GaugeH₂ Iberian Green Hydrogen Cost Index

How it is calculated · version **index-v1.1**, in force since 11 October 2026 · gh2.ai/cost-index

1 What it measures

This index shows how the estimated cost of producing 1 kg of hydrogen changes when the wholesale electricity price changes. To keep the comparison consistent, it always uses the same reference plant: a 10 MW PEM electrolyser with a 50% capacity factor and constant technical and financial parameters.

The electricity price is updated every week with OMIE day-ahead market data. The index therefore tracks the impact of the electricity market on the LCOH, but it does not represent the final cost of a specific project, nor does it include all supply costs.

The result is the levelised cost of hydrogen (LCOH), in €/kg, and covers electricity, investment, operation and maintenance, stack replacement and water. It is published for mainland Spain (ES), mainland Portugal (PT) and the average of the two (ES-PT).

2 Reference plant

All parameters are fixed. The only input that changes from one week to the next is the electricity price.

Parameter	Value	Note
Technology	**PEM, grid-connected**	
Capacity	**10 MW**	The result in €/kg does not depend on the capacity chosen.
Electricity consumption	**53 kWh/kg**	Whole plant, averaged over its lifetime.
Capacity factor	**50%**	4,380 hours a year. 40% and 60% are also published (section 5).
Investment (CAPEX)	**2,200 €/kW**	Installed system including balance of plant. Excludes compression, storage, grid connection and civil works.
Operation and maintenance	**3% of CAPEX a year**	Excludes electricity.
Stack replacement	**30% of CAPEX**	Every 60,000 operating hours: year 14 at a 50% capacity factor.
Degradation	**1% a year**	Output declines every year and is not restored by the stack replacement.
Water	**10 L/kg at 2 €/m³**	0.02 €/kg.
Lifetime	**25 years**	
Discount rate	**6%**	In real terms: no inflation.
Subsidies	**None**	
Electricity price	**Variable**	OMIE day-ahead market (section 3).

Source of the CAPEX and the discount rate: European Hydrogen Observatory, *Levelised Cost of Hydrogen (LCOH) Calculator Manual*, v2.0, May 2025.

3 Electricity price

- **Source:** OMIE day-ahead marginal price for the Spanish and Portuguese zones, in 15-minute periods (96 a day).
- **Window:** the last 30 days with published data. The index is recalculated once a week.
- **Rule:** the plant is assumed to run in the cheapest periods of the window, as many as its capacity factor allows. At 50%, the cheapest half of the periods is taken and averaged.

$$\bar{p} = \frac{1}{N} \sum_{i=1}^{N} p_{(i)} \qquad N = 0.5 \cdot n$$

n: number of 15-minute periods in the window · $p_{(1)} \le p_{(2)} \le \ldots \le p_{(n)}$: their prices in ascending order, in €/MWh. Negative prices are included as published by OMIE.

If the window holds less than 80% of the expected periods, no value is published that week.

The rule assumes that the plant knows every price in advance and always picks the cheapest periods. A real plant cannot do this exactly, so the index is a **best-case floor** of the cost.

4 LCOH calculation

The LCOH is the ratio between the present value of all the plant's costs and the present value of its output over the 25 years.

$$\text{LCOH} = \frac{I + \sum_{t=1}^{25} \frac{E_t + O_t + S_t + W_t}{(1+r)^t}}{\sum_{t=1}^{25} \frac{P_t}{(1+r)^t}}$$

r = 6% · I = 2,200 €/kW × 10,000 kW = €22 million, invested in year 0.

Term (year t)	Formula
Output, kg	$P_t = (C \cdot h / e) \cdot (1 - d)^{t-1}$ with C = 10,000 kW, h = 4,380 h, e = 53 kWh/kg, d = 1%
Electricity, €	$E_t = P_t \cdot e \cdot \bar{p} / 1{,}000$
Operation and maintenance, €	$O_t = 0.03 \cdot I$
Stack replacement, €	$S_t = 0.30 \cdot I$ in the replacement year; 0 in every other year
Water, €	$W_t = P_t \cdot 0.010$ m³/kg · 2 €/m³

In practice. The electricity cost is proportional to output, so the LCOH splits into a part that depends on the electricity price and a fixed part:

$$\text{LCOH} = \frac{e \cdot \bar{p}}{1{,}000} + K = 0.053 \cdot \bar{p} + K$$

K groups investment, operation and maintenance, stack replacement and water, and depends only on the capacity factor. Every 10 €/MWh change in the electricity price moves the index by 0.53 €/kg.

Capacity factor	Hours a year	Stack replacement	K (€/kg)	LCOH at 55 €/MWh
40%	3,504	year 17	4.27	7.19 €/kg
50% (headline)	4,380	year 14	**3.47**	**6.39 €/kg**
60%	5,256	years 11 and 22	3.10	6.02 €/kg

Example at a 50% capacity factor and $\bar{p}$ = 55 €/MWh: 0.053 × 55 + 3.47 = 2.92 + 3.47 = 6.39 €/kg.

5 Published values

- **ES and PT** are calculated separately, each zone with its own price $\bar{p}$.
- **ES-PT** is the arithmetic mean of the ES and PT LCOH. The index headline is ES-PT at a 50% capacity factor.
- **Capacity-factor band (40%, 50% and 60%):** uses each zone's same price $\bar{p}$, obtained with the 50% rule, and changes only the operating hours and the stack replacement year. It shows how much plant utilisation matters, not the price.

6 What it does not include

- The price is wholesale: it excludes access tariffs, balancing charges, taxes and Guarantees of Origin. The real cost of delivered electricity is higher.
- It assumes perfect price foresight (section 3).
- It excludes compression, storage, transport and grid connection.
- It does not represent an RFNBO-compliant profile.
- It covers the Iberian Peninsula only: it does not model the Balearic or Canary Islands, Ceuta, Melilla, the Azores or Madeira.
- It is an index modelled by GaugeH₂ from OMIE prices; it is not an official OMIE figure.

7 Verification and versions

- Each published value keeps the data it was calculated from and two SHA-256 fingerprints: **content_sha256**, of the data and the result, and **methodology_sha256**, of the technical document *index-methodology-v1.1.md*, available at gh2.ai/cost-index.
- Changing a plant parameter, the window or the price rule creates a new version. Values already published are not recalculated.
- **index-v1.1 (11 Oct 2026):** the discount rate moves from 8% to 6%. At 55 €/MWh and a 50% capacity factor, the LCOH falls from 6.78 to 6.39 €/kg. In a series spanning both versions, the change on that date is methodological, not a market move.

Price source: OMIE (day-ahead market). Index modelled by GaugeH₂; not an official OMIE figure. This document summarises methodology index-v1.1. The technical reference is *index-methodology-v1.1.md*.