## Hydrogen Expo 2025, Piacenza - Thursday 22 May, 13.00-14.30

## Il futuro dell'idrogeno verde: progetti in Italia fino a giugno 2026 e dopo il PNRR









## SIMPLIFHY current Projects State of the Art

Speaker: Mauro Cesana Technical Director E-mail: mauro.cesana@simplifhy.com

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Simplifhy SB s.r.l.

## Hydrogen Solutions, Simplified.

Simplify integrates experience and products to ensure advanced hydrogen solutions by providing engineering, construction and operation services in the energy sector. Despite its young age, it has already participated in and implemented several hydrogen-related projects in Italy







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How we work and what we offer today



Assess & consult

We provide you with the expertise in technologies, markets and value chains to support you in creating or evaluating innovative business models based on green hydrogen.



We quickly test your idea with minimal investment and we deliver value within weeks.



Engineering



We deliver feasibility studies, basic engineering and detailed engineering.

We support you on approval, permittal, and safety studies.

From small skid building to 20MW electrolyzer plant, we deliver turnkey project for hydrogen generation to refueling

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#### Pilot



#### Innovative Solution co-creation

We work side by side in defining the decarbonisation targets, building together customised solutions to your application needs

### **Project execution**



Service & Operation

To maintain and operate hydrogen assets, optimizing effective use of operation



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#### MAIN ONGOING PROJECTS

## FEASIBILITY STUDIES









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## ENGINEERING

## CONSTRUCTION







### FEASIBILITY STUDIES

Several feasibility studies are being carried out for projects funded by the PNRR:

GRASTIM-Sofinvest: from initial design to detail engineering OMCD Tek Hub SPA: from engineering to construction Autotrasporti Pensiero: from initial design to autorization

Activities where we can make our skills available

- Support for the preparation of the documentation required in the authorization  $\bullet$ phase
- Studies for the calculation of mass balances, energy needs
- Preparation of economic scenarios

This is a very important activity that allows us to be involved in the subsequent phases of executive design and implementation





#### **EXECUTIVE DESIGN - HYDROGEN VALLEY**



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#### OMCD Tek Hub SPA HYDROGEN PRODUCTION PLANT DESIGN

From mains water inlet and power supply to  $H_2$  delivery point

#### Main components

- Water treatment system
- AEM 1 MW electrolyzer (~200 Nm<sup>3</sup>/h 18.7 kg/h) in 40" container (Enapter NEXUS)
- Low pressure hydrogen storage (50m<sup>3</sup> @ 35 Bar)
- High pressure  $H_2$  back up storage (8m<sup>3</sup> @200 Bar)
- Piping interconnection / pressure reduction
- Control system

#### Auxiliary systems

- Gas detection system
- Flame detection system
- Extinguishing / cooling system

#### Project disciplines covered

- Process
- Equipment layout
- Piping layout
- Cableway layout
- Atex classification
- Fire fighting and cooling systems



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### CONSTRUCTION - HYDROGEN LABORATORY FOR EDUCATIONAL USE ITS GREEN ACADEMY VIMERCATE

The aim is to offer students a unique opportunity for research, experimentation and simulation of technical-scientific processes related to hydrogen.

The laboratory includes on a small scale all the main elements of the "hydrogen supply chain"

- $H_2O$  Demineralizer
- 1 Nm3/h Electrolyzers (AEM Enapter EL 4.0)
- Dryer
- Low Pressure Storage
- Metal Hydride Storage (DASH M3 GRZ)
- Compression
- High Pressure Storage
- Fuel Cell (PEM)
- Vehicle Refueling System (Bicycle)
- General Control System  $\bullet$
- Auxiliary safety Systems (F&G)



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#### What Simplifhy does

- Design
- Authorization process
- Supply
- Construction
- Commissioning
- Support for teaching activities









## Future-Proof Hydrogen with Metal Hydride Technology

Compact, safe, and efficient storage and conversion systems for tomorrow's energy landscape



Speaker: Alexandre Damourette Sales Engineer E-mail: alexandre.damourette@grz-technologies.com



### Metal Hydrides Technology

#### Hydrogen Molecule

#### Metal Hydride



Factor 16.6 in Distance = Factor 2300 in Volume



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Ph. Mauron, M. Bielmann, A. Züttel EMPA, Switzerland



#### Product Lines











 $CO_2$ 







### DASH M-Series: Modular, Versatile H<sub>2</sub> Storage

- Very high volumetric density (equal to 1000 bar gas storage)
- Superior safety: solid-state, lowpressure design
- Low Levelized Cost of Storage (LCOS): no compression or liquefaction
- Modular, versatile design adapts to growing demand
- High round-trip efficiency
- Flow rates can be controlled with temperature
- No ATEX Zone

	DASH M-Series	
	H <sub>2</sub> Storage Capacity	
	Weight	
S	Dimensions (L x W x H)	
	ATEX Zones	
	Noise Emissions	
:h	H <sub>2</sub> Charging Pressure	
	H <sub>2</sub> Discharging Pressure	
	Expected Service Life	

<sup>1</sup> Depending on Thermal Management System (TMS)

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M1	M3	M10	M20	MZ
1 kg <sub>H2</sub>	3 kg <sub>H2</sub>	10 kg <sub>H2</sub>	20 kg <sub>H2</sub>	45 k
111 kg	315 kg	1035 kg	1910 kg	4180
0.55 x 0.44 x 0.22m	1.05 x 0.65 x 0.22m	1.07 x 0.65 x 0.70m	2.00 x 0.60 x 0.70m	2.00 x 1.10
		None		
		None		
		30 to 45 bar (g)		
		1 to 45 bar (g) <sup>1</sup>		
		> 20 years		



#### DASH M-Series: Reference Projects

Educational H<sub>2</sub> Storage: Hydrogen laboratory

- Customer: ITS Green Academy (Italy)
- Target Group: students
- Product: DASH M3
- Benefits: Compact, safe, scalable storage



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Industrial H<sub>2</sub> Storage for Steel Processing

- Customer: Easy Energy Consulting (Switzerland)
- Target Group: industrial consumers of H2
- Product: DASH M20  $\bullet$
- Benefits: Low-cost, reliable, safe H2 on-site lacksquare





### DASH C-Series: Containerized, High-Density H<sub>2</sub> Storage



Standardized 20-foot ISO container

- Robust construction  $\bullet$
- Easy transport  $\bullet$
- Designed for industrial applications
  - Fluctuating H<sub>2</sub> production lacksquare
  - Buffer storage lacksquare

DASH C-Series

H<sub>2</sub> Storage Capacity

Weight

**Dimensions Container** 

ATEX Zones

Admissible Ambient Tem

Noise Emissions

H<sub>2</sub> Supply Purity

H<sub>2</sub> Charging Pressure

H<sub>2</sub> Discharging Pressure

Expected Service Life

<sup>1</sup> Depending on Thermal Management System (TMS)





	C45	C90	C135	C180	C270	C405	C540	
	45 kg <sub>H2</sub>	90 kg <sub>H2</sub>	135 kg <sub>H2</sub>	180 kg <sub>H2</sub>	270 kg <sub>H2</sub>	405 kg <sub>H2</sub>	540 kg <sub>H2</sub>	
	10.4 t	14.9 t	19.4 t	23.9 t	32.9 t	46.4 t	59.9 t	
				20 f	eet			
				Only at exhaus	st of vent lines			
Э.	-5 to +38 °C							
	< 70 at 10 meters dB(A)							
	99.995%							
				30 to 45	5 bar (g)			
				1 to 45	bar (g) <sup>1</sup>			
				> 20 v	years			
	- (							









#### Large-scale H<sub>2</sub> Storage for Industrial Use



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#### DASH Power: High-Density, Plug-and-Play H<sub>2</sub> Storage

Auxiliary equipment: batteries, TMS, etc.

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	175-900	260-1800	400-2700	500-3500	500
(Peak)	175 kW <sub>e</sub>	260 kW <sub>e</sub>	400 kW <sub>e</sub>	500 kW <sub>e</sub>	500
(Avg.)	75 kW <sub>e</sub>	160 kW <sub>e</sub>	240 k $W_e$	320 kW <sub>e</sub>	320
pacity	0.9 MWh <sub>e</sub>	1.8 MWh <sub>e</sub>	2.7 MWh <sub>e</sub>	3.5 MWh <sub>e</sub>	4.5
	17.7 t	21.9 t	26.1 t	30.8 t	35
ce Output		3-	phase 400 V 50/60	Hz	
ient Temp.			-5 to +38 °C		
			> 4.5 (99.995%)		
sure			30 to 45 bar (g)		
Incl. Waste Heat)			84 %		
Requirements			None		



#### DASH Power: A True Plug & Play Solution





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#### HyCo Technology





- Revolutionary hydrogen compression technology without moving parts resulting in noise free, vibrationless operation and minimal maintenance
- Combined storage and compression function in a single device, resulting in a simplified chain and a more compact setup
- Very high safety due to the lowpressure, solid-stage storage technology
- Possibility to use waste heat if available

#### HyCo for Trailer Refueling











### HyCo HRS for Forklift



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### HyCo HRS for Trucks









#### UPSOM – High-Efficiency Methanation

Converting CO<sub>2</sub> and H<sub>2</sub> into Synthetic Methane (CH<sub>4</sub>) via the Sabatier process

## $CO_2 + 4H_2 \rightarrow CH_4 + 2H_2O$

- 100% carbon-neutral alternative to fossil natural gas
- >99% single-stage conversion efficiency enabled by proprietary catalyst and reactor design (world record)
- Proven technology: in operation for 3+ years
- Key applications:

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- Biogas upgrading
- CO<sub>2</sub> valorization from flue gases 2.
- Power-to-gas: store surplus renewable electricity 3.
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CO

 $H_{\gamma}$ 







 $CH_{4}$ 

 $H_2O$ 

#### Part of GreenGas project in Switzerland at Gaznat



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#### UPSOM – Synthetic Methane from Photovoltaic Power

- 500 kW Photovoltaic
- 500 kW Electrolyzer
- CO<sub>2</sub> from industrial source or biogas
- UPSOM Reactor with a production capacity of 2 to 37 kg<sub>CH4</sub>/h











## Electrolysers: Decentralized H2 and lowering Costs



Speaker: Ruben Furi Sales & Partner Manager E-mail: rfuri@enapter.com



Enabling a sustainable green hydrogen economy

- Innovation must remain the key focus of OEMs
- Technological advancements
- Manufacturing at scale and automation
- Decentralized production
- This will be key to reducing CAPEX and OPEX
- Offtake incentive policies are necessary



#### Enapter Electrolysers



- Industry leading efficiency: **4.6 kWh/Nm<sup>3</sup> 51.3 kWh/kg**
- Fully automatic operation, AI optimized
- Modular & scalable  ${ \bullet }$

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## The EPC contractors' Point of View



Speaker: Giulio Raganelli Sales Director Grids Services, IT Solutions & Energy Plants E-mail: GRaganelli@cpl.it



**PNRR – Ecological Transition – Renewable Energies** has a capability of 8.6 G€ of which around 2 G€ for hydrogen projects. The table below summarizes the panorama of the projects as for public data.

It's clear the delay of the projects development and the **poor outcome in Hard-to-Abate stream**.

In the other streams, the projects under construction or that have reached the FID (Final Investment Decision) are not in line with the expectations. For example, in Hydrogen Valleys less than 10 projects are in a mature phase and have a good chance to be built and operated.

Торіс	Projects (#)	Available from PNRR (M€)	Assigned with other contribution (M€)	Spent (M€)	Deadline
Hydrogen Valleys	47	500	590	2	30/6/2026
Hard-to-Abate	3	1,000	19	0.2	30/6/2026
<b>Road Mobility</b>	44	230	407	6	30/6/2026
Rail Mobility	11	300	342	5	30/6/2026
	105	2,030	1.358 (*)	13.2	

(\*) 531 M€ come from other contribution









### Various reasons for the delay – not only because of the operators

Many analysis have been made to understand and to highlight the reasons of such delay. The main result is:

- Authorization process frequently too long (no previous experience of hydrogen plants authorization);
- Subsidies sometimes too low respect of the total investment (depending on the ranking);
- National Hydrogen Strategy issued only at the end of November 2024 and still not clear on the factual measures to sustain the production and the hydrogen market afterwards;
- So called **«Decreto Tariffe»** probably will be issued in the coming months, thus the investors and the operators will have less than one year to complete the plants, if they decide to go on;
- Time to supply the main equipments quite long.

## suppliers and contractors.



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The above context just caused uncertainty in the sector that affected and furthermore it's still affecting investors,

## What'are the issues that EPC contractors are facing?

- The quality of the project design used for the tender (especially in the beginning) wasn't at level as one could expect;
- Due to the short time available to build the plant (recent tenders) the client wants/tries to charge all the risks to the **contractor** and the mitigation is not always available;
- Price increase and supply time of the main equipments have forced the client to buy directly such equipments, reducing the contract value but not the liabilities of the construction;
- In public tenders the penalty for delay has been increased up to 20% of total amount of the contract and the client keeps the rights to charge the contractor the entire amount of the subsidies received from PNRR, in case of loss due to reasons not attributable to himself;
- Lack of vision after the deadline of PNRR daunts the operators to invest, as usually done, in long term businesses;



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The client is both public and private. The approach is quite different in terms of tenders, but there are some common topics:





### CPL Concordia – Company Profile Our motto: «Energy to improve the quality of life»

#### We are an Italian cooperative company leading in the design, implementation, and management of energy systems.

Founded in 1899, we currently have more than 1,700 employees in Italy across 10 operational offices.

Our strengths include heat management facility management, public lighting, cogeneration, services and plants for the distribution of natural gas and water and management software and IT services for utilities.

We are committed every day to sustainable achievements both environmentally and economically. Our processes and choices are centered on people because it is the cooperation between individuals that makes every project achievable.

#### \*Updated data ad of December 2024

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**Turn Over** >340 M€ **EBITDA** >31 M€









### CPL Concordia – What we do

#### In our world there is much to discover. We'll be happy to guide you and provide the best solution for your needs.

Our solutions focus on efficiency and modularity, catering to diverse client needs with both traditional fuels and renewable energy sources. We handle the design, construction, maintenance, and management of plants. Through technology, innovation, research, design, and strategy, we ensure guaranteed and certified quality. We are dedicated to providing innovative, environmentally conscious solutions.





IT solutions

**Public Lighting Facility management Energy management** 





#### CPL Concordia – Our works in H2 More than 60 M€ already in portfolio

- Milano Serravalle (client Trenord) Construction of 5 refueling stations for cars and trucks
- HydrogenMO (client Snam) Construction of H2 production plant of the Hydrogen Valley in Modena
- Other projects as BOP (Balance of Plant) contractor
- Other ongoing tenders











## Loccioni Leaf Community: a living lab of ecological transition

Speaker: Luca Marassi Powertrain BU Director E-mail: I.marassi@loccioni.com



Loccioni competences and businees

Polaris®

Our road map toward the ecological transition

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Loccioni customers

## The choice of the best in the world

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![](_page_37_Picture_6.jpeg)

We work together with the world-class enterprises and leaders in their industry.

We build strong and long-lasting relationships with them, helping them to solve their most annoying quality problems with tailor-made solutions that integrate technologies and innovate processes.

![](_page_37_Picture_10.jpeg)

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#### the upcoming hydrogen market

![](_page_38_Figure_1.jpeg)

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Current world production of hydrogen is about **100 Mtons**, over **99.6%** of it is produced emitting CO<sub>2</sub> into the environment.

The **decarbonization** of current industrial processes using H<sub>2</sub> as feedstock, such as the production of ammonia, methanol or other fuels, would lead to a **huge increase** in the production of **electrolysers** and **Carbon Capture systems** 

![](_page_38_Picture_7.jpeg)

#### the upcoming hydrogen market

![](_page_39_Figure_1.jpeg)

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![](_page_39_Figure_3.jpeg)

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#### LOCCIONI

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Source: The European House – Ambrosetti, data from Hydrogen Council, 2020; elaborated by LOCCIONI

![](_page_39_Picture_10.jpeg)

![](_page_39_Figure_11.jpeg)

#### The upcoming hydrogen market

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![](_page_40_Figure_1.jpeg)

![](_page_40_Picture_2.jpeg)

#### When low-cost green hydrogen will be available, the applications and market niches could be

Loccioni cooperates with many customers who are investing in the development of:

- electrolysers
- fuel cells

several.

- hydrogen combustion engines

![](_page_40_Picture_9.jpeg)

![](_page_40_Figure_10.jpeg)

### Solutions and services for hydrogen technology

![](_page_41_Picture_1.jpeg)

#### Tested products

![](_page_41_Picture_3.jpeg)

#### Fuel Cell's stack

Membrane Electrode Assembly (MEA)

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![](_page_41_Picture_12.jpeg)

Electrolyzer's stack

H<sub>2</sub> Injectors

H<sub>2</sub> Regulators

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![](_page_41_Picture_19.jpeg)

#### Test benches for Electrolyzer stacks up to 300kW

![](_page_42_Picture_1.jpeg)

Test bench for Membranes and small ELY up to 5 kw

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![](_page_42_Picture_5.jpeg)

Ex-proof test chamber with EIS capability

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![](_page_42_Picture_9.jpeg)

Test bench for PEM-AEM – AWE ELY up to 15 kw

![](_page_42_Picture_11.jpeg)

Test bench for PEM-AEM ELY up to 300 kw

![](_page_42_Picture_13.jpeg)

Bosch PEM Ely test benches installation

![](_page_42_Picture_15.jpeg)

containerized solution

![](_page_42_Picture_17.jpeg)

![](_page_42_Picture_18.jpeg)

#### Test benches for injectors and fuel cells

![](_page_43_Picture_1.jpeg)

![](_page_43_Picture_2.jpeg)

![](_page_43_Picture_3.jpeg)

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![](_page_43_Picture_9.jpeg)

HP H2 injector endurance test bench in Hydrogen

![](_page_43_Picture_11.jpeg)

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HP H2 injector calibration test stand
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![](_page_43_Picture_13.jpeg)

LP H2 injector EOL production test bench

![](_page_43_Picture_15.jpeg)

Helium HP leak test up to 1000 bar for H2 valves

![](_page_43_Picture_18.jpeg)

![](_page_43_Figure_19.jpeg)

## R&D and Funding projects

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## TEGRIS

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# • The living lab of ecological transition

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Since 2008 Loccioni has been developing the first eco-sustainable community in Italy.

An **open-air lab** to demonstrate that it is possible to balance man, nature and technology.

Today the company is energetically autonomous, producing from renewables as much energy as it consumes.

![](_page_45_Picture_8.jpeg)

#### LEAF Community

![](_page_46_Picture_1.jpeg)

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![](_page_46_Picture_6.jpeg)

![](_page_46_Figure_7.jpeg)

#### The numbers of Loccioni LEAF Community

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**19 Photovoltaic Systems** installed for a total of 3,134 kW

4 Hydroelectric Plants for a total of 174 kW

**1 Cogeneration** power plant for 50kW

4 Electrical Storage systems for a total of 1,750 kWh

1 Thermal storage of 450 m3

**1 Hydrogen** production system 100kW

**20 Electric cars** in the fleet and potential grid storage

**36 Charging stations** 22 kW AC

**2 FAST charging stations** 150 kW

1 Bidirectional electric charging station (Vehicle 2 Grid)

1.162 Tons of CO2 avoided/year

53% Self-sufficiency from renewable sources

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SIM PLI FHY

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![](_page_48_Picture_3.jpeg)

#### Loccioni Nomadic Hydrogen Labs

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![](_page_49_Picture_7.jpeg)

supplying the **dispenser** for H<sub>2</sub> refueling study of **reference standards** and constraints choice of **main components** of the facility **optimization** of sizing to fit within standards Study of constraints and distances for **component placement** 

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## Simplifhy Compressorless dispenser

designed for low-cost simplified hydrogen refuelling systems dispenser H35, suitable for 350 and 700 bar vehicles in accordance with **DM 23/10/2018** Open communuication with the vehicle Possibility to works **in "cascade" mode** uncooled refuelling with Wenger B map protocol for refuelling up to 350 bar

**Testing system** for experimentation of **alternative protocols** 

![](_page_51_Picture_3.jpeg)

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## The Hydrogen Valleys beyond PNRR

Speaker: Livia Pastore Responsabile sviluppo idrogeno Italia E-mail: Livia.Pastore@axpo.com

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![](_page_53_Figure_1.jpeg)

![](_page_53_Figure_4.jpeg)

#### Hydrogen@

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#### Valle Peligna Hydrogen Valley

- Corfinio, Abruzzo
- 45MW PV + 30MW Ely
- 30% Axpo + 70% IGEi Partnership
- to supply Etex (hard-to-abate) & public transport
- Phasing under assessment

#### **Drivers of the Project:**

#### >> Industrial energy transition plan >> Pivotal location for national mobility corridors

30MW

100MW

#### Hynego

- Priolo, Sicily
- at ISAB refinery
- 100 MW Ely
- 25% Axpo + 75% Enego Partnership
- Feasibility Study by SB SETEC and Simplifhy under finalization

#### **Drivers of the Project:**

- >> Hard to Abate need
- >> Potential large scale energy hub

![](_page_54_Picture_27.jpeg)

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### From Hydrogen Valleys to Energy Hubs

Hydrogen as a Vector – key to energy balance & storage Hydrogen is not only a fuel, rather it is an energy vector to enable sector coupling

Hydrogen Valleys – just the first step to integrate solutions Production by green energy and for P-to-X, where hydrogen is the platform to launch energy solutions for clusters and networks

Pivotal role of ports and logistic hubs Energy intensive areas with many differtent logistic solutions, with storage, import and export facilities already in place

Incentives scheme along the full value chain, still Started from production with PNRR for H2 Valleys, need to pursue projects from green energy production to mobility, transport and tranformation facilities at industrial scale

#### > The role of innovation to enhance business opportunities

Co-development and strategic partnerships to secure investments in new technologies with committment levels by steps along the progress of the initiatives and the change of the regulatory environment

- ΙΜ S F 🔂 Y
- Il futuro dell'idrogeno verde: progetti in Italia fino a giugno 2026 e dopo il PNRR Hydrogen Expo 2025, Piacenza

![](_page_55_Picture_9.jpeg)

Integrated Services to **Energy System** 

> Support to New Technologies along the Value Chain

**Identification of** 

National

**Key Clusters** 

Strategic Long Term **Partnerships** 

Set-up of a RegulaStory

![](_page_55_Picture_15.jpeg)

![](_page_55_Picture_16.jpeg)

![](_page_55_Picture_17.jpeg)

![](_page_56_Picture_0.jpeg)

## Simplifhy SB

... So whats next in hydrogen in Italy?

Speaker: Sergio Torriani CEO Simplifhy SB srl E-mail: Sergio.Torriani@simplifhy.com

SIM PLI FHY

![](_page_56_Picture_6.jpeg)

#### ... So whats next in hydrogen in Italy?

![](_page_57_Picture_1.jpeg)

ΙΜ S F 🔂 Y

Il futuro dell'idrogeno verde: progetti in Italia fino a giugno 2026 e dopo il PNRR - Hydrogen Expo 2025, Piacenza

#### Before to get the green, we need to get out from the clouds

- Hydrogen Valleys need to become operative. Companies are learning, project are not making hydrogen competitive
- Opex support incentives need to be in place and clear and stable
- EU rules need to remain (RED III, CBAM, ETS2) -
- Energy Prices from Renewable need to drop -
- Use of renewable hydrogen need to be promoted

![](_page_57_Picture_12.jpeg)

![](_page_57_Picture_13.jpeg)

![](_page_57_Picture_14.jpeg)

#### ... So whats next in hydrogen in Italy?

#### Wild forest are only for experienced and brave: you need guides

- Simplifhy worked in more than 5 H2 lab projects, 6 hydrogen valleys, 7 refueling stations.
- A lot is moving out of PNRR: feasability studies, new mobility projects, new research funds, new technologies. Less than expected, but a lot to do.
- It is going to be a marathon, not a short track
- Opex support incentives will open industry initiatives

![](_page_58_Picture_6.jpeg)

![](_page_58_Picture_8.jpeg)

![](_page_58_Picture_11.jpeg)

![](_page_58_Picture_12.jpeg)

![](_page_59_Picture_0.jpeg)

## Let's make change happen. Let's make it possible. Together.

THANKS FOR YOUR ATTENTION

![](_page_59_Picture_3.jpeg)

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