# The development of hydrogen in Portugal: Galp and BP case studies

EPCOL explores hydrogen projects in Portugal and highlights how Galp and BP are shaping the country's renewable hydrogen future.

The development of renewable hydrogen in Portugal has been consolidated as a national strategic priority, framed by the National Hydrogen Roadmap (2020) and the Hydrogen Action Plan (2023), which set ambitious targets for electrolyser capacity, industrial integration and export positioning. In this context, several initiatives have been announced and are at different maturity stages, ranging from feasibility studies to pilot projects and industrial-scale demonstrations.

However, when observing the entire hydrogen value chain covering production, integration in industrial processes, transport, storage, distribution, and export, only two member companies of EPCOL, the Portuguese Association of Fuel and Lubricant Companies, Galp and Bp, stand out with a consolidated presence across almost all of these steps.

Both, albeit with distinct approaches, have positioned themselves as central players in the Portuguese and Iberian renewable hydrogen ecosystem, aligning their strategies with national targets, EU financing mechanisms and regional market dynamics across the Mediterranean and Europe.

This document therefore focuses on the activities of Galp and Bp in Portugal, analysing the strategic framework, technological options, business models and integration with cross-border projects that will shape the country's role in the future hydrogen market.

## Strategic and regulatory framework

The National Hydrogen Roadmap sets the vision of Portugal as an Iberian and Mediterranean export hub, with a target of up to 2 GW of installed electrolysis capacity by 2030, linked to industrial clusters and export corridors. The Hydrogen Action Plan operationalises this framework with support measures for licensing, financing, industrial clustering (Sines, Matosinhos, Estarreja, Setúbal) and integration with European infrastructures such as the European Hydrogen Backbone and H2Med.

At the European level, the EU Hydrogen Strategy, the Green Deal, and support mechanisms such as IPCEI Hy2Tech/Hy2Use, the Innovation Fund, and the European Hydrogen Bank provide the financial and regulatory instruments required to support capital-intensive investments and reduce market risks.

## Companies overview

Galp's flagship project in Sines, Portugal consists of a ~100 MW electrolyser, with an estimated production of ~15 kt H per year, aimed at replacing fossil-based hydrogen used in the refinery. The direct emissions reduction is approximately ~110 kt CO e per year. The project is fully integrated with existing utilities such as steam, oxygen and recycled industrial water, linked to renewable PPAs, and uses PEM modular McPhy technology, offering flexibility and scalability.

In parallel, Galp is developing a large-scale advanced biofuels (HVO/SAF) unit, where hydrogen plays a central role in hydroprocessing. The integration of green hydrogen reduces the carbon footprint of processes and adds value to final products, enhancing the industrial business case. Financing was partially secured through EIB facilities and European instruments.

The GreenH2Atlantic consortium in Sines, which includes Galp alongside other energy, engineering and electrolyser technology partners, acts as a demonstration project for integration with a hybrid renewable network (solar and wind), supported by Horizon 2020 and Innovation Fund financing. Key technical challenges focus on managing renewable intermittency, water treatment, and safety in compression and storage.

BP has adopted a dual Iberian strategy. In Castellón (Spain), it is developing a 25 MW project with Iberdrola, already at FID stage, focused on industrial decarbonisation. In addition, BP has projects under consideration in Portugal, although detailed public information on their scope and technical configuration remains limited. Public technical specifications such as PEM versus alkaline, electrolyser suppliers and integration architecture are not yet disclosed, hindering precise assessment of efficiency (kWh/kg H ), CAPEX/OPEX and LCOH. However, Bp clearly prioritises close renewable integration and commercialisation models combining PPAs, offtake agreements and partnerships with gas distributors.

## Infrastructure and interconnections

The viability of Portugal's hydrogen strategy depends on integration with H2Med, including the Celorico–Zamora (CelZa) pipeline and the Barcelona–Marseille (BarMar) link, which will connect Iberian production with European markets. Technical success requires alignment on compression, pressure standards, material compatibility, EN/ISO quality standards, booster stations and measurement systems, as well as maritime transport solutions such as ammonia, LOHC and methanol.

The European Hydrogen Backbone positions Portugal and Spain as net exporters and Germany and the Benelux as structural importers, reinforcing the asymmetry between southern production regions and northern consumption hubs.

Regarding differences between economic regions, the Mediterranean area benefits from abundant solar and wind resources, enabling competitive green hydrogen production. Industrial port hubs such as Sines, Algeciras and Taranto provide significant demand but not enough to absorb total output, making export essential. The Mediterranean strategy is therefore export-oriented, critically dependent on corridors like H2Med and long-term contracts.

By contrast, Western Europe focuses on local substitution of grey hydrogen in massive industrial clusters where demand is secured, projects enjoy strong national public support, and infrastructures including dedicated pipelines and salt cavern storage are more advanced. However, production costs are higher due to lower renewable availability and higher electricity prices. Therefore, the Mediterranean benefits from cost competitiveness but has high export dependency, while Western Europe has demand certainty but higher production costs.

## Technical and economic drivers

The competitiveness of Portuguese hydrogen projects will depend on several key factors. Electrolyser efficiency is critical, with Proton Exchange Membrane (PEM) systems typically consuming 50–55 kWh/kg, while alkaline systems have lower CAPEX but offer less operational flexibility. The capacity factor is determined by PPA coverage and the renewable energy profile. Compression and drying require additional energy and costs to reach pressures of 30–350 bar. Storage and vectors, whether through physical storage or conversion to ammonia or liquid organic hydrogen carriers, involve energy losses and logistical challenges. Safety integration is essential, ensuring compliance with environment, health, and safety standards, managing leakage risks, and maintaining material compatibility.

Key economic risks include renewable electricity price volatility, the absence of long-term PPAs, uncertainty in hydrogen market pricing, and international competition, particularly from North Africa.

## Conclusion

Galp, through its Sines project and the GreenH2Atlantic consortium, is closely aligned with the Roadmap and PAH2, having secured critical components including FID, European Investment Bank financing and integration with HVO/SAF units, which reduces execution risks and enables industrial-scale renewable hydrogen production before 2027. BP, via Castellón and, subject to favourable developments, in Portugal, is positioning itself as a leading Iberian operator, with scalability in Portugal heavily dependent on market development and the operationalisation of H2Med.

For both operators, the full implementation of the Roadmap and PAH2, including GW-scale electrolysis deployment, infrastructure buildout and market mechanisms such as CfDs, PPAs and certification of origin, will be decisive in shifting from isolated projects to a liquid, competitive and integrated hydrogen market between 2028 and 2035.

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