

United States Hydropower Market Assessment, By Type [Impoundment, Diversion, and Pumped Storage], By Size [Large Hydropower (Above 30 MW), Small Hydropower (100 kW to 10 MW), Micro Hydropower (up to 100 kW)], By Components [Electromechanical Equipment's, Electric Infrastructure, Civil Works], By Sector [Public and Private], By End-user [Residential, Commercial, Industrial], By Region, Opportunities, and Forecast, 2016-2030F

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Abstracts

The United States has been witnessing significant developments in its Hydropower Market. In 2022, the United States hydropower market will witness a net addition of 66 MW. This will increase to a net addition of 70.3 MW in 2030, growing at a CAGR of 0.8%.

The United States focuses on modernizing its hydropower infrastructure to improve efficiency, increase capacity, and reduce environmental impacts. The Department of Energy states hydropower currently contributes 28.7% of renewable and 6.2% of overall electricity generation. Innovations like run-of-river projects and large-scale installations aim to expand hydropower options and mitigate environmental concerns. Run-of-river projects have a simplified permitting and regulatory process, making them more attractive and feasible for developers.

The Chief Joseph Dam in Washington, located on the Columbia River, generates electricity through a rotor and magnetic poles. The dam's rotor interacts with copper windings to produce electricity, initially rated at 13,800 volts but converted to 230,000 or

540,000 volts to minimize power losses. Approximately 80% of the generated electricity is transmitted to the Everett area, serving states like Oregon, Montana, Idaho, California, Wyoming, Utah, and Nevada. Run-on-river projects are boosting the growth rate of the hydropower market in the United States.

Rise in Large Scale Hydro Power Projects

The United States boasts an extensive network of rivers, lakes, and reservoirs, offering abundant water resources that can be effectively tapped for hydropower generation. This abundance of water makes large-scale hydropower projects economically feasible, enabling the development of facilities with substantial power generation capacities. According to the United States Department of Energy, a significant portion of the country's hydropower comes from large-scale projects exceeding 30 megawatts (MW) in capacity. These projects can generate sufficient electricity to meet the power needs of approximately 30,000 households nationwide.

One of the key advantages of large-scale hydropower projects is their ability to serve as baseload power sources, ensuring a stable and dependable supply of electricity to meet constant demand. The consistent and substantial power generation capacity makes large-scale hydropower an attractive option for fulfilling the base load requirements of the national grid. As a result, these projects play a crucial role in enhancing the hydropower market in the United States, contributing significantly to the country's energy mix, and supporting its transition towards sustainable and reliable energy solutions.

Advent of Highly Efficient Technologies

In the United States, there has been a notable advancement in highly efficient hydropower technologies. This expansion of hydropower, driven by efficient technologies, has created promising opportunities for economic growth and job creation. Hydropower facilities' construction, operation, and maintenance have also significantly contributed to local economies. Furthermore, integrating efficient hydropower technologies into the electric grid has improved its stability and flexibility.

Hydropower's flexibility in responding to electricity demand fluctuations, its grid-balancing services, and the ability to generate electricity from incoming and outgoing tides improve overall energy system reliability. For instance, Tidal Barrage Technology harnesses tidal power through a barrage across an inlet, creating a tidal basin regulated by sluice gates. During high tides, the basin fills, and an electricity turbine system

empties it during low tides. This system efficiently generates electricity from both tidal movements, highlighting the impact of advanced technologies on market growth.

Government Regulations

In the United States, the hydropower sector is governed by a comprehensive regulatory framework at the federal, state, and local levels to promote responsible development, operation, and environmental sustainability. The Federal Power Act (FPA) serves as a pivotal piece of legislation, empowering the Federal Energy Regulatory Commission (FERC) to grant permits or licenses for dam construction, power generation from water bodies, and establishing transmission lines.

FERC's meticulous review process encompasses various aspects, including technical feasibility, economic viability, and environmental impact assessment. This process ensures that hydropower projects comply with all relevant laws, regulations, and environmental standards, while also considering potential effects on the environment and local communities. By providing a well-structured regulatory framework, the FPA facilitates the smooth development and operation of hydropower projects, ensuring their adherence to safety and environmental protocols. As a result, introducing the FPA has played a vital role in driving market growth and enhancing the reliability and sustainability of the hydropower sector in the United States.

Impact of COVID-19

The hydropower market experienced significant challenges during the COVID-19 pandemic, leading to delays and disruptions in project timelines. Restrictions, supply chain disruptions, and labor shortages hampered construction activities. Additionally, the decline in electricity demand due to business closures and stay-at-home measures affected the revenue and profitability of existing hydropower facilities.

Government priorities and resources shifted in response to the pandemic, potentially delaying hydropower policy decisions and regulatory processes. The economic downturn and uncertainties in energy markets, including fluctuating electricity prices and uncertainties in power purchase agreements, also impacted the investment attractiveness of hydropower projects. Overall, the hydropower market faced adverse impacts because of the COVID-19 pandemic, highlighting the challenges posed to the sector during times of global crisis.

Key Players Landscape and Outlook

The hydropower sector in the United States is witnessing notable expansion, prompting international companies to emphasize quality and brand positioning to retain their market presence and expand their global footprint. These companies are allocating increased resources toward research and development, marketing efforts, and expanding their distribution networks. Manufacturers actively study consumer behavior to gain deeper insights into their preferences and consistently introduce new products to meet evolving demands.

In May 2023, Idaho National Laboratory and Pacific Northwest National Laboratory collaborated with Idaho Power to assess hydrogen production feasibility at hydropower plants. The goal is to enhance grid stability, improve water quality, and support decarbonized energy production in Idaho. The insights gained will help determine the potential for integrating hydropower and hydrogen in facilities across the United States.

In November 2022, Voith Hydro secured a USD 50 million contract from the USACE to upgrade hydro turbines and generators at Norfork Dam in Baxter County, Arkansas. The project is set to commence soon and is estimated to continue until 2028. The modernization will generate up to 46.5 MW of hydropower. Voith Hydro's dissolved oxygen enhancement technology will improve water quality downstream of the dam, benefiting aquatic habitats. This technology has been proven to improve environmental conditions in dam vicinity for over 25 years.

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*Companies mentioned above DO NOT hold any order as per market share and can be changed as per information available during research work

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