

HYIELD

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



Project ID	101137792
PRR 2024	Pillar 1 – Renewable hydrogen production
Call topic	HORIZON-JTI-CLEANH2-2023-01-05: Waste to hydrogen demonstration plant
Project total costs	EUR 15 512 377.50
Clean H ₂ JU max. contribution	EUR 9 999 964.63
Project period	1.1.2024–31.12.2027
Coordinator	Magtel Operaciones SL, Spain
Beneficiaries	Agencia Estatal Consejo Superior de Investigaciones Científicas, Aquambiente Circular Economy Solutions SL, ArcelorMittal Bremen GmbH, AristEng SARL, Cartago Ventures SL, Cemex España Operaciones SL, Cetaqua, Centro Tecnológico del Agua, Fundación Privada, Enagás SA, Fundació Eurecat, Hydrogen Onsite SL, La Farga Lacambra SA, Mincatec Energy SAS, SINTEF AS, Synhelion SA, Waste to Energy Advanced Solutions SL

<https://hyield.eu/>

PROJECT AND GENERAL OBJECTIVES

The overall objective 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.

The project aims to build Europe's first large-scale waste-to-hydrogen demonstration plant, which will produce over 400 t 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 the production of a volume 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 the H2site membrane separation reactor and it will be implemented at a Cemex cement factory in Spain, where the green hydrogen produced will be utilised in cement production.

NON-QUANTITATIVE OBJECTIVES

- Design a multistage 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 the H₂ yield.
- Develop new digital tools and models for optimising the performance of waste-to-hydrogen plants.

- Unlock the energy potential in new organic waste feedstock for 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 an industrial scale.
- Develop and test a novel metal hydride hydrogen storage unit at an industrial scale.
- Validate the integrated waste-to-hydrogen plant at the near-industrial scale and in a real-world setting.
- Validate the 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 H₂ pathways.
- Develop a regional scale-up plan for after the project.

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 for June 2024 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	LCOH at target production	€/kg	2.19		2.8-3 USD/kg	N/A
	Conversion efficiency	%	> 65		2020	N/A
	System operational cost	€/kg	0.00512		13	2020
SRIA (2021–2027)	System capital cost	€/(kg/day)	1.2		1.806	2020
	System carbon yield	kg H ₂ /kg C	0.32		0.15	2020