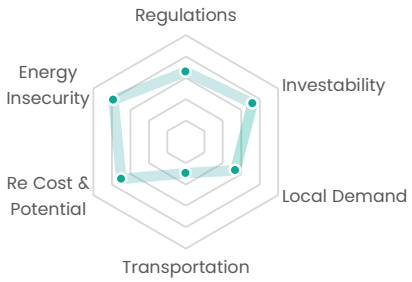
# Portugal

**Index rank** # 19

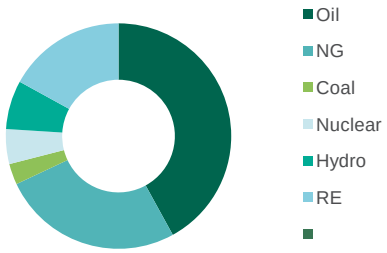
**Aggregate score (out of 5)** 3.2

| | |
|---|---|
| GDP - USD (bn): | 231 |
| GDP per capita - USD: | 22,440 |
| Land area ('000 km2): | 92 |
| Population density (per km²): | 112 |
| Grid emissions factor (gCO²/kWh): | 307 |

**Hydrogen Drivers Matrix**




**Primary Energy Mix**




**3.3 Regulatory commitment**
- Scale hydrogen strategy realistic and realizable
- c.USD300m funding allocated
- Delayed hydrogen CfD

**1.5 Transportation**
- Port-located cluster for export
- No existing ammonia export
- Renewable gases pipeline to France reportedly under negotiation

**3.6 "Investability"**
- Rated BBB by S&P
- 39th in WB Ease of Doing Business

**3.5 RE cost and potential**
- 2nd ranked solar resource in Europe but only 1GW installed to date
- Good wind resource

**2.7 Local demand potential**
- National strategy targets transport & shipping sectors
- Some demand from refineries, and from a small steel sector

**3.9 Energy insecurity**
- 77% net energy importer

## Strong fundamentals but stronger regulatory push required

The Portuguese national hydrogen strategy is wholly green hydrogen-focused, targeting the blending of 10-15% green hydrogen into the gas grid by 2030, as well as 2-5% green hydrogen share in the industrial sector, 1-5% in the transport sector, 3-5% in the shipping sector, 2-2.5GW of electrolyser capacity and 50-100 hydrogen refuelling stations. The Government flagship project H2Sines is located at its largest deepwater port, and an MOU has been signed with the Netherlands to explore maritime export to Rotterdam. The Government is preparing its IPCEI document and has shortlisted 37 submissions, with final selection to come. Thus far, only c.USD300m has been allocated towards hydrogen; a hydrogen CfD was to come in April this year but remains in development.

Portugal imports 77% of its energy needs, and oil makes up 42% of total energy supply, with natural gas at 26%. Transportation is thus a major avenue for decarbonisation, while industrial demand will be primarily from refineries. Portugal, together with Spain, has the highest solar radiation in Europe, and its 2020 renewable energy auction clearing prices were as low as EUR11.14/MWh[1], a world record low at its time. While having strengths for all transport options, it is at a slight disadvantage to leading countries in each: it is at a disadvantage to Spain for pipeline access and distance to the load centres in Northern Europe; in ammonia shipping, it is at disadvantage to countries with existing ammonia export infrastructure like Saudi Arabia; for green hydrogen shipping, as long as conversion remains the largest transportation cost component, it would be at disadvantage to countries with lower LCOE. Lack of geological storage and water scarcity in the long run may also pose challenges.

### Hydrogen CfD expected 2021

In March this year, the Energy Secretary of State announced that the Government would publish general guidelines for a national hydrogen carbon CfD auction in early April targeted primarily for "own consumption", but with a separate channel for energy suppliers to participate. To date, further developments, or details such as overall budget, have not been announced.

### H2Sines / Green Flamingo project

The Government's 1GW H2Sines flagship project was planned to supply an EDP coal power plant and a GALP oil refinery in the region and is exploring export to Netherlands. Since its announcement in 2020, GALP and EDP have pulled out to pursue their independent hydrogen agenda but consortium members REN, Martifer, Vestas and Engie remain. The project will start with a modest 10MW pilot.

### Galp 100MW electrolyser

Subsequent to leaving H2Sines, oil and gas company Galp has announced plans to develop a 100MW electrolyser project to supply its 220,000bpd Sines refinery and a neighbouring biofuels plant, to commission by 2025.

### Export pipeline

Portugal is reportedly[2] negotiating the construction of a pipeline for renewable gases, including hydrogen, with Spain. The pipeline would run from Sines in Portugal, crossing Spain into France.

hydrogen investability index

Cranmore Partners energy estate.

1 Referring to the lowest bid of the auction, which represented only 10MW out of 670MW of awarded capacity; a significant source of value likely came from the bundled evergreen grid connection right; 2 Reuters quoting Environment Minister Joao Matos Fernandes