

# **Underwater Turbine Market - Global Industry Size, Share, Trends, Opportunity, and Forecast, Segmented By Type (Horizontal Axis Turbine, Vertical Axis Turbine), By Capacity (Less than 100 Kilowatt, 100–500 Kilowatt, Above 500 Kilowatt), By End-User (Commercial, Industrial, Utility), By Region & Competition, 2020-2030F**

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## **Abstracts**

Global Underwater Turbine Market was valued at USD 598.76 million in 2024 and is expected to reach USD 807.77 million by 2030 with a CAGR of 4.96% during the forecast period.

The Underwater Turbine Market comprises technologies and systems designed to generate renewable energy by harnessing the kinetic power of underwater currents, including tidal streams, ocean flows, and river movements. These turbines operate beneath the water's surface, converting the continuous motion of water into electricity through rotor-driven generators. Unlike solar or wind energy, which are variable and weather-dependent, underwater turbines benefit from the predictability and consistency of aquatic currents, making them a reliable option for continuous power generation.

This market is witnessing growing interest due to the urgent global shift toward cleaner energy sources and carbon emission reduction targets. Coastal and island nations are especially focusing on this technology to enhance their energy independence and reduce reliance on imported fossil fuels. Countries such as the United Kingdom, Canada, and France are leading investments in tidal and marine energy initiatives, supported by favorable regulatory frameworks and funding programs. Technological innovations in turbine blade design, corrosion-resistant materials, and underwater

anchoring systems have significantly enhanced the efficiency and lifespan of these installations while reducing maintenance costs.

Additionally, integration with smart grid and hybrid renewable systems is making underwater turbines increasingly viable for both grid-scale and off-grid applications. The market is also rising due to collaborative research between marine engineering firms, environmental organizations, and energy providers that address ecological concerns and promote sustainable deployment practices. Environmental impact assessments and marine life protection protocols are being embedded into project planning to ensure long-term ecosystem compatibility. The potential to repurpose existing marine infrastructure, such as decommissioned oil rigs or underwater tunnels, is opening new deployment opportunities.

Furthermore, growing awareness of ocean energy's vast untapped potential is encouraging increased investments in demonstration projects and commercial deployments. As technological maturity improves, economies of scale and declining costs are expected to further accelerate market penetration. In the coming years, the underwater turbine market is poised for robust growth, driven by increasing energy demand, environmental sustainability goals, and continuous innovation in marine renewable technologies, ultimately positioning it as a key contributor to the global clean energy transition.

## **Key Market Drivers**

### Growing Global Demand for Renewable Energy

The escalating global demand for renewable energy sources is a pivotal driver for the Underwater Turbine Market, as nations strive to meet ambitious climate goals and reduce reliance on fossil fuels. Underwater turbines, which harness kinetic energy from ocean currents, tides, and waves, offer a reliable and sustainable energy solution, particularly for coastal and island nations with abundant marine resources. The urgency to combat climate change, evidenced by international commitments like the Paris Agreement, has accelerated investments in clean energy infrastructure.

Governments are promoting renewable energy through subsidies, tax incentives, and streamlined regulatory processes, making underwater turbines an attractive option for diversifying energy portfolios. These turbines provide consistent power output due to the predictable nature of tidal and ocean currents, unlike variable sources such as wind or solar. Their submerged design minimizes visual and environmental impacts, aligning

with sustainability objectives and reducing land-use conflicts.

The ability to integrate underwater turbines with existing grid systems enhances energy security, particularly in regions with limited access to traditional hydropower or other renewables. As global electricity consumption rises, driven by urbanization and industrial growth, underwater turbines are increasingly recognized for their potential to deliver low-carbon, high-efficiency power, supporting the transition to a sustainable energy future.

In 2023, global renewable energy capacity reached 3,870 gigawatts, with hydropower (including marine-based technologies) contributing 1,412 gigawatts, or 36% of the total, according to the International Renewable Energy Agency. Underwater turbines, a subset of hydropower, accounted for approximately 1% of this capacity, generating 14.1 gigawatts globally. In Europe, tidal energy projects alone produced 50 gigawatt-hours in 2022, powering around 12,500 households annually, highlighting the growing role of underwater turbines in renewable energy.

## **Key Market Challenges**

### High Capital Expenditure and Installation Complexity

One of the foremost challenges impeding the large-scale deployment of underwater turbines is the substantial capital investment required for project development and installation. Underwater turbines, unlike traditional land-based wind or solar technologies, demand advanced marine-grade materials capable of withstanding corrosion, pressure variations, and biofouling. The high costs are further amplified by complex engineering, custom-built infrastructure, subsea cabling, underwater foundations, and the use of specialized vessels for turbine deployment and retrieval. In addition, access to suitable underwater locations is often limited by geological factors, seabed composition, and proximity to the electrical grid, which collectively elevate the overall cost of site assessment and preparation.

Moreover, subsea operations necessitate significant investment in remote-operated vehicles, autonomous underwater monitoring systems, and sonar mapping technologies, all of which contribute to escalated project budgets. From a business standpoint, this high upfront expenditure poses a significant barrier to entry, especially for small and medium-sized energy developers. The return on investment for such projects may take a prolonged period to materialize, making it financially unattractive compared to faster-yielding renewable alternatives such as solar photovoltaic or

onshore wind energy.

Furthermore, the lack of standardized components and universal design frameworks for underwater turbines contributes to non-uniformity and cost inefficiencies across projects. Even though long-term operational costs may be relatively lower due to the reliability of tidal and ocean current energy sources, the initial financial burden deters both public and private sector stakeholders from aggressively pursuing development in this space. As a result, the high capital expenditure and installation challenges remain key bottlenecks that hinder the scalability and commercialization of the underwater turbine market on a global level.

## **Key Market Trends**

### **Increasing Integration of Underwater Turbines with Hybrid Renewable Energy Systems**

A significant trend in the underwater turbine market is the growing integration of these systems with hybrid renewable energy platforms that include offshore wind, solar photovoltaic, and battery storage. The consistent and predictable nature of tidal and ocean currents allows underwater turbines to complement intermittent energy sources such as wind and solar. As energy stakeholders increasingly focus on balancing grid reliability with sustainability goals, hybrid configurations are becoming more attractive.

Underwater turbines can provide base-load power due to their high predictability, which supports grid stability even when wind and solar output fluctuate. Furthermore, the shared use of subsea infrastructure such as cabling and transmission hubs for hybrid systems reduces the capital expenditure associated with individual projects. As nations worldwide strive to decarbonize their energy systems, the integration of underwater turbines into multi-source energy clusters is emerging as a preferred model.

This integration is also aligned with the strategic objectives of island nations and remote coastal regions where land availability is limited, and a diversified portfolio of renewable energy sources is essential to meet local demand. The trend is further bolstered by advances in digital technologies such as smart energy management systems and artificial intelligence-based monitoring tools that ensure efficient coordination between different renewable sources. As this hybrid deployment model proves effective in pilot projects, it is anticipated that the underwater turbine market will see heightened investment interest and increased commercial installations, particularly in regions with strong tidal resources and pre-existing offshore infrastructure.

## Key Market Players

Verdant Power, Inc.

Ocean Renewable Power Company (ORPC)

SIMEC Atlantis Energy Ltd

Voith Hydro GmbH & Co. KG

Andritz Hydro GmbH

Tocardo International BV

Nova Innovation Ltd.

Sabella SAS

Minesto AB

HydroQuest

## Report Scope:

In this report, the Global Underwater Turbine Market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

Underwater Turbine Market, By Type:

Horizontal Axis Turbine

Vertical Axis Turbine

Underwater Turbine Market, By Capacity:

Less than 100 Kilowatt

100–500 Kilowatt

Above 500 Kilowatt

Underwater Turbine Market, By End-User:

Commercial

Industrial

Utility

Underwater Turbine Market, By Region:

North America

United States

Canada

Mexico

Europe

Germany

France

United Kingdom

Italy

Spain

South America

Brazil

Argentina

Colombia

Asia-Pacific

China

India

Japan

South Korea

Australia

Middle East & Africa

Saudi Arabia

UAE

South Africa

## **Competitive Landscape**

Company Profiles: Detailed analysis of the major companies present in the Global Underwater Turbine Market.

## **Available Customizations:**

Global Underwater Turbine Market report with the given market data, TechSci Research offers customizations according to a company's specific needs. The following customization options are available for the report:

## **Company Information**

Detailed analysis and profiling of additional market players (up to five).

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