

'22

PORTUGAL
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APREN Associação
de Energias
Renováveis



Iberian green hydrogen - opportunities and threats

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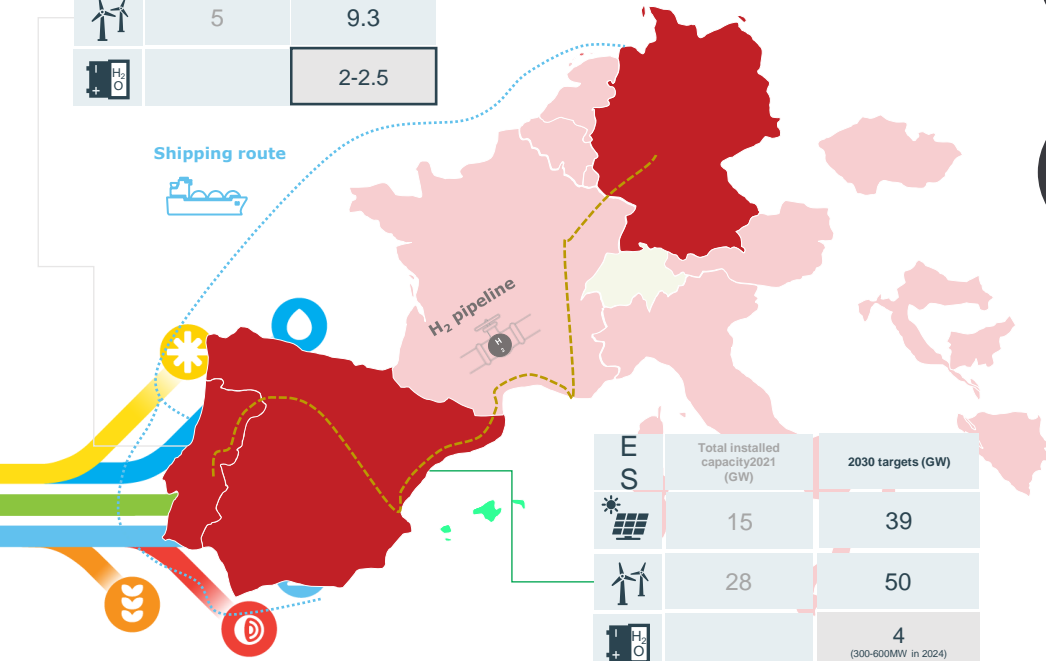
Smartenergy

Chief Technology Officer

Supply and
demand matching
to accelerate
renewable H2 in
Iberia

Iberia is perfectly positioned to serve with Green H2 both its own demand and to export to Central Europe

P T	Total installed capacity 2021 (GW)	2030 targets (GW)
	1.2	9
	5	9.3
		2-2.5



E S	Total installed capacity 2021 (GW)	2030 targets (GW)
	15	39
	28	50
		4 (300-600MW in 2024)

Source: SMARTENERGY Group AG

Top geopolitical conditions
Green H2 from democratic state and from EU, at best conditions, short transport routes, H2 long-term storage potential

Top natural resources
Abundant natural resources in terms of sun, wind and suitable land (relatively). Co-existence with **agri-PV** can even save land for agriculture

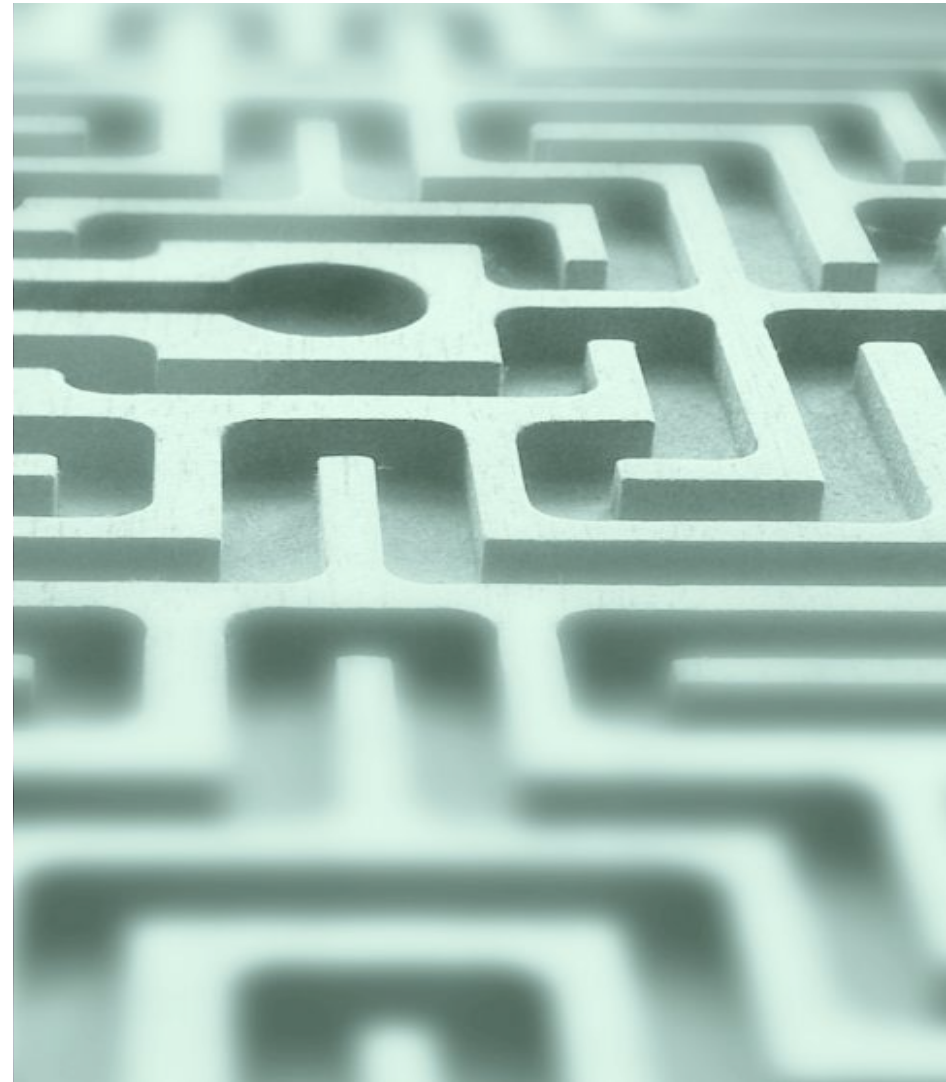
Iberia top strategic position
Transport route from Iberia to France and Germany will be essential



Image Source: Air Clim

Key challenges for green H₂ projects

- 1 High uncertainty around medium- and long-term green hydrogen prices and offtake
- 2 Technology is not (yet) fully mature across complete value chain
- 3 Uncertain policy landscapes and different support approaches across geographies



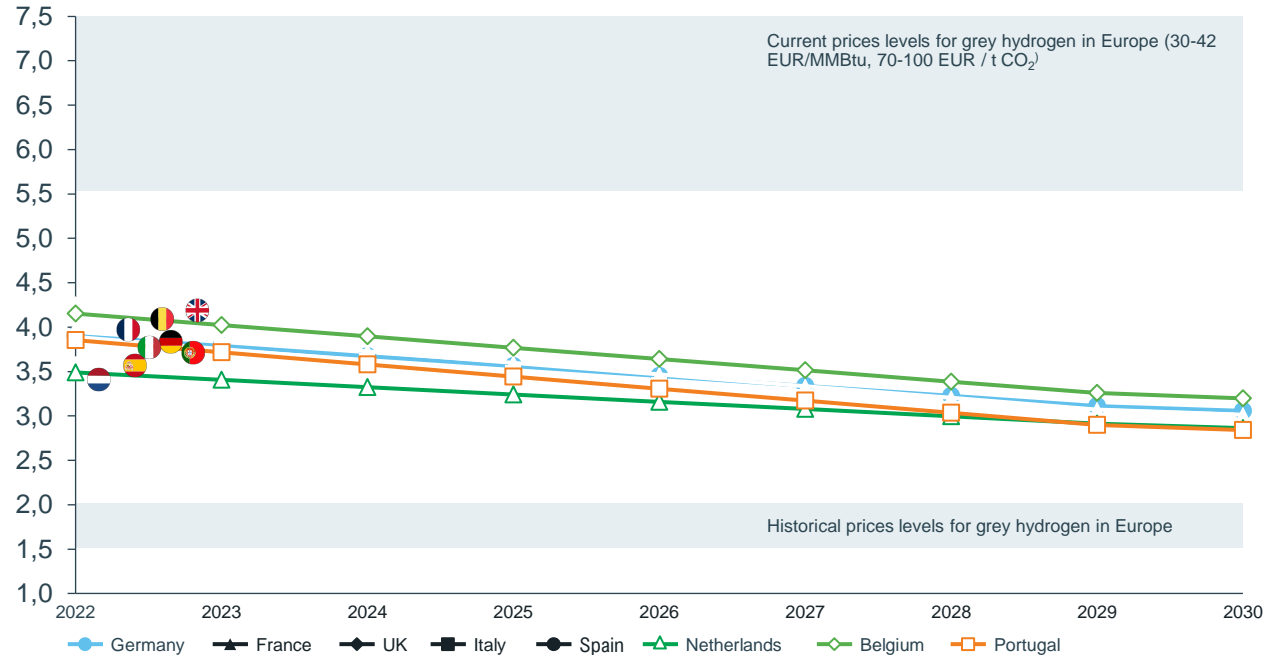
Due to rising natural gas costs, green H₂ has reached cost-parity in Europe (for now), but high uncertainty for long-term outlook

Indicative; excl. transport costs

Financing challenge

- Overall, **green hydrogen production cost (LCOH) is expected to decrease significantly by 2030**, enabled by both OPEX and CAPEX reductions
- Driven by recent surge in natural gas prices, **green H₂ has already achieved cost-parity with fossil-based H₂** in Europe
- However, high **energy price uncertainty remains and is affecting the predictability of project revenues** over lifetime

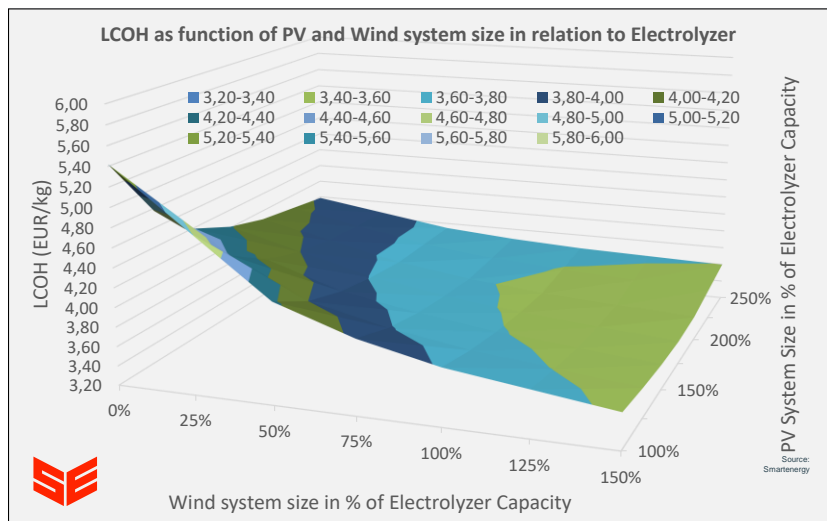
Levelized cost of hydrogen in core countries, 2022–2030 [EUR/kg]



Assumptions: Mix of PV, onshore wind and offshore wind in Germany, Netherlands, Portugal and UK; PV and onshore wind in Spain, France and Belgium; PV in Italy

The opportunity of hybridisation, repowering and overpowering

Hybridisation of RES sources to increase loading factor.
Example analysis PV / Wind / EL sizing by Smartenergy.



Portuguese law decree to add other renewable sources to PV

The Portuguese Decreto-Lei 15/2022 (14th January) defined the **hybridization framework**, as well as repowering and overpowering



For instance, the “H₂ GLOBAL” concept foresees government-backed intermediary as market maker for green H₂ ramp-up

**“H₂ GLOBAL” concept – H₂ auctions with public intermediary:
blueprint for the EU’s hydrogen bank?**

During COP27 German chancellor Scholz cranked up the funding for H2Global from €900 million to €4 billion!



1) Hydrogen Purchase Agreement; 2) Hydrogen Sales Agreement

Government budget
Public funds to cover price gap

What Smartenergy would like to see as auction model from production side



Minimum 10 years tenor



CfD or CCfD mechanism



Accessible for SMEs



De-risking mechanisms



Green certification system



Renewable H2 only



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Obrigado!
Thank you!