HYIELD

A NOVEL MULTI-STAGE STEAM GASIFICATION AND SYNGAS PURIFICATION DEMONSTRATION PLANT FOR WASTE TO HYDROGEN CONVERSION

Project ID	101137792
PRR 2025	Pillar 1 - H_2 Production
Call Topic	HORIZON-JTI-CLEANH$_2$-2023-01-05
Project Total Costs	15 512 377.50
Clean H_2 JU Max. Contribution	9 999 964.63
Project Period	01-01-2024 - 31-12-2027
Coordinator Beneficiary	MAGTEL OPERACIONES SL, ES
Beneficiaries	HYDROGEN ONSITE SL, MINCATEC ENERGY SAS, AQUAMBIENTE CIRCULAR ECONOMY SOLUTIONS SL, ARISTENG SARL, CEMEX ESPANA OPERACIONES SL, WASTE TO ENERGY ADVANCED SOLUTIONS SL, SYNHELION SA, HYDROGEN ONSITE, SL, CARTAGO VENTURES SL, SINTEF AS, FUNDACIO EURECAT, ARCELORMITTAL BREMEN GMBH, LA FARGA LACAMBRA SA, CETAQUA, CENTRO TECNOLOGICO DEL AGUA, FUNDACION PRIVADA, ENAGAS SA, AGENCIA ESTATAL CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS

https://hyield.eu/

PROJECT AND GENERAL OBJECTIVES

The overall objective of HYIELD is to open a new low-cost pathway for clean hydrogen production and waste management to accelerate Europe's progress towards zero-carbon and zero landfill goals. HYIELD aims to build Europe's first large-scale waste-to-hydrogen demonstration plant that will produce over 400 tonnes of green hydrogen during the project. The ambition is to develop a robust and efficient solution that will pave the way for commercial scale-up and replication across Europe, enabling the closure of landfills and production of relevant volumes of low-cost green hydrogen that can help decarbonise sectors such as shipping and heavy industry.

The demonstration plant will utilise WtEnergy Advanced Solutions' CleanTech gasification technology and H_2Site membrane separation reactor and it will be implemented at a CEMEX cement factory in Spain, where the green hydrogen will be utilised in cement production.

NON-QUANTITATIVE OBJECTIVES

- Design a multi-stage gasification, gas cleaning and gas separation process for a beyond state-of-the-art waste to hydrogen plant.
- Gain deeper knowledge of organic waste gasification reactions to identify opportunities to optimise H_2 yield.
- Develop new digital tools and models for optimising performance of waste to hydrogen plants.
- Unlock energy potential in new organic waste feedstock for the waste to hydrogen applications.
- Increase knowledge of planning and regulatory requirements for the implementation of waste-to-hydrogen plants.
- Develop and test a novel water-gas shift membrane reactor at industrial scale.
- Develop and test a novel metal hydride hydrogen storage unit at industrial scale.
- Validate the integrated waste-to-hydrogen plant at near industrial scale and in real-world setting.
- Validate clean hydrogen quality certification and clean hydrogen guarantees of origin for waste-to-hydrogen technologies.
- Benchmark the waste-to-hydrogen solution developed against other clean H_2 pathways.
- Develop a regional scale-up plan for after the project.

PROGRESS, MAIN ACHIEVEMENTS AND RESULTS

The kick-off meeting, held on the 18th January 2024 in the HQ of WtEnergy Advanced Solutions located in Barcelona and was attended by all partners, along with project and financial officers from the Clean Hydrogen Partnership.

FUTURE STEPS AND PLANS

Work is commencing to define the demonstrator specification and parameters, prepare the site (including permit issuing), develop models and digital tools, and start the communication campaign, among other activities. The second general assembly is planned at the demonstration site in Spain.

PROJECT TARGETS

Target source	Parameter	Unit	Target	Target achieved?	SoA result achieved to date (by others)	Year for reported SoA result
Project's own objectives	System carbon yield	kg H_2/kg C	0.32		0.15	2020
	System CAPEX	€/(kg/d)	2 736		1 806	2020
	System OPEX	€/kg	0.328		0.013	2020
	Conversion efficiency	%	>50		40-50	2020
	Operational hours	hours	>4 000		N/A	N/A
	LCOH at target production	€/kg	< 3		1.8-3.4 (USD/kg)	2020
	Reactor size	MW	≥3		N/A	N/A
	Yearly Hydrogen Production	t/year	≥180		N/A	N/A

Clean Hydrogen Partnership
Co-funded by the European Union