OCEAN POWER

KEY FACTS FOR 2024

- Ocean power continued to attract investment and support in 2024, reflecting its untapped potential as a predictable renewable energy source.
- The sector has seen a clear shift from pilots and demonstration deployments to full-scale devices and a pipeline of commercial projects.
- With increasing government support, targeted funding, and reforms to regulations and permitting processes, the sector is moving toward scale-up.

513 MW
total installed capacity

1.6 MW
of ocean power capacity added

5 developers
deployed devices in Europe

Ocean power represents the smallest share of the renewable energy market, though there is a vast global resource potential.[1] Continued technology development, policy support, and investment are gradually moving ocean power towards commercial scale.[2] A total of 1.6 MW of ocean power capacity was added in 2024,[3] with an estimated total operating capacity of approximately 513 MW.[4]

Most ocean power capacity is from two tidal range systems – the 240 MW La Rance facility in France and the 254 MW Sihwa plant in the Republic of Korea.[5] Tidal range installations require large-scale engineering works and suitable sites are limited, so few new projects have been proposed and development efforts have focussed on in-stream tidal turbines and wave energy converters.[6]

While Europe has long been the hub of activity, strong revenue support measures and ambitious research and development programmes in other regions have spurred growing momentum, particularly in Canada, the United States, and China.[7]

Policies and programmes show a clear shift from pilot and demonstration phases toward larger-scale commercialisation.[8] This transition is being driven by targeted policies, substantial financial commitments, streamlined regulations, and new infrastructure development, with notable progress in the European Union and North America.

165 MW

pipeline of publicly funded projects in Europe over the next five years

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EUROPE

The build-out of tidal and wave energy in Europe continued in 2024, with five developers deploying new devices, most of them full-scale.[9] Three tidal and two wave devices were installed across five different countries, underscoring both regional and technological diversity.

Tidal stream technologies continue to demonstrate their reliability and maintainability, with electricity production totalling 13.4 GWh in 2024, bringing total cumulative production to 106 GWh.[10]

A pipeline of 165 MW of publicly funded ocean power projects is planned for deployment over the next five years.[11] Tidal stream projects dominate, with 152 MW planned across 11 pre-commercial farms. Of the current pipeline, 50 MW are backed by European grants, sometimes combined with national revenue support. Since 2023, ocean power has attracted EUR 60 million in private investment in Europe.[12]

In **Spain**, Danish company Wavepiston installed its first full-scale wave energy collector at the PLOCAN test site in the Canary Islands (Plataforma Oceánica de Canarias), commencing full-scale testing for both desalination and electricity production.[13] The long-running Mutriku Wave Power Plant generated 210 MWh in 2024 and continues to operate as both a power plant and a test site.[14] The TurboWave Project, launched in December 2022, is working to replace the plant's aging air turbine system.[15]

Construction also began on the SEAWORTHY hybrid platform at PLOCAN, integrating wind, wave, hydrogen, and storage technologies, supported by USD 28.3 million (EUR 26 million) from the EU Innovation Fund.[16] Spain also leads the USD 3.3 million (EUR 3 million) MARES power take-off (PTO) project to develop superconducting generators for wave devices.[17]

In 2024, Spain adopted a new permitting and bidding framework for offshore renewables, providing for competitive tenders in high-potential zones and exemptions for innovative projects under 20 MW or located in ports.[18] Measures were also implemented to support the upgrade port infrastructure for ocean power deployment.[19]

In **Portugal**, CorPower Ocean installed its first commercial-scale wave energy converter, the C4, at the Aguçadoura test site, demonstrating strong survivability during severe storms and successfully trialling processes for operations, maintenance and retrieval.[20] CorPower is also advancing the C5 wave energy array, aiming to deploy the first grid-connected, production-scale project at Aguçadoura beginning in 2026.[21]

CorPower secured a USD 34.9 million (EUR 32 million) investment, while Eco Wave Power raised USD 3 million to build a 20 MW commercial wave power plant.[22] Portugal is also leading on two projects: the ONDEP project received USD 20.7 million (EUR 19 million) from Horizon Europe to deploy a 2 MW WaveRoller array;[23] and the MEGA WAVE PTO project received USD 4.4 million (EUR 4 million) to develop a modular PTO system.[24]

In the **Faroe Islands**, Minesto, a Swedish company, commissioned its 1.2 MW Dragon 12 tidal power project, delivering its first electricity to the grid.[25] The company is now preparing to develop a 10 MW utility-scale array in the islands.[26]

In **France**, two large tidal farms in Raz Blanchard — FloWatt (17 MW, HydroQuest/Qair) and NH1 (12 MW, Normandie Hydroliennes) — secured a combined USD 55.6 million (EUR 51 million) from the EU Innovation Fund and USD 81.8 million (EUR 75 million) from France 2030, along with preferential feed-in tariffs.[27] France's National Strategy for the Sea and the Coast (2024–2030) highlights tidal energy, with key actions including mapping ocean power zones, promoting multi-technology co-location, supporting research and development, strengthening local supply chains, and ensuring environmental integration.[28]

In **Denmark**, Wavepiston launched a USD 4.1 million (EUR 3.8 million) project to develop hydraulic PTO systems, alongside its ongoing deployment at PLOCAN.[29] In **Ireland**, the Saoirse Wave Energy Project, a 5 MW CorPower wave power array, received USD 43 million (EUR 39.4 million) from the EU Innovation Fund.[30]

USD 19.1 million

dedicated budget for tidal power in the UK's most recent CfD round

UNITED KINGDOM

The MeyGen Project in Scotland remains the world's largest tidal stream project, with consented capacity of 86 MW and potential expansion to 398 MW.[31] Phase 1 has been operational since 2018 with four 1.5 MW turbines generating over 70 GWh of electricity to date (10 GWh in 2024).[32]

Nova Innovation continues to operate the Shetland Tidal Array, now with more than eight years of generation and over 80,000 cumulative turbine operating hours.[33] In 2024, Nova secured 6 MW of Contracts for Difference (CfD) in the UK Government's latest auction round to support deployment at the EMEC Fall of Warness site and advanced its next-generation turbine design under the UpTEMPO (Upgrading Tidal Energy Marine Power Operations) project.[34] Nova also launched AquaGen365, a floating solar joint venture with RSK, aiming to pair tidal power with complementary solar technology.[35]

The UK Government awarded six new tidal projects under in the sixth CfD allocation round, the third consecutive round with a dedicated budget for tidal stream projects.[36] This USD 19.1 million (GBP 15 million) investment adds 28 MW of tidal projects to the 93 MW contracted in the previous two rounds, bringing the UK's tidal deployment pipeline to 121 MW by 2029.[37] This marks a key milestone toward industrialisation of the sector and shows the effectiveness of national revenue support in unlocking precommercial ocean power projects. The European Marine Energy Centre (EMEC) also received USD 3.8 million (GBP 3 million) to expand its tidal test facilities.[38]

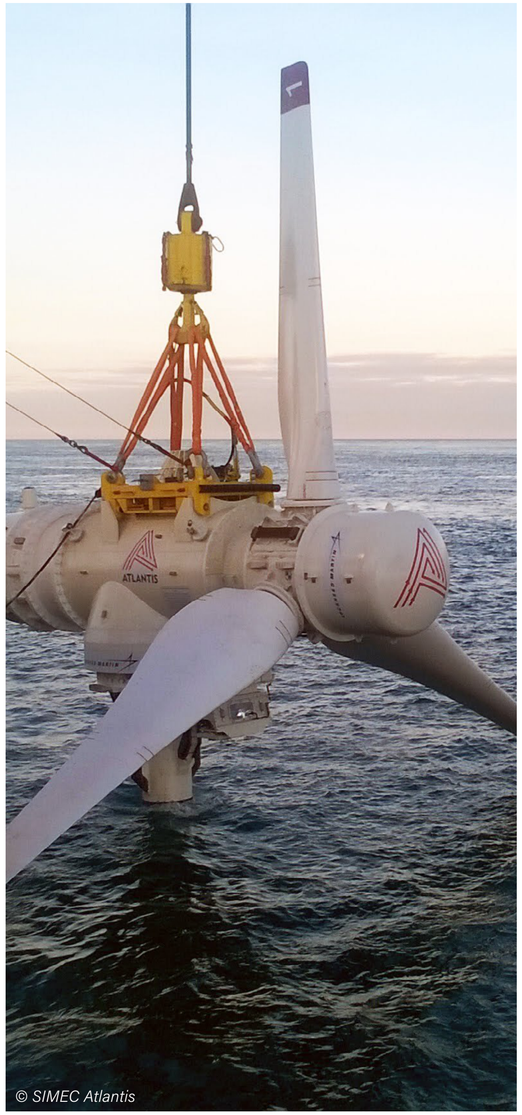
NORTH AMERICA

In 2024, Eco Wave Power signed a co-investment agreement with Shell's Marine Renewable Program to develop its first U.S. wave energy project at the Port of Los Angeles, deploying wave energy converters on an existing concrete wharf.[39] The company secured a permit from the U.S. Army Corps of Engineers and plans to complete installation in 2025.[40]

Ocean Renewable Power Company (ORPC) advanced its RivGen river and tidal power technology, completing testing in Maine and Alaska, a two-year demonstration in Manitoba, and site studies in Quebec.[41] The company collaborated with Indigenous and remote communities across Canada on feasibility assessments and advanced design work for the Kamdis Tidal Power Project in British Columbia.[42]

The United States committed USD 141 million in public support to ocean power in 2024, the highest to date for the sector, bringing total public funding over the past five years to USD 591 million.[43]

In policy developments, Nova Scotia expanded tidal energy licensing to include both offshore wind and tidal power as part of its clean power and net-zero goals.[44] At the federal level, laws regulating offshore fossil fuels were updated to support renewables in Nova Scotia and Newfoundland & Labrador.[45] Federal support also included Innovation Cluster funding for research, development and training, along with Clean Economy Investment Tax Credits (15% for clean electricity, 30% for clean manufacturing, and 30% for clean technology).[46]



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ASIA-PACIFIC

In **China**, the LHD Zhoushan Tidal Current Power Station has been operating stably for over seven years.[47] The Endeavour turbine, China's first MW-scale tidal power device, was connected to the grid in March 2022 and has run continuously for more than 30 months, generating over 4.5 GWh of electricity by the end of 2024.[48] A landmark energy law was published in 2024 and two new test sites were opened.[49] Public support is provided through a combination of substantial grants and revenue support.[50]

In **Taiwan**, Eco Wave Power will supply a fully financed 100 kW pilot unit to I-Ke — the first step toward a 20 MW wave power facility.[51]

In **South Korea**, USD 6.9 million was invested in 2024 in the Yongsoo OWC project, which has installed a wave-powered hydrogen plant, now in commissioning. Plans are underway for a larger multi-module facility integrated into a breakwater in 2025.


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OPPORTUNITIES & CHALLENGES

Ocean power is still in the early stages of commercialisation, with high capital costs driven by limited experience with commercial-scale deployment and operational costs from maintaining equipment in harsh marine environments.[52] Data gaps remain on device lifetimes, site-specific constraints and technological hurdles such as grid integration.[53] Regulatory and permitting processes have been developed and revised in many regions, but often remain complex and fragmented.[54]

Ocean power continued to attract investment and support in 2024, reflecting its untapped potential as a predictable renewable energy source, as well as its role in building supply chains, creating jobs, and opening export opportunities. With increasing government support, targeted funding, and a growing project pipeline, the sector is moving toward scale-up.

USD 141 million

public funding from the U.S. in 2024

4.5 GWh

total electricity generated by China's first large-scale tidal turbine


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The endnotes for this fact sheet are available to download on

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For the 2025 edition of the Renewables Global Status Report, REN21 updated the methodology and classification system of its Policy Database to improve clarity and better capture current policy developments. Consequently, some figures in this edition may not be directly comparable with data from previous reports.

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