Portugal: a living laboratory for global decarbonisation

Despite significant improvements in its economy and credit profile, investing in Portugal's renewable energy projects presents notable challenges. In its latest country analysis, ***TEI Times*** looks at Portugal's generation and consumption profiles, policy, emissions targets and ability to attract the investment needed to meet government targets.

Portugal is a global leader in climate action. Its strategy focuses on electrification, renewable expansion, and energy efficiency so as to reach carbon neutrality by 2045. The nation's strong clean energy profile and improved investment environment position it for significant growth, despite bureaucratic hurdles and high energy taxes.

Commitments

Portugal is an early adopter of carbon neutrality, aiming to achieve net zero emissions by 2045 – five years ahead of the EU's target. By 2030 it wants to cut greenhouse gas emissions 45-55 per cent compared to 2005 levels, increasing to 65-75 per cent by 2040. Additionally, the country aspires for 47 per cent of gross final energy demand and 80 per cent of generation to come from clean energy.

The decarbonisation strategy rests on three primary pillars: higher electrification rates, renewables generation, and energy efficiency. Its roadmap has a greater level of detail and more ambitious renewable energy goals compared to many of its peers. Portugal also leads many in integrating solar, wind, and green hydrogen technologies into its energy system.

Notably, hydrogen is prioritised as a solution for hard-to-decarbonise sectors. Also, the autonomous regions of the Azores and Madeira have become "living laboratories", spearheading innovative energy solutions, focusing on smart grids, and achieving high levels of renewable energy integration.

Despite its achievements, Portugal faces significant challenges on the road to carbon neutrality. Reducing reliance on energy imports remains a priority, alongside managing high energy costs, which are heavily influenced by taxes and tariffs. Further investment is required to expedite transport decarbonisation, while energy efficiency improvements are critical, particularly in buildings. Currently, two-thirds of structures lack energy performance certificates.

Energy profile

Portugal boasts a strong clean energy profile, which is poised for significant expansion in the coming years. In 2023, 61 per cent of its electricity was from renewables, 19 per cent from non-renewable energy, with net imports making up the remaining 20 per cent. This represented a 12-percentage-point increase for renewables compared to 2022, while non-renewable sources fell by 14 percentage points and imports rising 2 percentage points. Production from renewables reached 31.2 TWh, a 24 per cent year-on-year increase. This output was distributed across several technologies: wind energy contributed 25 per cent, hydroelectric power 23 per cent, biomass 19 per cent, and solar energy 7 per cent.

Portugal has successfully phased out coal fired power generation, achieving a major milestone in 2021 with the closure of its final two coal plants. The 1180 MW Sines Power Plant, operational for 35 years, was the first to cease operations in April 2021. Later that November, the 628 MW Pego Power Plant, in service for 28 years, also shut down.

Both sites now play pivotal roles in the country's energy transition. Following the Sines closure, Portuguese utility EDP announced plans to transform the site into a green hydrogen hub. This ambitious project proposed 200 MW of renewable energy, 100 MW of electrolysers, and a R&D centre. However, the initiative was suspended in 2024. Meanwhile, Spanish utility Endesa won the tender to repurpose the Pego site. Its €700 million ($728 million) project outlines a hybrid renewable energy project comprising a 365 MWp solar installation, 264 MW of wind capacity, 168.6 MW of integrated energy storage, and a 500 kW electrolyser for green hydrogen production.

Portugal has also expressed intentions to phase-out gas fired generation by 2040. However, no natural gas plant owners or operators have yet agreed to decommission their plants. Portugal saw a 30 per cent decline in natural gas consumption in 2017-2923, a downward trend that continued in 2024. Over the six-year period, gas usage for conventional purposes, such as domestic and industrial applications, fell by 20 per cent, while consumption for combined cycle plants generation experienced a sharper decline of 41 per cent, highlights the Institute for Energy Economics & Financial Analysis.

Investment environment

Portugal's economy and credit profile have improved significantly over the past decade. Moody's currently assigns the country a sovereign credit rating of A3 (Stable), while S&P rates it A- (Positive) – both classified as upper-medium grade. This marks a significant recovery from the 2012-2013 period, when the credit rating was close to "junk" status, or Non-Investment Grade Speculative. The country ranks among the top 25 per cent globally for innovation and is in 25th spot out of 40 nations on the 'EY Renewable Energy Country Attractiveness Index'. Other indicators further highlight Portugal's investment appeal: top 5 per cent globally for press freedom and within the top 20 per cent for corruption perception and rule of law. Nonetheless, its judicial system remains heavily backlogged.

Despite these achievements, investing in renewable energy projects in Portugal presents notable challenges, some common across markets and others unique to the country. Bureaucratic hurdles, such as delays in project permitting, and restricted access to financing for smaller-scale projects are widespread issues. Portugal-specific challenges include slow progress in green infrastructure approvals and smart grid expansion, limited policy clarity regarding its green hydrogen strategy, and a high energy cost structure. Only 33 per cent of the average household electricity price reflected actual energy costs, with the remaining 67 per cent due to taxes and tariffs in 2020, according to the IEA. Similarly, for industrial users, energy costs comprised just 42 per cent of the average price, while tariffs and taxes accounted for the remainder.

Year to 31 December 2023	GWh	Change (%)
Total Generation	**44,129**	**-**
Renewable Generation	31,218	*24*
Hydro	11,772	*85*
Wind	12,935	*-*
Biomass	2,900	*(12)*
Solar	3,611	*43*
Non-Renewable Generation	10,032	*(40)*
Natural Gas	9,850	*(40)*
Others	182	*(6)*
Pumped Storage Generation	**2,879**	***27***
Import balance	**10,233**	***11***
Total Demand	**50,737**	***1***

Portugal 2023 electric power generation and net demand
Source: Author using data from Redes Energéticas Nacionais, Sgps, S.A. (ed), '2023 REN Technical Data' (REN 2024) https://datahub.ren.pt/en/publications/

Policies

Portugal received significant recognition for its progressive climate and energy transition policies. These efforts are detailed in the National Energy and Climate Plan 2021–2030 (NECP 2030) and the Roadmap for Carbon Neutrality 2050 (RNC2050), both lauded as ambitious strategies.

The NECP 2030 was updated in October 2024 with revised targets to include a 51 per cent share of renewables in final energy consumption, an increase from the earlier goal of 47 per cent. It also raised its greenhouse gas emissions reduction target to 55 per cent compared to 2005 levels. Clean energy targets include 2 GW of offshore wind capacity by 2030 (10 GW by 2050). Green hydrogen production targets were also updated, aiming for 3 GW of installed electrolysis capacity, down from the previous goal of 5 GW, while setting a target of 2 GW for energy storage capacity.

To enhance the efficiency and speed of environmental and climate-related investments, the Ministry of Environment and Energy announced the creation of a new Climate Agency which will take over management of the Environmental Fund, currently overseen by the general secretariat of the Ministry. The agency will also handle other environment and climate funds. The minister emphasised that the Climate Agency will be significantly more effective and efficient, with five times the current workforce of the Environmental Fund, according to the Observador.

Investors

Portugal has cultivated a vibrant clean energy investment landscape, characterised by the involvement of robust domestic companies alongside a diverse range of international developers. An example is wind power investments announced in the past 12 months. Ireland's Gazelle Wind Power plans to establishing a local supply chain for offshore wind energy and aims to develop modular floating platforms capable of supporting wind turbines with a capacity of 15-22 MW, paving the way for large-scale offshore wind production. Another Irish firm, Simply Blue Group, partly owned by the UK-based Octopus Energy Generation, is advancing plans to construct a 990 MW floating offshore wind farm, further boosting Portugal's offshore wind potential.

Japan's Tokyo Gas has also demonstrated its interest, acquiring a 21.2 per cent stake in an existing 25.2 MW floating offshore wind farm. Germany's RWE has expressed its intention to explore offshore wind investments in the country. Finally, Spain's Iberdrola is seeking authorisation for a 274 MW onshore wind farm, which would integrate with its existing 160 MW hydropower and 880 MW pumped storage facilities.

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Portugal's renewables investment profile

RENEWABLES INVESTMENT PROFILE	RANK/RATING	YEAR	SOURCE
Business & Finance			
Moody's sovereign credit rating	A3 (Stable)	2023	*countryeconomy.com/ratings*
S&P sovereign credit rating	A- (Positive)	2024	*countryeconomy.com/ratings*
Global Innovation Index	31/133	2024	*wipo.int/global_innovation_index/*
EY Renewable Energy Country Attractiveness Index	25/40	2024	*ey.com*
Other			
Global Corruption Perceptions Index	34/180	2023	*transparency.org/*
Reporters Without Borders Press Freedom Index	7/180	2024	*rsf.org/en/index*
World Justice Project Rule of Law Index	28/142	2024	*worldjusticeproject.org/rule-of-law-index/*