GaugeH2

LCOH Analysis Report

Prepared by Gaugeh2-Team with GaugeH2

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Methodology	DCF levelized cost
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LEVELIZED COST OF HYDROGEN, UNSUBSIDIZED

EUR10.09/kg H2

Technology Alkaline · Region Southern Europe · 150 MW

In constant money: EUR8.63/kg, the same project with nothing escalated and discounted at the real WACC of 4.90 %, in the money of the inputs. The inputs are from more than one year, so that is not the money of any single year. The figure above is nominal.

COMPARABILITY - WHAT THIS FIGURE ANSWERS

Subject	T-HYNET Tarragona (Repsol, Enagas Renovable, Messer). The EU Innovation Fund fiche that six of the declarations cite is marked TERMINATED, updated 9 September 2026. Stated by the author, not verified.
System boundary	plant gate - upstream, only what the capital cost and the electricity price cover; no compression, storage or delivery downstream
Energy basis	per kilogram - no calorific basis applied
Electricity price	83.6% of this figure is electricity over the project life. Its first-year price is the OMIE day-ahead average of 30 market days for peninsular Spain (2026-08-21 to 2026-09-19), escalated at the inflation rate after that. Every hour of the window weighs the same - no choice of hours and no hedging assumed, and a market average is not a delivered cost.
Money year	2022 EUR inputs except the electricity price, anchored to 2026 market prices, unadjusted - the Nelson-Farrar series ends at 2018 and its source gives nothing with which to extend it, so these inputs are carried as declared. Levelized prices in this report, such as the LCOH, are nominal over the project life: electricity, O&M, water and stack replacement are escalated from the inputs at the inflation rate, and every flow is discounted at the nominal WACC. With inputs from more than one year they are not the money of any single year, whatever the inflation rate.
Site	cost figure already regional - no site loading applied (GaugeH2 does not verify that the figure is regional: if it is a base estimate for another location, it needs a site loading this model does not apply.)
Estimate class	concept - ±25-40 % on the capital cost, per appendix A9 of Seddon, The Hydrogen Economy (2022)

AT A GLANCE

Executive summary

What this report answers, on one page. Every figure here is printed elsewhere in this report, where it is explained.

THE PROJECT

Subject	T-HYNET Tarragona (Repsol, Enagas Renovable, Messer). The EU Innovation Fund fiche that six of the declarations cite is marked TERMINATED, updated 9 September 2026. Stated by the author, not verified.
Plant	Technology Alkaline · Region Southern Europe · 150 MW

THE RESULT

LCOH, nominal, unsubsidized	EUR10.09/kg H2
LCOH in constant money	EUR8.63/kg, at the real WACC of 4.90 %
Largest cost shares	Electricity 83.6%, CAPEX 11.9% (NPV-weighted)
Year 1 production	20148.5 tonnes (before stack degradation)

WHAT MOVES THE LCOH MOST

Specific Consumption	EUR8.07 at low input · EUR12.10 at high input · moved by ±20 %
Electricity Cost	EUR8.40 at low input · EUR11.77 at high input · moved by ±20 %
Inflation Rate	EUR9.43 at low input · EUR10.82 at high input · moved by 1-3 %

HOW FIRM THE INPUTS ARE

Estimate class	concept - ±25-40 % on the capital cost, per appendix A9 of Seddon, The Hydrogen Economy (2022)
Backing index	20 parameters: 6 declared with a document, 2 declared without one, 0 from the catalogue, 11 platform defaults, 1 anchored to a published market (electricity_cost_eur_mwh), 0 entered with no stated origin.

REVIEWS AND ATTACHED ANALYSES

Not in this report	Internal review · Issue record · Regulatory screening · How much renewable capacity to contract · Third-party figures screened · Comparison against conventional fuel

This page restates figures printed elsewhere in this report and adds none of its own. What the author declared is stated by the author, not verified.

INPUTS

Input parameters

Parameter	Value	Where it comes from
Technology	Alkaline	published study
Region	Southern Europe	platform default
Capacity	150 MW	published study
Electrolyzer Cost	EUR1179.49/kW	internal estimate
Balance of Plant	30%	internal estimate
Electricity Cost	EUR127.63/MWh	anchored · OMIE ES
Electricity price basis	127.63 EUR/MWh - OMIE ES, average of every hour, window 2026-08-21->2026-09-19 (30 days)	anchored · OMIE ES
Specific Consumption	55.56 kWh/kg	internal estimate
Water Consumption	10 L/kg	platform default
Water Cost	EUR2.00/m3	platform default
Operating Hours	7463 h/year	internal estimate
Availability	100%	internal estimate
Project Lifetime	20 years	platform default
Construction Period	18 months	platform default
WACC	7% nominal	platform default
Inflation Rate	2%/year	platform default
O&M Cost	2% gross CAPEX/year	platform default
Stack Degradation	0.5%/year	platform default
Stack Replacement	Every 13 calendar years - 97,019 operating hours at 7,463 h/year	platform default
Stack Replacement Cost	35% of electrolyzer CAPEX	platform default
Subsidy	EUR0 (declared; not included in the LCOH)	internal estimate

Backing index - 20 parameters: 6 declared with a document, 2 declared without one, 0 from the catalogue, 11 platform defaults, 1 anchored to a published market (electricity_cost_eur_mwh), 0 entered with no stated origin.
Every printed parameter states where it comes from.
Each declared origin links to its entry in the parameter declarations block.

Source: OMIE day-ahead market (omie.es). Every hour of the window weighs the same - no choice of hours and no hedging assumed, and a market average is not a delivered cost. Applying this price asserts that the plant buys electricity on the MIBEL day-ahead market, which covers PENINSULAR Spain and Portugal only - not the Canary Islands, the Balearic Islands, Ceuta or Melilla, which are isolated systems outside MIBEL, and not any other Southern-European country. GaugeH2 re-derives the price from public market data; the market premise is the author's and is not checked. The zone and window printed with it are enough to re-derive it from public OMIE day-ahead prices.

PARAMETER DECLARATIONS - STATED BY THE AUTHOR, NOT VERIFIED

Availability (availability_pct) — internal estimate · backed by EU Innovation Fund project fiche - T-HYNET (CINEA 101133010) (76c1eef18ac6)

Basis: 7,463 h x 2.7 t/h = 20,150 t a year, the fiche's ten-year average, so the hours are net of downtime and availability is declared at 100 %; the 95 % default would count it twice. Only year 1 makes that output: with the default stack degradation the first ten years make 197,011 t, 2.2 % below the fiche's 201,506 t. The fiche does not say what the other 1,297 hours are.

Balance of Plant (bop_pct) — internal estimate

Basis: The source gives EUR 230 M for the whole project, and no split: 1,179.49 EUR/kW of equipment plus a 30 % balance of plant gives back the EUR 230 M. The 30 % is our assumption, the platform default when this sample was first issued. Total CAPEX is the same with any split; stack replacement is costed on equipment only, and with 0 % the LCOH would be EUR 10.13/kg instead of 10.09.
Source: Catalonia.com, published 2022-09-27, accessed 2026-09-21: https://catalonia.com/w/tarragona-will-have-the-largest-green-hydrogen-plant-in-spain-with-an-investment-of-230-million-euros - "The companies foresee an investment of 230 million euros in the project, with an additional 80 million for electrical storage facilities."

Specific Consumption (electricity_consumption_kwh_kg) — internal estimate · backed by EU Innovation Fund project fiche - T-HYNET (CINEA 101133010) (76c1eef18ac6)

Basis: 150,000 kW / 2,700 kg/h = 55.56 kWh/kg. Both figures are stated in the EU Innovation Fund project fiche: a 150 MW electrolyser and 2.7 tonnes of renewable hydrogen per hour. The division is ours, so the origin is an internal estimate and not a published study. The same 2.7 t/h sets the operating hours, so the two declarations are one reading of the fiche and not two.

Capacity (electrolyzer_capacity_mw) — published study · backed by EU Innovation Fund project fiche - T-HYNET (CINEA 101133010) (76c1eef18ac6)

Basis: Stated in the EU Innovation Fund project fiche: a 150 megawatt (MW) capacity, alkaline electrolyser. The fiche is marked terminated, and Repsol still publishes the same 150 MW for the project.

Electrolyzer CAPEX (electrolyzer_cost_eur_kw) — internal estimate

Basis: EUR 230 M project investment / 150,000 kW / 1.30 = 1,179.49 EUR/kW. The source gives the investment for the project, with storage listed apart; the engine adds the 30 % balance of plant back, so the total CAPEX printed is the published EUR 230 M. One assumption: the 230 M includes the balance of plant.
Source: Catalonia.com, published 2022-09-27, accessed 2026-09-21: https://catalonia.com/w/tarragona-will-have-the-largest-green-hydrogen-plant-in-spain-with-an-investment-of-230-million-euros - "The companies foresee an investment of 230 million euros in the project, with an additional 80 million for electrical storage facilities."

Operating Hours (operating_hours) — internal estimate · backed by EU Innovation Fund project fiche - T-HYNET (CINEA 101133010) (76c1eef18ac6)

Basis: The fiche's 1,378,161 t CO2e avoided over the first ten years of operation are calculated, it says, against the 2021-2025 ETS benchmark of 6.84 t CO2e per t of hydrogen, with 99.99 % relative avoidance: 1,378,161 / (6.84 x 0.9999) / 10 = 20,151 t of hydrogen a year, and at 2.7 t/h that is 7,463 hours. The fiche says it will run continuously and does not say what the other 1,297 hours are.

Subsidy (subsidy_eur) — internal estimate · backed by EU Innovation Fund project fiche - T-HYNET (CINEA 101133010) (76c1eef18ac6)

Basis: The EU Innovation Fund project fiche is marked TERMINATED (updated 9 September 2026), so its grant of EUR 62,491,697 is not declared and the subsidy is 0. The EUR 104.19 M of state aid that Repsol reports for the project is left out too: how it splits between capital and operating support is not public.

Technology (technology) — published study · backed by EU Innovation Fund project fiche - T-HYNET (CINEA 101133010) (76c1eef18ac6)

Basis: Alkaline: the EU Innovation Fund project fiche describes a 150 MW alkaline electrolyser, a breakthrough in alkaline technology in its own words.

Declared by the author, not verified by GaugeH2. Unlike the electricity price basis, nothing here was recomputed or checked against a source. Declarations are covered by this report’s content hash, so one cannot be changed after the fact without the hash moving: the hash proves what was claimed, not that the claim is true.

COMPOSITION

Cost breakdown

LCOH share by component (NPV-weighted)



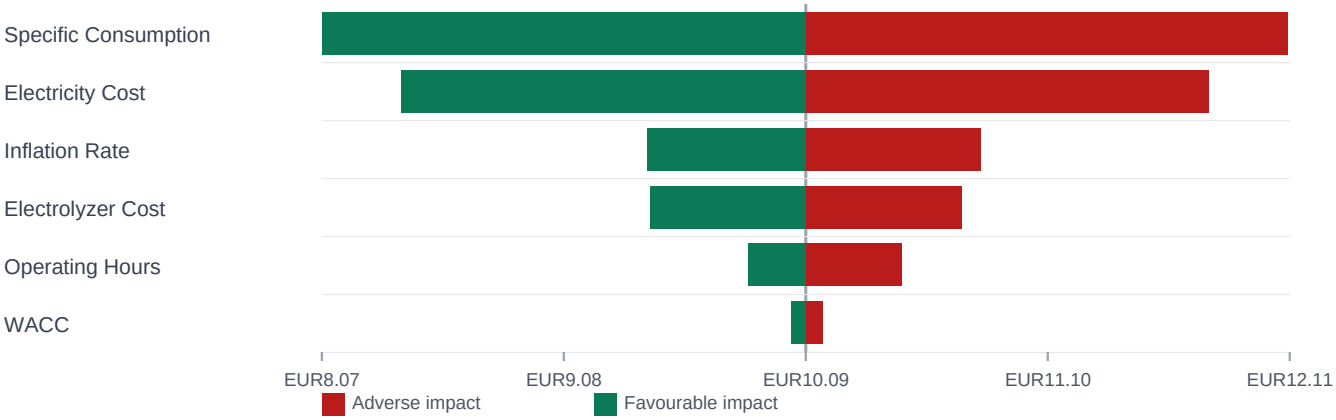
Electricity	83.6%
CAPEX	11.9%
O&M	2.7%
Stack replacement	1.5%
Water	0.2%

The shares are rounded one by one, so as printed they add up to 99.9%.

SENSITIVITY

Sensitivity analysis

LCOH (EUR/kg) with each input moved across the band in the table below



Variable	Moved by	LCOH at low input	Base LCOH	LCOH at high input	Impact range
Specific Consumption	±20 %	EUR8.07	EUR10.09	EUR12.10	EUR4.03
Electricity Cost	±20 %	EUR8.40	EUR10.09	EUR11.77	EUR3.37
Inflation Rate	1-3 %	EUR9.43	EUR10.09	EUR10.82	EUR1.39
Electrolyzer Cost	±40 %	EUR9.44	EUR10.09	EUR10.74	EUR1.30
Operating Hours	-20 % / +17.4 %	EUR10.49	EUR10.09	EUR9.85	EUR0.64
WACC	±20 %	EUR10.03	EUR10.09	EUR10.16	EUR0.13

Each row moves one input and holds the rest at their base values, even inputs read from the same source: the electrolyser cost ±40 %, the wide end of the ±25-40 % accuracy band of a concept estimate, the inflation rate 1 percentage point either way and the other inputs ±20 %. Moving the inflation rate holds the nominal WACC, so the real rate moves the other way. Operating Hours stops at 8760 h on the high side, the most the calculator accepts. The WACC row also moves the construction interest in the capex charged at year 0. The stack replacement years do not move with Operating Hours, and the anchored electricity price, an average of every hour of its window, does not depend on them. Each end is computed from the exact inputs and printed to the cent, and the impact range is the difference of the two printed ends.

OUTPUT

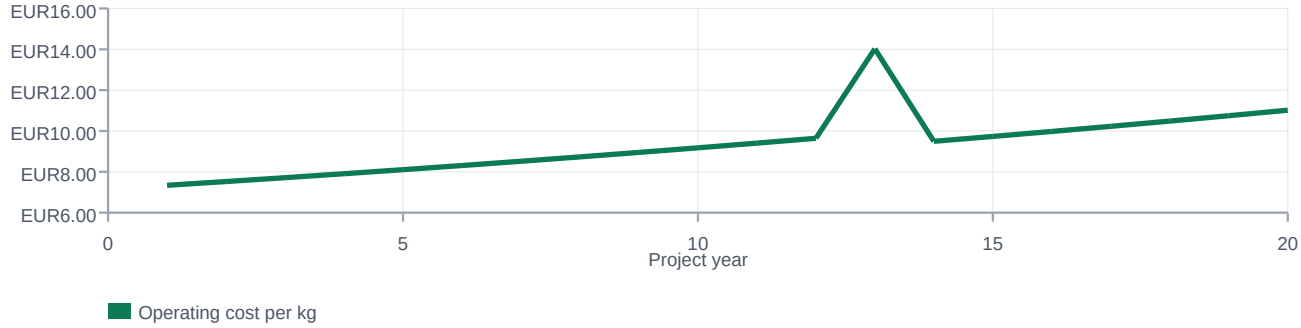
Production summary

Year 1 production	20148.5 tonnes (before stack degradation)
Average per year	19657.8 tonnes/year over 20 years
Lifetime production	393156 tonnes (sum of the degraded annual series)
Total CAPEX, gross of subsidy	EUR230.00M
Construction Capitalisation	1.088725x over 18 months
Capex charged at year 0	EUR250.41M

TIME SERIES

Operating cost per kg over project lifetime

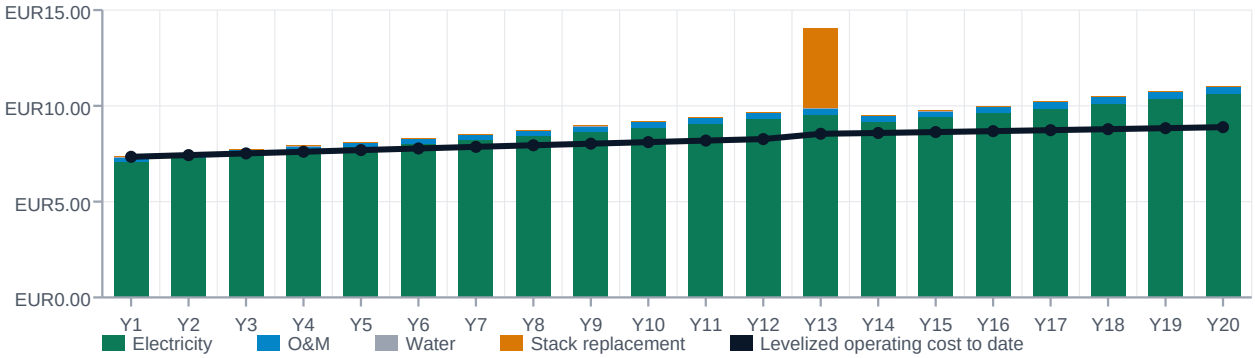
Operating cash cost per kg H2 in each project year



COMPOSITION

Operating cost by component

Operating cost per kg H2 by component, one bar per year - levelized operating cost to date overlaid



The line is the operating cost levelized from year 1 to each year: discounted operating cost over discounted production to date. Capex is not in these series: it is charged at year 0, outside the years plotted, and adds EUR1.20/kg. The headline LCOH is EUR10.09/kg.

What this report did not evaluate

The analyses below are absent from this report because nothing was attached to evaluate them - NOT because they were evaluated and found satisfactory, and not because they were judged not to apply. A blank page cannot tell those three apart, so this report says which one it is. Each line states what would have to be attached for the analysis to appear.

- Regulatory compliance: no compliance assessment was attached to this calculation - RFNBO / RED III or the EU taxonomy for a project in the European Union, 45V for one in the United States, or permitting - so this report states nothing about whether the project meets any of them. Run an assessment and attach it to the calculation.

- Renewable sizing: no sizing sweep was attached, so these figures rest on the operating hours and electricity price entered, not on a renewable supply this report sized against an hourly profile.

- Third-party figure screening: no third-party figures were screened against this calculation. Nothing here contradicts a published figure because nothing here was compared with one.

- Comparison against conventional fuel: the end use of the hydrogen was not declared, so this report does not say whether a parity comparison against petroleum products applies to this project - which is a different statement from saying it does not.

- Internal review: no internal review was recorded against this calculation. The figures are as the author entered them and no second person in the organisation has signed off on them here.

REFERENCE

Methodology

This report applies a Discounted Cash Flow (DCF) levelized-cost methodology against the user-provided inputs. Methodological reference frameworks: NREL Annual Technology Baseline, IEA World Energy Outlook, IRENA Green Hydrogen Cost Reduction. These frame the METHOD; they are not the source of any parameter printed in this report - each printed parameter states its origin in the input parameters table, and a declared one also cites its source in the parameter declarations block. Electricity, O&M, water and stack replacement are escalated at the inflation rate each year after the first. Each year's costs and production are placed at the end of that year and discounted at the WACC, which is therefore applied as a nominal rate. Capex is charged at year 0 and is not escalated. Stack replacement is treated as an operating expense in the year it occurs. The capex charged at year 0 includes the interest accrued over the construction period, capitalised at the WACC. The factor applies the construction spending profiles of Table A7-1 of Seddon, The Hydrogen Economy (2022): each share of the capital accrues interest at the WACC from when it is spent until start-up. An 18-month build is interpolated halfway between the one-year profile, all of the capital one year before start-up (1.07 at a WACC of 7 %) and the two-year profile, 50 % two years and 50 % one year before start-up (1.10745): 1.088725. Stack degradation is modelled as lost efficiency: the stack draws the same power every year and its output falls by the stack degradation rate for each year since it was installed, so each kilogram takes more electricity; a replacement is charged in its own year, which still runs on the old stack, and the output of year 1 returns the year after it.

Model version: v7.1.0 Methodology version: v3.31

What this cost excludes, and the money-year index

This levelized cost excludes working capital. It covers the plant and its operation, not the funds tied up in stock, receivables and payables while the plant runs. Published factorial guidance puts working capital at 10 to 20 per cent of fixed capital investment (Towler and Sinnott, Chemical Engineering Design, chapter 7); it is recovered when the plant stops, so it is carried as an annual charge on the funds rather than amortised with the capital. Nothing computed here includes that charge, so a figure that has to cover it will be higher than the one above.

No figure is escalated to another money year: this model version applies no cost index to any figure it computes or prints. The Nelson-Farrar refinery construction cost index series runs from 1946, where it stands at 100, to 2018, the base year of its escalation factors. When the declared money year falls before that base, the money-year line of the comparability block states the factor that escalating to 2018 money would apply, and that it is not applied; from the base year on, it states that the series ends there. That factor uses the index with its published weighting, 60 per cent labour and 40 per cent materials. That weighting is the one its publisher, the Oil & Gas Journal, maintains for continuity of the series; the same publisher reports that surveyed project composition has moved towards 40 per cent labour, and publishes the series at five weightings so an evaluator can match their own project. The index is a refinery construction index, accurate for the US Gulf Coast and described as suited to petroleum and petrochemical work, not an electrolysis index. No alternative weighting is applied.

Integrity verification

The SHA-256 hash on the cover is a cryptographic fingerprint of the calculation inputs (the parameter declarations included), outputs, model version and timestamp registered in the GaugeH2 database. It does NOT cover the PDF binary itself. To verify a report: open the verification URL on the cover, then compare the figures shown there against the figures in this PDF. Any divergence indicates the PDF was modified after generation.

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