controls as management system

Intellectual Property

- Hybrid battery fuel cell
- Sodio-boro based solid hydrogen
- Ergonomy, wearability
- Hybrid solar fuel cell
- Modular Ion lithium based energy storage
- Proprietary Know-How

The Company Overview



*Headquarter in Vimercate, Italy
(Vimercate Technology Park)*



*Location in West Lafayette, IN
(Purdue Technology Park)*

Foundation

Genport srl in 2009 as spinoff Politecnico of Milan,
Genport North America Corp. in 2012.

Headquarters and Laboratory

Vimercate (IT)

Subsidiary

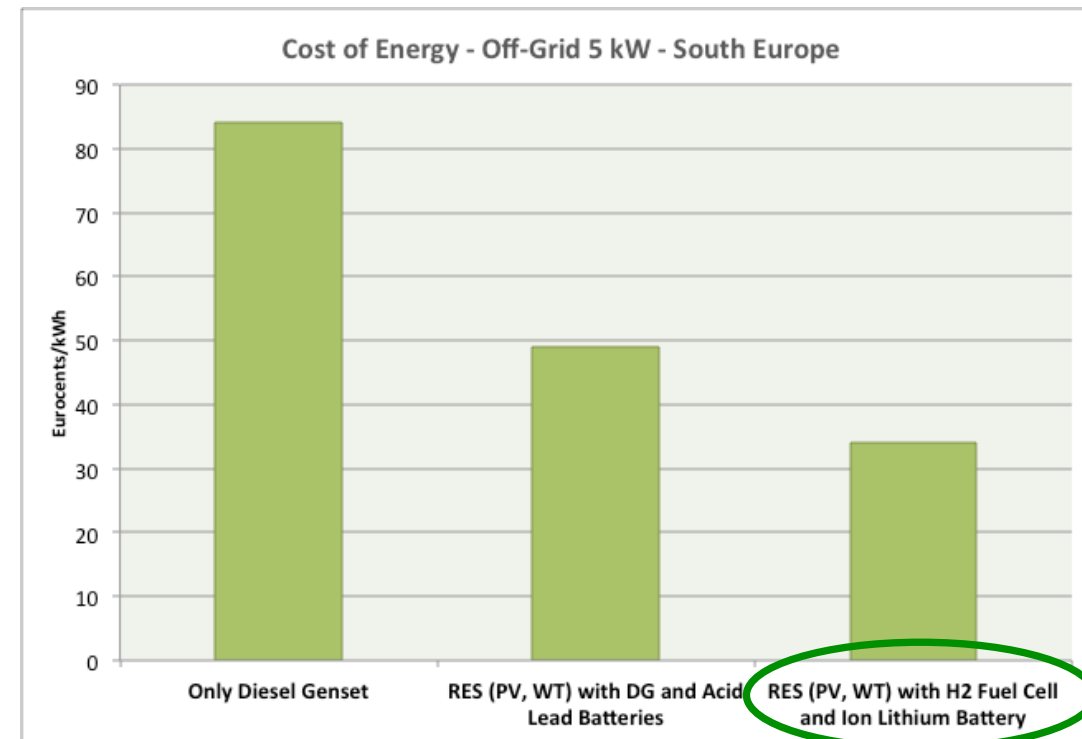
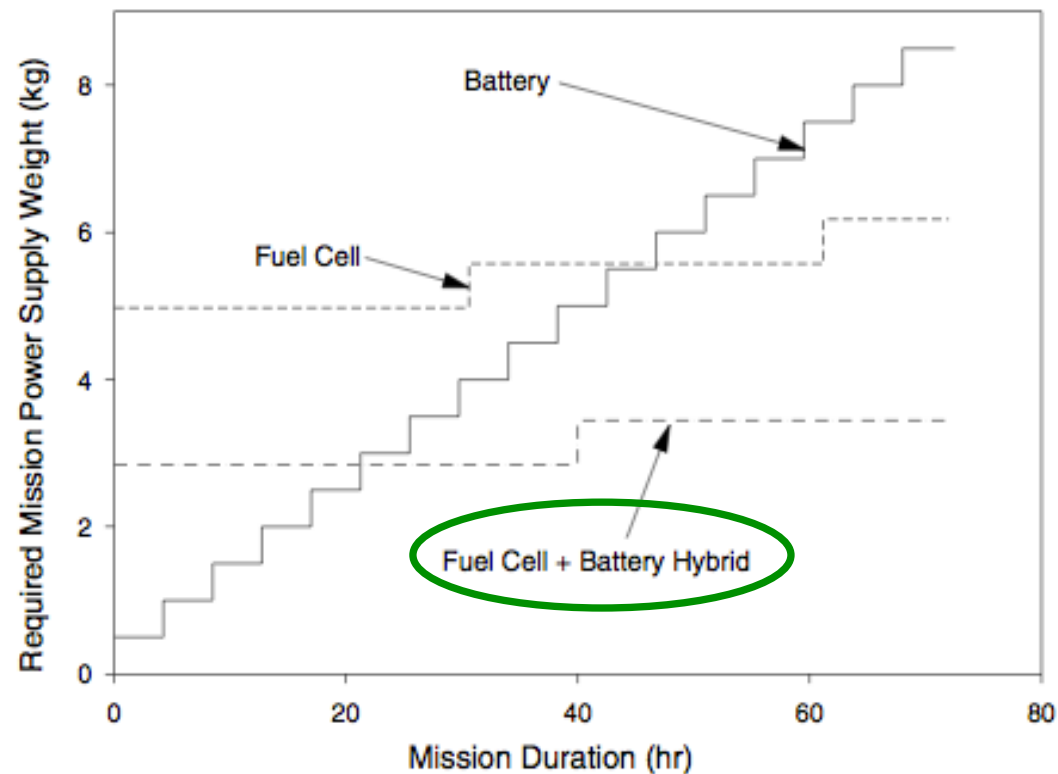
West Lafayette (IN)

Technology Partners

Texas Instruments (US), Linear Technologies (US) Arbin
Instruments (US), Schunk (D), Politecnico of Milan (IT),
Purdue University (IN)



Advantages of Genport Hybrid Technology

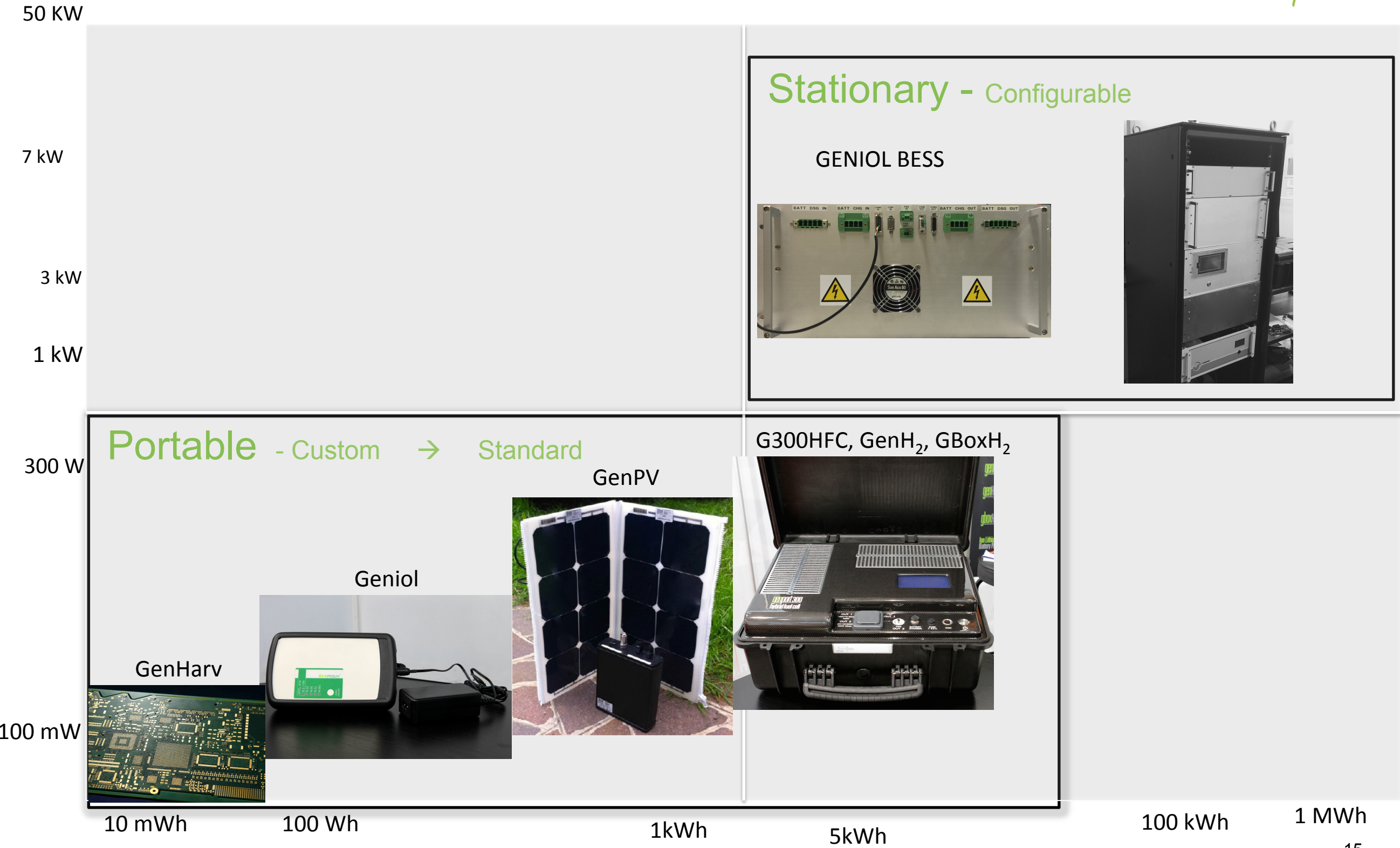


- Improved reliability in off-grid
- Improved renewable power factors
- Increase overall micro-grid resilience
- High quality power
- Robust and long life technology
- Zero environmental emissions, reduced lifecycle footprint
- Reduced weight and dimensions in portable applications
- Optimized CAPEX
- Lowest off-grid Cost of Energy
- Simple installation, quiet operation, reduced maintenance
- Scalable, modular for almost any portable and small stationary application



Products Matrix

By Power and Energy range



Portable Power source

genport
Power Solutions
we power



genport 300 hybrid fuel cell

Wearable power source • 300 Watts nominal power output (400 Watts peak power) • Voltage: 24 Vdc, 230/110 Vac • Operating Temperature Range -20C - 40C • Immediate startup • Automatic startup • No thermal signature • Low noise • Green Hydrogen Fuel: GENFUEL, Metal Hydrides, Compressed Hydrogen • Rugged water-proof case • Cover in lightweight carbon fibers based composite • Indoor use • web remote monitoring • CE compliant

Hydrogen Storage

gboxH₂



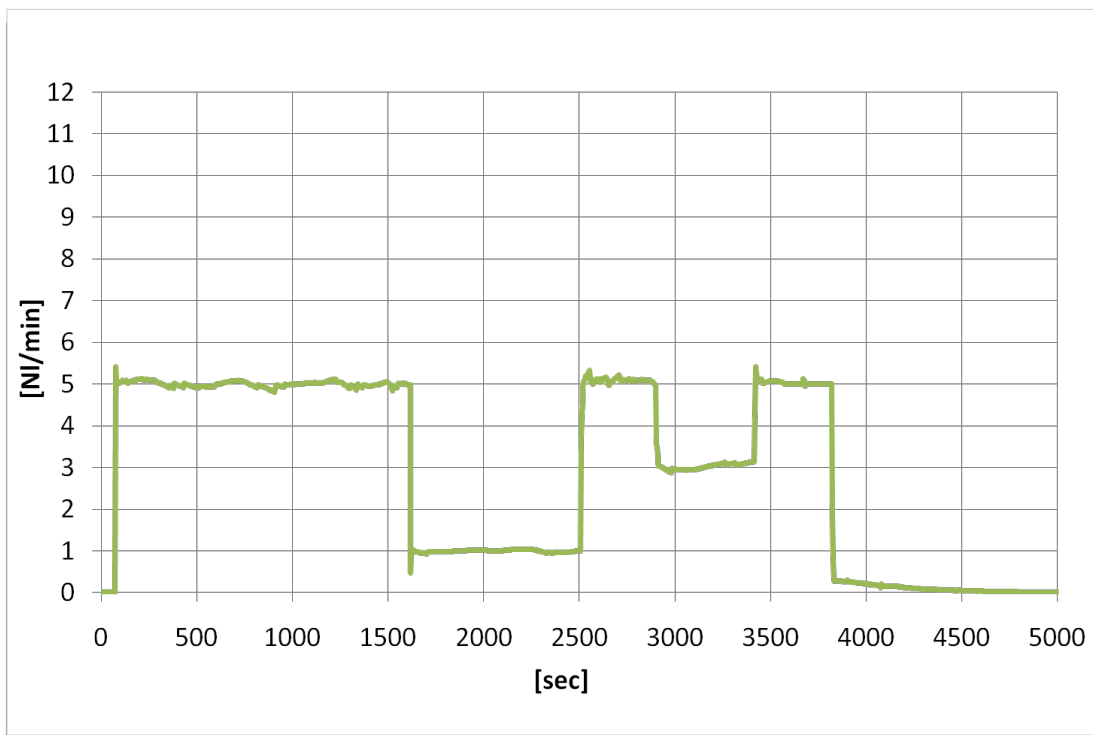
- Solid H₂
- rechargeable cartridge
- high energy storage capacity (4200 Wh)
- Portable rugged case
- Thermal regulation embedded
- Safe storage and generation
- Zero environmental impact
- continuous H₂ on demand
- long life and no effect to charge/discharge cycling
- no capacity loss in extreme environment

Hydrogen Storage

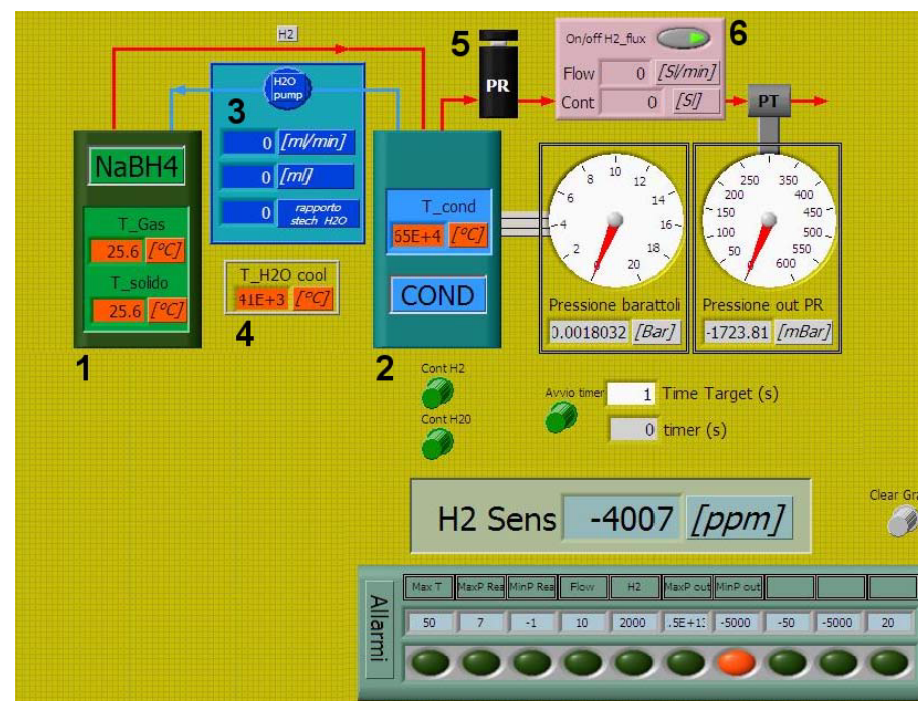


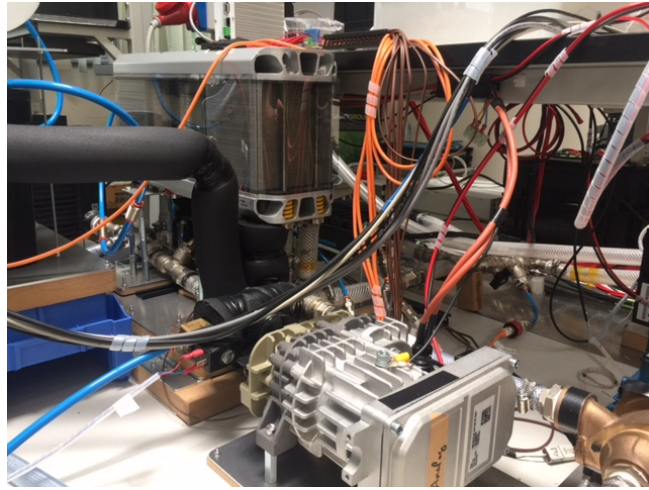
- Compressed H₂ • rechargeable canister •
- 24 hours @ Max Power • transportable •
- Continuous H₂ on demand

Hydrogen Storage GenFuel



- Solid H₂
- Safe storage and generation
- Zero environmental impact
- continuous H₂ on demand
- High energy density (1000 Wh/kg)
- Clean, recyclable co-product





Background and motivation

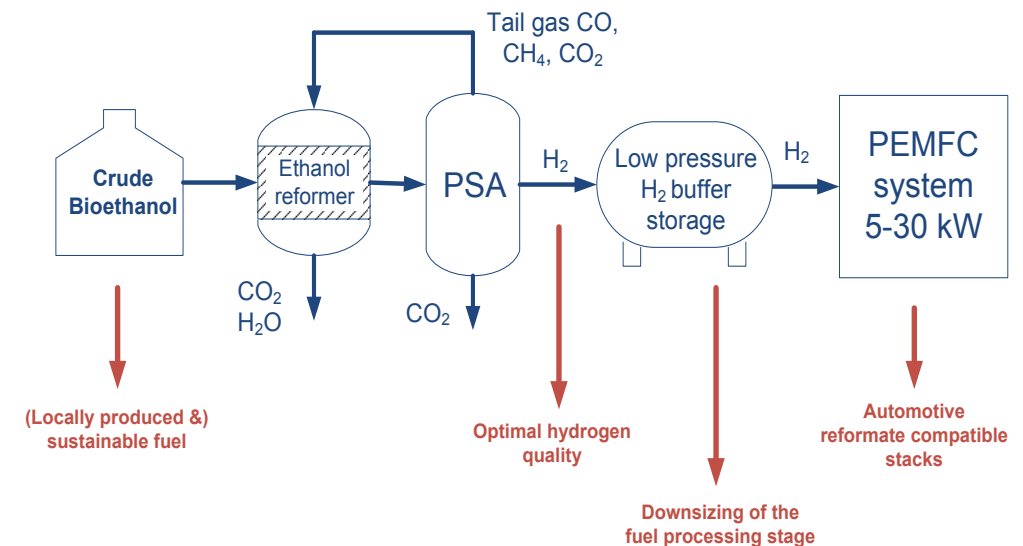
- Telecom back-up and off-grid power is one of the strongest markets for fuel cells today
 - Competitive total cost of ownership (TCO) especially in long back-up (several days) or completely off-grid applications
- Need for reliable, cost-competitive and environmentally sustainable solutions growing
 - Low quality bioethanol fuel would allow use of locally produced and sustainable fuel also in developing countries
- Relatively high investment cost and fuel logistics key challenges slowing market penetration

Objectives

- Developing an integrated PEM fuel cell based power system for stationary back-up and off-grid power generation, that is
 - Using crude (80-95%) bioethanol as primary fuel
 - Cost-competitive (complete system < 2 500 €/kW @ 500 units)
 - Energy-efficient (> 30% overall system efficiency)
 - Durable (> 20 000 hours system lifetime in continuous operation)
- Laboratory testing and limited field trial (~1000 hours)
- A roadmap to volume production one of main project deliverables

Main outcome

- Applications / End users
 - Long back-up and off-grid power (mainly telecom in developing countries)
 - Power production and grid stabilization for micro grids
- In addition to the complete system, development of separately utilizable subsystems is another main outcome of the project
 - PEMFC system for back-up/off-grid application using low-grade hydrogen fuel
 - Low-cost, state-of-the-art PEMFC stack for various applications
 - Crude bioethanol processor unit (reformer + PSA) for distributed H₂ generation



- Project volume 4,6 M€ total budget / 378 person-months total
- Duration 3 years, May 2014 – April 2017



Thank you!

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