

Mapping hydrogen initiatives in Italy: An overview of funding and projects

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S1. Topic 3.1: Hydrogen production in brownfield areas

Table S1. PtH projects list (Topic 3.1: Hydrogen production in brownfield areas).

Region	Location*	Company	Coordinates	RES type	RES size [MW]	EL size [MW]	H ₂ [ton/y]	Funding [M EUR]	Hydrogen applications
Piemonte	Gattinara	RF-IDRA Srl	45.614, 8.371	PV	-	1	-	1.2	Hard-to-abate industry (bricks production)
	Trecale	SARPOM Srl	45.434, 8.738	PV	6.7	4	-	16.8	Hard-to-abate industry (refinery)
	Premosello-Chiovenda	FILMS SpA	46.004, 8.331	-	-	-	-	1.5	Hard-to-abate industry (metallic alloys)
Valle d'Aosta	Cogne	COGNE ACCIAI SPECIALI SpA	45.608, 7.359	Hydro, PV	0.9, 0.3	1	-	7.9	Hard-to-abate industry (steel)
	Issogne	COMPAGNIA VALDOSTANA DELLE ACQUE SpA	45.649, 7.658	-	-	-	-	6.1	-
Lombardia	Mantova	Sapio Produzione Idrogeno Ossigeno Srl	45.157, 10.792	PV	14	9.18	475	20	Transport (HRS for road, railway and rivers), Hard-to-abate industries (ceramic, paper), District heating plant
	Mura	Raffmetal	45.714, 10.344	PV	4.5	1	83	4.5	Hard-to-abate industry (aluminium)
	Verolanuova	LUCCHINI ENERGY Srl	45.327, 10.075	PV	5.5	1	77	6.5	Local industries (transported via tube trailers)
	Cairate	Expand	45.691, 8.869	PV	4.5	2	100	2.5	Transport (buses)

Trentino-Alto Adige	Riva del Garda	Cartiere del Garda SpA	45.890, 10.846	-	-	-	-	1	Hard-to-abate industry (paper)
	Storo	Polytec Energy Srl, Polytec SpA	45.848, 10.579	PV	5	-	-	7.5	Hard-to-abate industry (painting)
	Rovereto	Dolomiti Energia Holding SpA	45.891, 11.039	PV	-	-	-	5.5	-
Veneto	Porto Marghera	Sapio Produzione Idrogeno Ossigeno Srl	45.463, 12.267	PV	-	5	-	17.3	Port area for industrial uses (energy intensive industries available in the port area)
Friuli-Venezia Giulia	Trieste	AcegasApsAmga SpA	45.650, 13.782	PV**	4.5	2.5	370	14	Transport (local buses, port area: railway, heavy-duty)
Liguria	Savona	Autotrasporti Pensiero Srl	44.379, 8.288	-	-	-	-	0.3	-
	La Spezia	ENEL SpA	44.110, 9.873	PV	-	2	130	13.7	Local industries
Emilia-Romagna	Bologna	Hera SpA	44.531, 11.434	PV***	6	-	400	19.5	Transport (buses), Local industries
Toscana	Rosignano Marittimo	Solvay Chimica Italia SpA	43.409, 10.472	PV	9.5	-	756	16	Hard-to-abate industries (chemicals)
	Massa	F2I holding portuale SpA	44.035, 10.137	PV	1.5	-	-	1.5	Port activities (logistic, heavy-duty), grid injection
Umbria	Narni	Sangraf Italy Srl	42.518, 12.516	PV	10	8	-	7.4	Hard-to-abate industry (graphite production plant)****
Marche	Santa Maria Nuova	Esdigis4u Srl	43.497, 13.309	-	-	-	-	9.8	-
	Falconara	RTI Renco SpA	43.627 13.406	-	-	-	-	4.1	-

Lazio	Civitavecchia	Civitavecchia Fruit & Forest Terminal SpA	42.093, 11.795	-	-	-	-	7.5	Transport (local buses, cars and cruises in the port)*****
	Frosinone	Engie Servizi SpA	41.641, 13.341	PV	7	5	400	9.5	Injection in a dedicated H ₂ -CH ₄ network, industrial use
Abruzzo	Monteodorisio	KONIA Srl	42.090, 14.650	-	-	-	-	6.4	-
	Vasto	ARAP	42.105, 14.707	PV	-	-	-	10	-
	Popoli	BluSolar Rosciano Srl	42.169, 13.831	-	-	-	-	3.7	-
Molise	Guglionesi	Foglia Umberto Srl	41.914, 14.915	PV	2	1	60	4.7	-
	Pettoranello	Recupero Etico Sostenibile Srl	41.573, 14.279	PV, Bio-mass	1.95, n.a.	1	150	6	Garbage trucks fleet
	Termoli	SIRAM pA	41.949, 15.004	Wind	1800	800	-	5.3	-
Campania	Ponte Valentino	IVPC 4.0 Srl	41.146, 14.838	-	-	-	-	1.5	-
	Battipaglia	Jcoplastic SpA	40.591, 14.999	-	-	-	-	13	-
	Acerra	Engie Servizi SpA	40.944, 14.372	-	-	-	-	4.6	-
	Caserta	IGAT SpA	41.170, 14.155	-	-	-	-	8.7	-
	Avellino	F.M.C. S.R.L.	40.940, 14.752	-	-	-	-	8	-
	San Vitaliano	SO.F.Invest	40.925, 14.483	-	-	-	-	5.6	-
Puglia	Statte	Panita Srl	40.563, 17.209	-	-	-	-	0.34	-
	Cerano	Enel produzione SpA	40.560, 18.043	PV	-	-	-	9.8	Cooling of the alternators in a coal power plant
	Taranto	Solarind Green Srl	40.465, 17.249	-	-	-	-	10	Hard-to-abate industry (steel) and internal transport (railway)
	Campi Salentina	CE.RI.SMA Srl	40.398, 18.014	-	-	-	-	10	-

	Cerignola Campagna	Cerichem Bio-pharm Srl	41.316, 15.899	Biomass, PV	1.15, 2	1.5	246	9.9	CHP, transport (local buses), Hard-to-abate industries (chemicals)
Basilicata	Tito	Patrone e Mongiello SpA	40.583, 15.677	-	-	-	-	6.3	Mining and metal company (application not defined)
	Pisticci	Greenswitch	40.390, 16.553	-	-	-	-	10	-
	Jesce	Mermec SpA	40.674, 16.624	PV	3	1	57	2.2	Railway fleet in a rolling stock manufacturer
Calabria	Lamezia Terme	Teca Gas	38.963, 16.307	-	-	-	-	14.7	Transport (HRS on the highway)
	Corigliano-Rossano	Enel produzione SpA	-	-	-	-	-	6.8	Cancelled
Sicilia	Catania	Società Agricola Agrobiofert Srl	37.519, 14.734	-	-	-	-	10.4	Hydrogen farm
	Giammoro	Duferco Energia SpA	38.204, 15.305	CSP*****	-	1.25	46	7.4	CHP (molten carbonate fuel cells)
	Aci Castello	Etna Hitech Srl	37.559, 15.136	-	-	-	-	20	-
	Priolo Gargallo	RES Integra Srl	37.158, 15.183	PV	5	-	170	2	-
Sardegna	Porto Torres	Nuove Tecno Energie Srl	40.834, 8.389	PV, Wind	-	-	-	10	Hydrogen blend for industries, methanol production for aviation and maritime
	Ossi	Maffei Sarda Silicati SpA	40.675, 8.589	-	-	-	50	5.2	Hard-to-abate industry (mining, for drying process)
	Carbonia	Sotocarbo SpA	39.160, 8.516	-	6	1	-	5.4	Transport (local buses)

* The location corresponds to the planned installation, when information was available. Otherwise, they are referred to the municipality where the company which has received the funding is located.

** Hydrogen storage 2 tonnes, battery 4 MWh.

*** Battery included.

**** Part of the TernHy initiative.

***** Part of Life3H Hydrogen Valley.

***** Innovative integrated CSP-EL system available from Fusion Fuel company.

S2. Topic 3.3: Hydrogen refuelling stations for road transport

Table S2. HRS projects list [1,2] (Topic 3.3: Hydrogen refuelling stations for road transport).

Region	Company	Location	Coordinates	Funding [M EUR]
Piemonte	Edison SpA	Carisio	45.408, 8.195	2.95
	IP SpA	Casale Monferrato	45.132, 8.452	2.21
	Milano Serravalle SpA	Tortona Est	44.894, 8.861	5.26
	SNAM 4 Mobility SpA	Torrazza Piemonte	45.216, 7.969	1.83
	SNAM 4 Mobility SpA	Arquata Scrivia	44.689, 8.884	1.87
	SNAM 4 Mobility SpA	Belforte Ovada	44.630, 8.648	2.31
	Sapio Srl – KeroPetrol SpA	Vicolungo	45.479, 8.463	4.43
Valle d'Aosta	SOL SpA	Pollein	45.728, 7.351	1.82
Lombardia	Edison SpA	Malpensa	45.630, 8.725	2.39
	Milano Serravalle SpA	Carugate Est	45.549, 9.340	4.92
	Milano Serravalle SpA	Carugate Ovest	45.554, 9.323	4.81
	Sapio Srl – KeroPetrol SpA	Mantova	45.156, 10.792	4.43
	ENI SpA S. Mobility	San Donato Milanese	45.411, 9.268	1.91
	SNAM 4 Mobility SpA	Torre d'Isola	45.218, 9.077	1.65
Trentino-Alto Adige	SASA SpA	Bolzano	46.498, 11.354	2.74
	SASA SpA	Merano	46.670, 11.157	2.74
	Autostrada del Brennero SpA	Vipiteno	46.893, 11.433	3.75
	Autostrada del Brennero SpA	Lavis Est	46.141, 11.113	3.75
	Autostrada del Brennero SpA	Lavis Ovest	46.147, 11.091	3.75
	Alperia Greenpower Srl	Brunico	46.796, 11.938	3.99
Veneto	ENI SpA S. Mobility	Mestre	45.494, 12.245	5.75

	Autostrada del Brennero SpA	Verona	45.436, 11.001	3.75
	Green Factory Srl	Paese	45.674, 12.167	5.75
	Edison SpA	Meolo	45.618, 12.454	1.80
	Edison SpA	San Bonifacio	45.396, 11.271	1.80
	SNAM 4 Mobility SpA	Limena	45.479, 11.846	1.78
	SNAM 4 Mobility SpA	Monselice	45.240, 11.750	1.78
	Gemmo SpA – Simplifhy Srl	San Donà di Piave	45.630, 12.568	2.84
Friuli-Venezia Giulia	Azienda Prov. Trasporti SpA	Monfalcone	45.805, 13.533	3.47
	Q8 Petroleum Italia SpA	Porpetto	45.862, 13.223	1.66
Liguria	No project funded			
Emilia-Romagna	Autostrada del Brennero SpA	Campogalliano Est	44.704, 10.849	Not funded*
	Autostrada del Brennero SpA	Campogalliano Ovest	44.703, 10.848	Not funded*
	Edison SpA	Piacenza	45.052, 9.706	1.80
Toscana	Beyfin SpA Soc. Benefit	Le Fosse	43.235, 11.959	2.13
Umbria	No project funded			
Marche	Renco SpA Azienda Agricola del Poggio Sas	Falconara Marittima	43.628, 13.404	3.50
	Energie Techfem Srl Soc. Benefit	Bellocchi di Fano	43.794, 13.006	2.37
Lazio	CFFT SpA	Civitavecchia	42.093, 11.796	1.25
	Q8 Petroleum Italia SpA	Roma	41.901, 12.491	1.63
	Q8 Petroleum Italia SpA	Roma	41.936, 12.504	1.60
	Edison SpA	Ferentino	41.696, 13.255	2.09
Abruzzo	SNAM 4 Mobility SpA	Avezzano	42.028, 13.423	1.89
Molise	RES – Recupero Etico Sostenibile SpA	Pettoranello del Molise	41.574, 14.276	1.18
Campania	FMC Srl – Base House Srl	Pianodardine	40.932, 14.827	1.07

Puglia	Edison SpA	San Severo	41.686, 15.378	2.06
	Dilella Invest SpA – Hope Srl	Bari	41.120, 16.866	2.55
	ENI SpA S. Mobility	Taranto	40.464, 17.242	3.66
	SNAM 4 Mobility SpA	Bari	41.130, 16.841	1.86
Basilicata	No project funded			
Calabria	Teca gas Srl	Lamezia Terme	38.963, 16.307	1.95
Sicilia	RES Integra Srl	Priolo Gargallo	37.157, 15.184	2.85
Sardegna	Italgas Reti SpA	Sestu	39.303, 9.091	1.57

* This two HRS have not been funded since the company, Autostrada del Brennero SpA, reached the maximum funding per company (EUR 15 M). They are anyway mentioned in the documents about the hydrogen infrastructure for the Brennero connection, and so they are included in the analysis.

The funding scheme (Topic 3.3) also includes 3 additional HRS for which is not clear if they will be constructed or not [3]. These HRS are reported below but they are not included in the maps in the manuscript.

Region	Company	Location	Coordinates	Funding [M EUR]
Lombardia	IP SpA	Cassano D'Adda	45.529, 9.513	2.12
Toscana	H2 Era Green Valley Srl	Figline e Incisa Valdarno	43.657, 11.447	1.10
Lazio	ISAM Srl	Montalto di Castro	42.352, 11.606	2.19

S3. Topic 3.4: Hydrogen refuelling stations for railway transport

Table S3. Railway project list (Topic 3.4: Hydrogen refuelling stations for railway transport) [4–9].

Region	Company	Location	Railway line details	Funding [M EUR]
Lombardia	Ferrovienord SpA	Linea Brescia-Iseo-Edolo	[4]	97.2
Sicilia	Gestione Governativa Ferrovia Circumetnea	Linea Circumetnea	[5]	15.4
Campania	Ente Autonomo Volturno s.r.l.	Linea SMCV Piedimonte	[6]	29.0
Puglia	Ferrovie del Sud Est e Servizi Automobilistici s.r.l.	Linea Lecce-Gallipoli Linea Novoli-Gagliano Linea Casarano-Gallipoli	[7]	13.4
Calabria	Ferrovie della Calabria	Linea Cosenza-Catanzaro	[8]	45.1
Sardegna	ARST Spa	Linea Sassari-Alghero Linea Macomer-Nuoro Linea Monserrato-Isili	[9]	74.7

S4. Topic 3.5: Research and development

Table S4. Research funded project (Topic 3.5: Research and development) [10].

Project Coordinator	Project name	Project topic	Topic	Funding [M EUR]
Type A – Fundamental research				
Università degli Studi di Messina	MECCA	Innovative technology based on non-thermal plasma and catalysis with nanocarbons		3.00
Università della Calabria	NoMaH	Novel Materials for Hydrogen Storage	Hydrogen storage	3.13
Università degli Studi di Genova	PROMETH2eus	Production of green H ₂ from seawater via innovative high-temperature electrolyser with integration into the power-to-methanol process	Hydrogen production	3.50
Università degli Studi di Parma	ART-2-HYDRO-GEN	Artificial enzymes for the photocatalytic production of hydrogen in photosynthetic bacteria	Hydrogen production	2.14
Sapienza Università di Roma - Dipartimento di Ingegneria Chimica Materiali Ambiente	TIPIC	n.a.		2.85
Università degli Studi del Piemonte Orientale “Amedeo Avogadro”	ECOSTORE-H2	Eco-sustainable development of ultra-porous polymers and carbons for hydrogen storage and transport	Hydrogen transport	3.96
Politecnico di Milano, Dipartimento di Energia	PERMANENT	High durability and stability of PEM fuel cell components	Hydrogen production	3.40
Type B – Industrial research				
Enapter Srl	-	Optimization and industrialization of the dry-cathode for AEM electrolyzers	Hydrogen production	0.98
SAPIO Produzione Idrogeno Ossigeno srl	HyPER Mantova	Hydrogen High Pressure Efficient Renewing at Mantova Facility: Innovation and efficiency of the compressed hydrogen distribution chain	Hydrogen transport	1.77
GAP SOLUTIONS SRL	MH2	Hydrogen fuel cell powertrain	Hydrogen use	2.41

TECHFEM S.P.A.	SMARTHYDRO GRID	Smart hydrogen microgrid for the energy transition and the decarbonisation	Hydrogen use	2.51
Graded Spa	GRETHA	A novel green energy technology, based on fuel cells, hydrogen and renewables	Hydrogen production	2.63
Distretto Tecnologico Aerospaziale Scarl	Serena	Development of zero emissions propulsion architectures for general aviation	Hydrogen use	2.50
Eni S.p.A.	IPEReGas	Innovative integrated process for the production of e-fuels from green hydrogen	Hydrogen use	1.74
Archimede Srl Società di Ingegneria	-	Development of an innovative eco-sustainable process for the treatment of olive vegetation water and oil mill wastewater, with final valorisation of the organic content into advanced biofuel	Biofuels	2.20
ECOS SRL	-	Development and optimisation of renewable-based system for the production of hydrogen and its application in internal combustion engines for automotive	Hydrogen production and use	2.34
Esea Automation Srl	SIDRO	Innovation solutions for hydrogen storage tanks	Hydrogen storage	2.08
Hyter srl	SIRIUS	Development of an electrolyser larger than 1 MW, innovative and scalable, to produce green hydrogen	Hydrogen production	2.13
GVS S.P.A.	MAINE	Innovative materials for electrolyzers	Hydrogen production	1.34
Ansaldo Green Tech S.p.A.	NEMESI	New electrodes and membrane for electrolyzers at industrial scale	Hydrogen production	2.64
Turboden spa	AWE-HTP	Study, development and industrial validation of an innovative alkaline electrolyser working at high temperature and pressure (300 °C, 50 bar) for application in hard-to-abate sectors with thermal recovery	Hydrogen production	0.89
aizoOn Consulting S.r.l.	HEHS	High efficiency hydrogen storage	Hydrogen storage	2.64*

* Not completely funded, only partially.

S5. Other hydrogen initiatives in Italy

Table S5. Other hydrogen initiatives in Italy [11–17].

Project name	Region	Description	End-use	Size	Budget [M EUR]	Ref.
TH2ICINO valley	Lombardia	Malpensa international airport	Ground equipment and airplanes	5 MW PEM electrolyser, 500 t/y	7.5	[11]
H2Iseo valley	Lombardia	Brescia-Iseo-Edolo railway line (also funded by PNRR and IPCEI)	Trains and buses	14 trains with 2 HRS (2.8 MW equivalent from methane steam re-forming and 5 MW from electrolysis) 40 buses with 5 HRS on the highway	2481.1	[12]
South-Tyrol Hydrogen Valley	Trentino Alto Adige	Automotive applications to decarbonise the Brenner commercial route	Buses, cars, trucks	n.a.	n.a.	[13]
North-Adriatic Hydrogen Valley	Friuli Venezia Giulia	Transnational Central European area of Slovenia, Croatia and Italy	Hard-to-abate industries and transport sector	> 5000 t/y	344 (25 funded by EU)	[14]
HyPER valley	Toscana	Decarbonisation of an industrial area	Steel and chemical industries	n.a.	n.a.	
LIFE3H hydrogen valleys	Lazio, Umbria, Abruzzo	Three hydrogen valleys in central Italy with a focus also on the manufacturing industry for hydrogen buses (available locally)	Buses fuelled by excess hydrogen from local industrial production	Altopiano delle Rocche: 2 hydrogen buses fed by by-product hydrogen from the caustic soda production process. Terni: 2 hydrogen buses fed by the surplus hydrogen produced in the local steel plant. Civitavecchia: 2 hydrogen buses in the port area of the city.	n.a.	[15]

Puglia green hydrogen valley	Puglia	Managed by two large companies in the field of energy and infrastructure (Edison and Saipem), part of the IP-CEI H2Infra initiative	n.a.	3 hydrogen production plants with a capacity of 160 MW (supplied by PV plants).	n.a.	[16]
Agnes initiative	Adriatic Sea	Production of energy from offshore renewable sources in the Adriatic Sea	Decarbonise industries and transport in the surrounding area	Offshore wind turbines and floating PV with battery storage	n.a.	[17]
ENEA “demo” valley	Lazio	Create an infrastructural hub for testing and demonstration of hydrogen technologies covering production, storage, distribution and utilisation of hydrogen	Applications in the energy, industrial and transport sectors	n.a.	n.a.	

S6. Reference

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