CONGRESO INTERNACIONAL BIOENERGÍA
VALLADOLID 1-2.OCT.2025

WtEnergy
advanced solutions

ORGANIZA
aveBiom
Asociación Española de la Biomasa

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aebig

WTE CLEANTECH GASIFICATION FOR GREEN H_2 GENERATION

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Biometano y otros gases renovables:
El camino hacia una economía sostenible y competitiva.

About Us

WtEnergy Advanced Solutions , is a technological company for implementing advanced thermochemical conversion technologies to energy from biomass and waste fuels*.

WtEnergy proprietary cleantech reduces the **greenhouse gases emissions**, guarantees the **safe management of wastes**, allows the recovery of valuable materials, and **generate large economic savings for the companies**.

(*) Waste feedstocks such as: MSW (RDF/SRF),Industrial Waste, MBM (Meat and Bone Meal),Poultry Litter, Biomass/Agricultural Residues, DSS (dry sewage sludge), Used Tires.

Our Mission

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SUBSTITUTE FOSSIL FUELS WITH ALTERNATIVE RENEWABLES FUELS, USING ADVANCED CLEANTECH SOLUTIONS

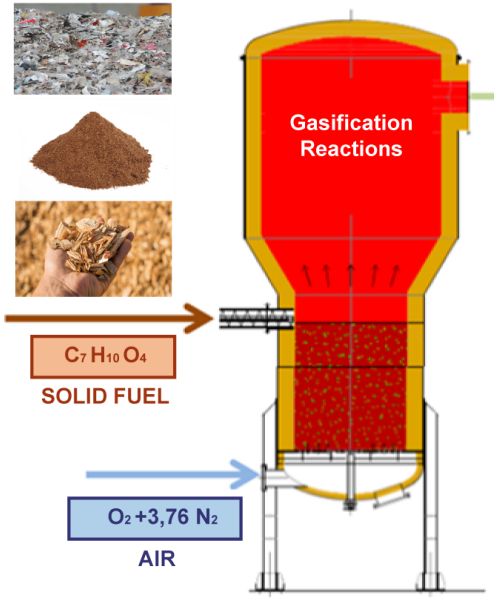
WtEnergy Cleantech Gasification (patented)

Bubbling Fluidized Bed Gasifier

Waste (SRF)

Biowaste

Biomass



SYNGAS at 800 ºC

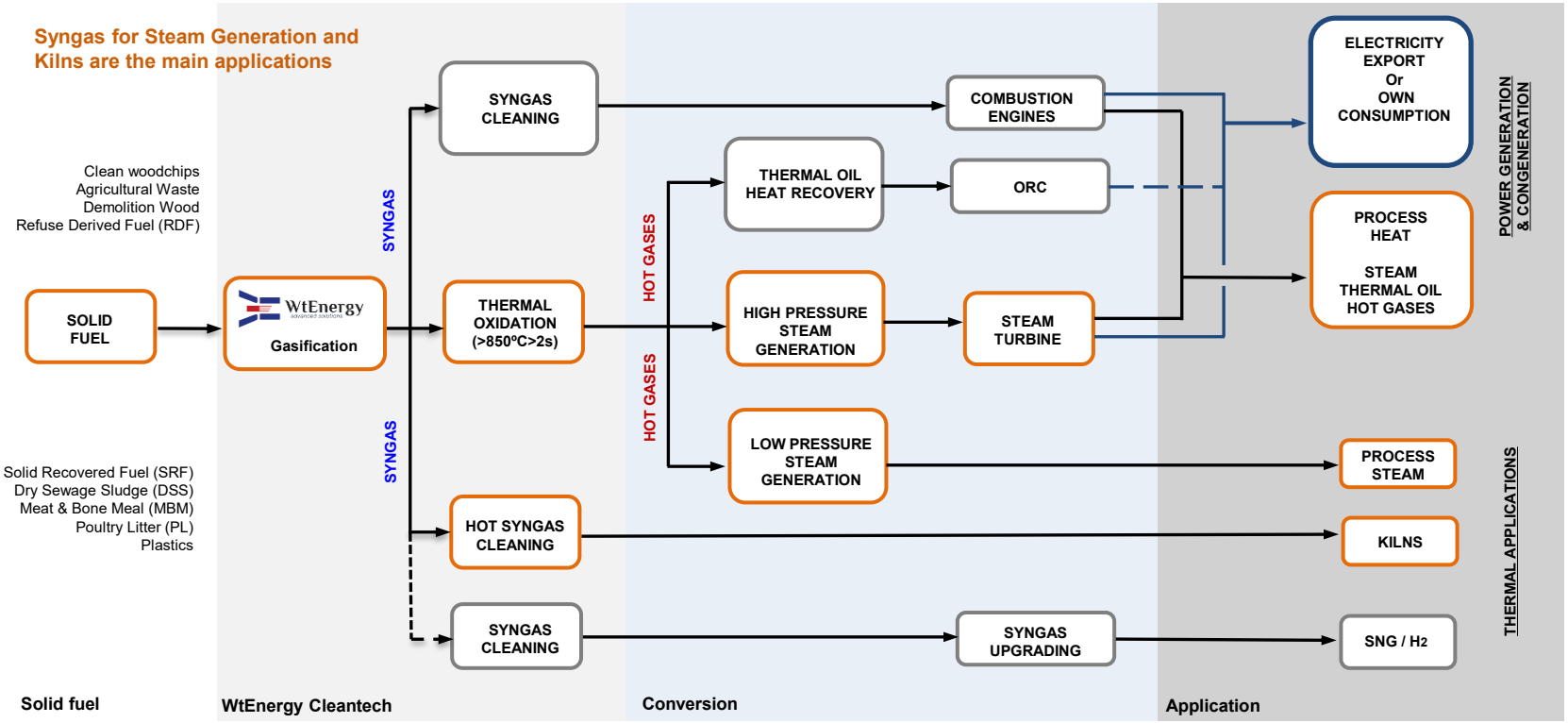
$H_2 + CO + CH_4 + C_2H_4 + CO_2 + N_2 + H_2O + C_xH_y$

Gasification Reactions

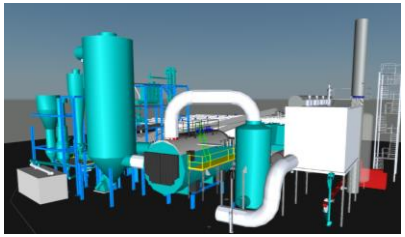
Oxidation Reactions	Reduction Reactions
$C + \frac{1}{2} O_2 \rightarrow CO$	$C + H_2O \rightarrow CO + H_2$
$C + O_2 \rightarrow CO_2$	$C + 2H_2O \rightarrow CO_2 + 2H_2$
$CO + \frac{1}{2} O_2 \rightarrow CO_2$	$C + 2H_2 \rightarrow CH_4$
$H_2 + \frac{1}{2} O_2 \rightarrow H_2O$	$C + CO_2 \rightarrow 2CO$
$CH_4 + 2O_2 \rightarrow CO_2 + H_2O$	$CH_4 + H_2O \rightarrow CO + 3H_2$
$C_2H_4 + 3O_2 \rightarrow 2CO_2 + 2H_2O$	$CO + H_2O \rightarrow CO_2 + H_2$

- In the gasification process, only a 20 to 30% of the stoichiometric air is used
- Reduction and oxydation reactions occur simultaneously

Syngas Applications



Reference Plants with WtEnergy Gasification Technology



SRF/Biomass Gasifier Plant
12 MWth syngas to steam. Spain.
Under construction.
Startup Feb 2026

SRF Gasifier Plant
30 MWth syngas to cement kiln. Spain.
Under construction.
Startup Nov 2025

MBM Gasifier Plant
25 MWth steam. St Langis lès Mortagne. France,
Under Construction.
Startup June 2025

MBM Gasifier Plant
18 MWth steam + 2 MWe. Lyss, Switzerland

MBM Gasifier Plant
16 MWth steam.
Oporto, Portugal

MBM Gasifier Plant
10 MWth steam.
Salamanca, Spain

Wood chips Gasifier Plant
1.6 MWe CHP.
Valencia, Spain

GREEN FUELS

SYNGAS FOR GREEN FUELS

N_2 Free Syngas - the Next Applications

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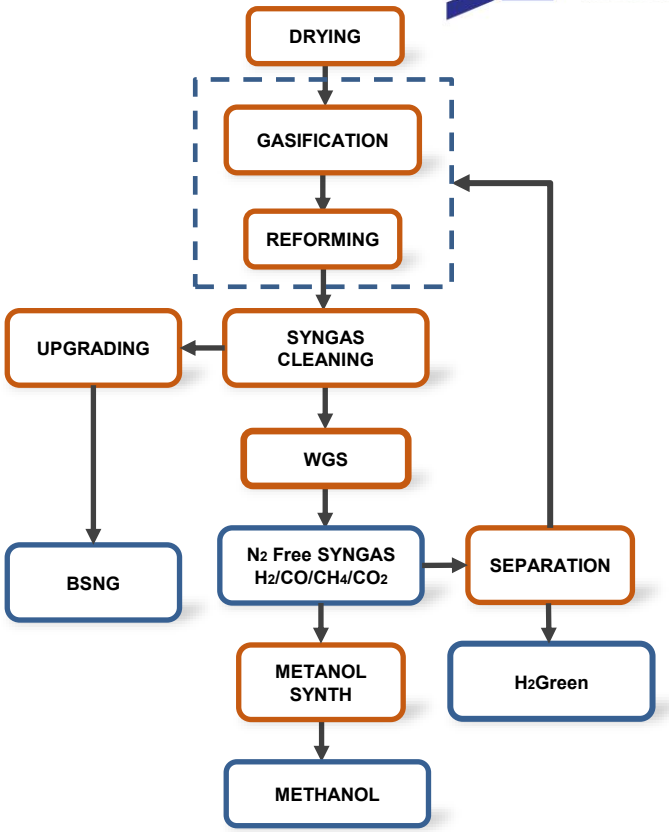
H_2 HYDROGEN

METHANOL

BioSNG

Steam gasification of Biomass & waste is one of the most promising options for renewable gases generation.

The heat can be supplied by either burning part of the fuel (i.e., autothermal steam reforming) or providing external heat at high temperature.



BioWaste to Hydrogen Demonstration Plant (3MWth)

Horizon Europe

hyield

400t
Clean H_2 production target

>50%
Energy conversion efficiency KPI

<3€/Kg
Levelized Cost of H_2 KPI

99.97%
H_2 purity KPI

HYIELD in numbers

48
Months

16
Partners

6
Countries

10M€
EU Funding

5,5M€
Private Contribution

Magtel · CEMEX · VEOLIA · WtEnergy · H2SITE · Mincatec Energy

eurecat · SINTEF · AristEng · Synhelion · CETAQUA WATER TECHNOLOGY CENTRE

inveniam · LAFARGA · ArcelorMittal · enagas · CSIC

Co-funded by the European Union · Clean Hydrogen Partnership

Demo Plant

HYIELD vision / motivation

Addressing the opportunity of converting waste into clean H_2.

Waste disposal

Challenging in territories with limited treatment options:

- Low population density areas, islands, limited infraestructures.
- Most common methods: landfilling and incineration.

SOLUTION → Gasification of waste and organic material to extract the energy content in the form of H_2.

Waste generation will increase

>3.40 billion tonnes by 2050.

- Rich in energy. If fully exploited - cover communities' energy needs.
- Challenges for recycling + energy generation -The heterogeneity and composition variations of MSW.

MOTIVATION → Open a new low-cost pathway for waste management and clean H_2 production.

De-carbonisation of hard-to-electrify sectors is still challenging - shipping, aviation, and cement industry.

HYIELD abstract and keywords

The HYIELD project will deploy a robust multi-stage steam gasification and gas separation process.

1. **Feedstock flexibility**: Variety of feedstocks may be used, including waste materials and agricultural residues with complex ash with **LHV** ranging from **2 to 5 kWh/kg**.
2. **Low cost**: HYIELD has a target LCOH of < **3 €/kg**, which is around half that achieved by the best electrolyser technology in the market today.
3. **Scalable design**: The plant will be designed to be highly scalable, **commercially** viable from **10,000t/year**.
4. Waste heat exploitation and internal heat recover: Capable of exploiting low and medium temperature (**150-600°C**) **residual heat** to raise energy conversion efficiency and hydrogen yield.
5. **Improved efficiency** of energy conversion compared to conventional state-of-the-art gasification processes: Enhanced H2 yield of over **0.16kgH2/kg** dry biomass. This is achieved by **maximizing the H2/C ratio**.
6. **H2 purity** output: The plant will be designed to produce H2 at **>99.97%** purity via novel membrane reactor that will be used for cement production.

HYIELD consortium

HYIELD consortium has extensive experience in innovation and development in fields including:

- Researchers' institutions & technology centers **(EUT, CSIC, SIN)**
- Technology developers **(WTE, H2S, MAG, MIN)**
- Industrial corporations **(CMX, ENG, FAR, ARC, SYN)**
- Waste managers as feedstock suppliers **(VEOLIA, CET)**
- Engineering and strategy consultancies **(ARIS, INV)**

SPAIN

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invenam

CEMEX

VEOLIA CETAQUA CENTRO TECNOLÓGICO DEL AGUA

Magtel

H2SITE enagas

eurecat CSIC

GERMANY

Synhelion

ArcelorMittal

LUXENBURG

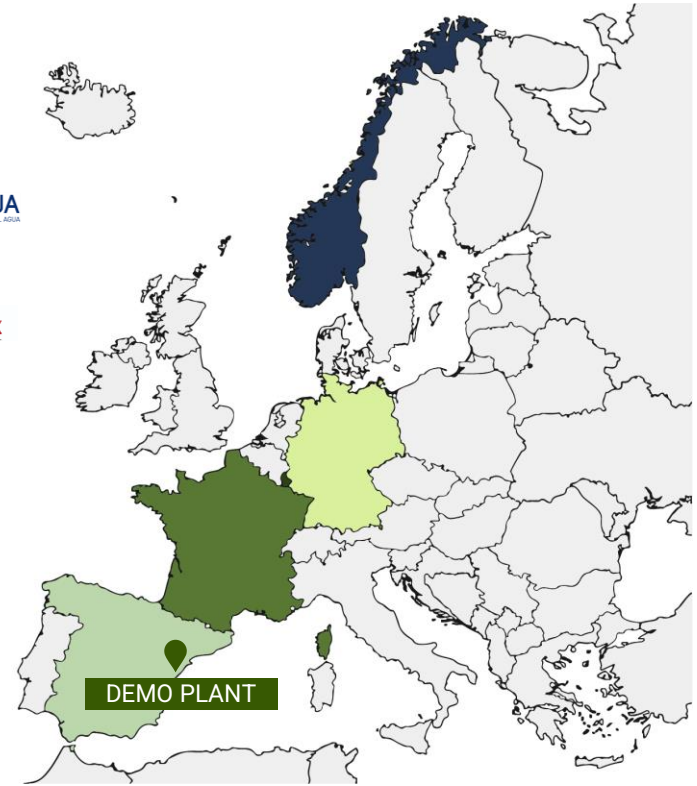
AristEng

FRANCE

N.Incatec Energy

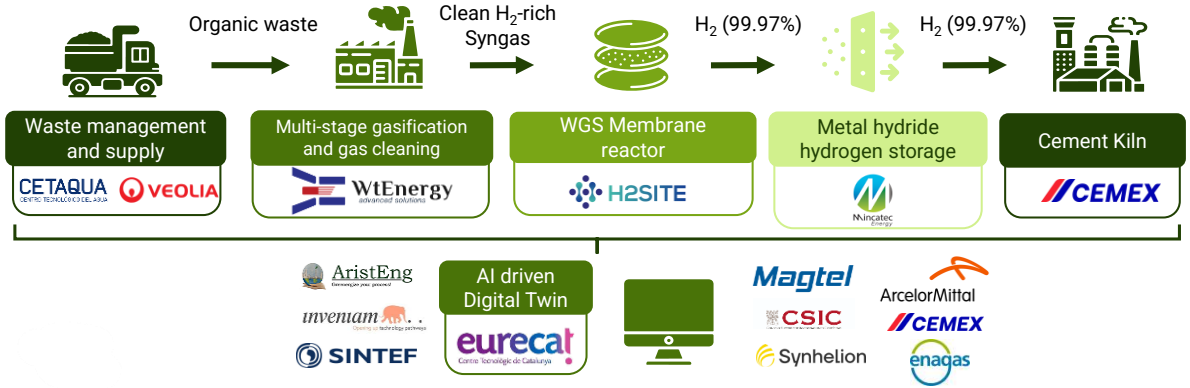
NORWAY

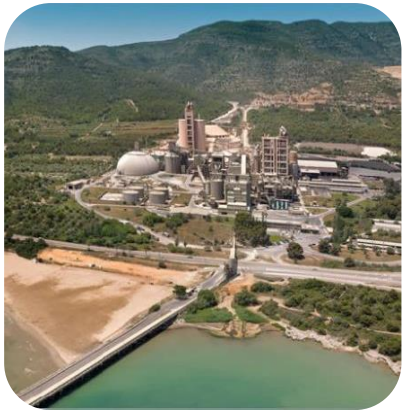
SINTEF



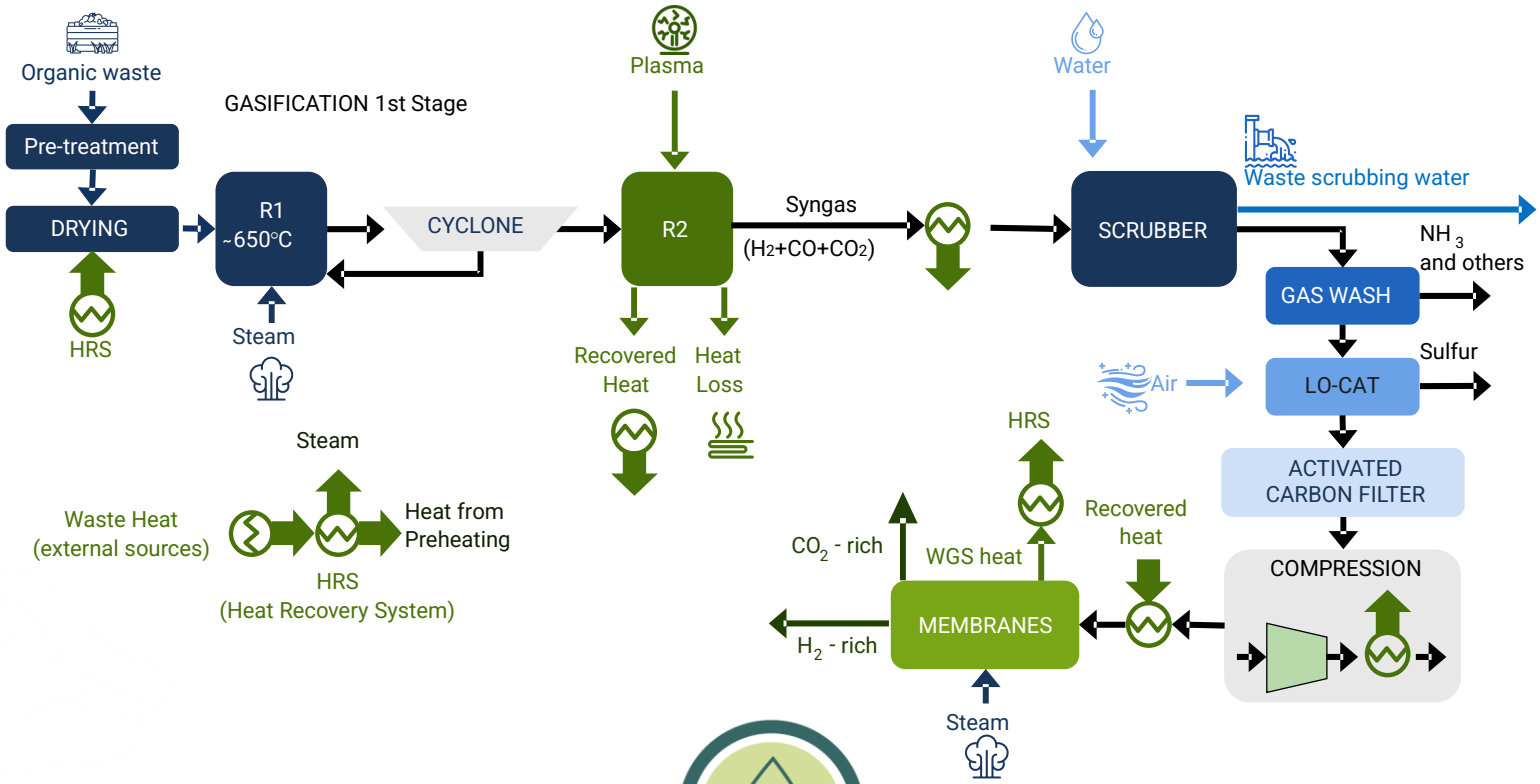
HYIELD Demonstration

- CMX's Alcanar plant located in the south of Tarragona, is the selected location for a demonstration plant. It is well connected by road and operates a port under concession.
- The plant has integrated:
  - Environmental authorization which includes the use of waste and is ISO 9001, 14001, 45001 and 50001 certified and EMAS registered.
  - Various sources of waste heat.
  - Industrially kilns with hydrogen injection.
  - Possibility of reintegrate ashes in raw materials.





HYIELD Plant concept



HYIELD Demonstration

Stage 1: Planning

- Validate process desing
- Specification and basic engineering for demonstration plant
- TRL 5-6 testing

Stage 2: Development

- Digital Twin
- Site preparation
- Waste feedstock management
- Detailed engineering, manufacture and installation

Stage 3: Demonstration

- Validation
- Extended testing period

Stage 4: Scale-up

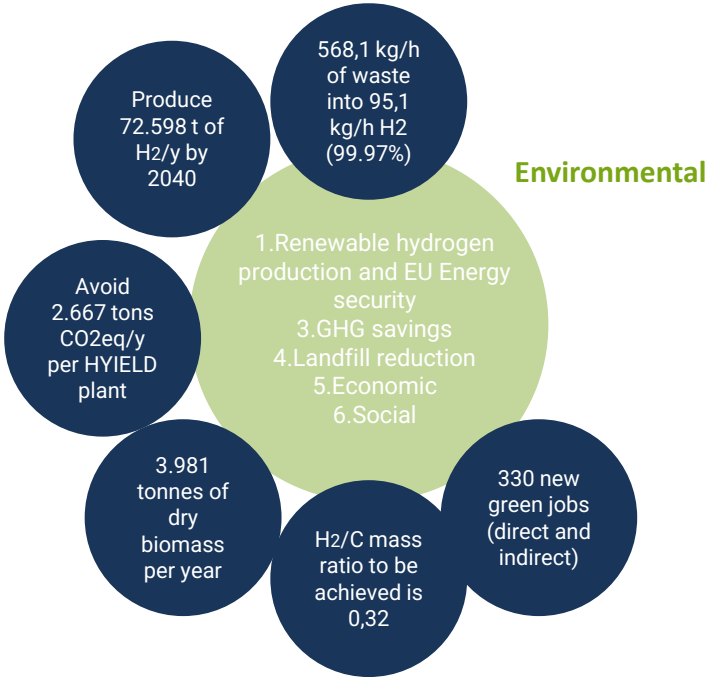
- Techno-economic and environmental analysis
- Benchmarking with other hydrogen pathways
- Territorial scale-up and EU potential

HYIELD Expected impacts and yields

		HYIELD	CLEAN HYDROGEN EUROPE (2030)
KPI 1: System carbon yield	kg H_2/ kg C	0,32	0,32
KPI 2: System capital cost	€/(kg/d)	1,20	1,26
KPI 3: System operational cost	€/kg	0,00512	0,009

100 kg bms → 14,67 kg of H_2
160 kg of CO_2

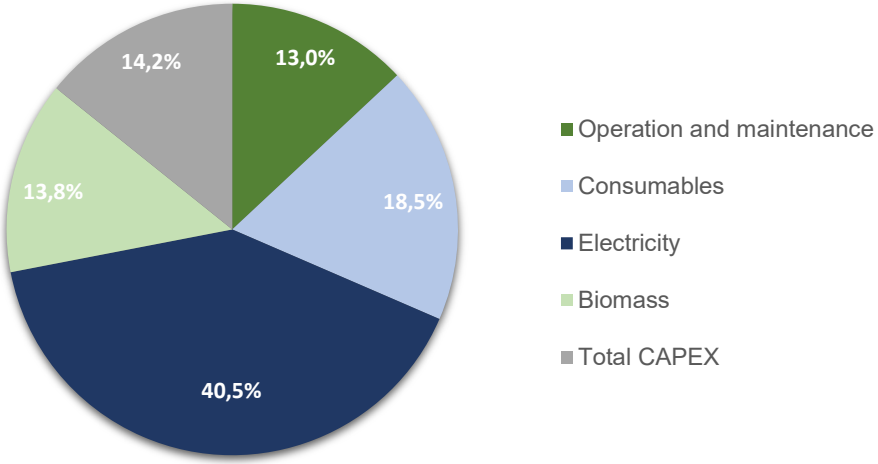
100 kWt bms
40,4 kWe → 91,5 kW of H_2



HYIELD Expected impacts

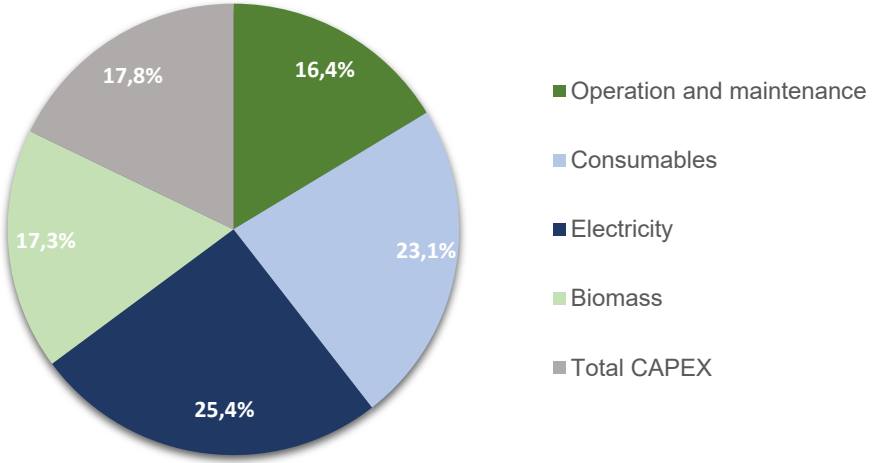
Costs of H_2

Cost of electricity: 120 €/MWh



The levelized Cost of hydrogen (LCOH) < 2,9 €/kgH_2

Cost of electricity: 60 €/MWh



The levelized Cost of hydrogen (LCOH) < 2,3 €/kgH_2

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