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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 Global Hydropower Market has experienced significant growth in recent years and is expected to continue expanding at an impressive pace in the coming years. In 2022, the global hydropower market will witness a net addition of 22.77 GW. This will increase to a net addition of 27.18 GW in 2030, growing at a CAGR of 3.24%.

The hydropower market is experiencing growth due to global efforts to reduce greenhouse gas emissions and transition to cleaner energy sources. This renewable energy source is gaining prominence as a solution to meet energy demands and mitigate climate change. Governments and energy companies are investing in new plants and modernizing existing facilities while introducing hydropower projects in different regions further boosting market growth.

China's Three Gorges Dam, the world's largest hydroelectric facility, offers numerous benefits to the Yangtze River region, including energy production, flood control, and improved navigation. With 26 fully operational turbines, the dam has a power capacity exceeding 22,000 megawatts electric (Mwe). Its primary objective is to reduce China's

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reliance on coal for energy generation, replacing around 50 million tons of coal burned. The dam also serves as a vital flood control measure and facilitates water resource diversion to water-scarce regions in northern China. The growth of the hydropower market is accelerating due to the increasing number of hydropower projects worldwide.

Small Hydro Power for Rural Off-Grid Village Electrification

This approach offers a sustainable and reliable solution to address the energy needs of remote communities that lack access to the traditional power grid. Implementing micro-hydro power systems in rural off-grid villages also has socio-economic benefits. It enables access to electricity, improves living standards and enabling economic activities such as productive enterprises, education, healthcare, and communication. It contributes to poverty alleviation, empowers communities, and enhances the overall quality of life.

The World Small Hydropower Development Report shows a 10% growth in the global installed capacity of small hydropower (SHP) plants, with up to 10 MW capacity. SHP accounts for 1.5% of global electricity installed capacity and 4.5% of total renewable energy capacity. It accounts for 7.5% of the total hydropower capacity for plants with less than 10 MW. SHP usage for rural off-grid village electrification is promoting global hydropower market growth.

Development of Run-of-River and Tidal Projects

The global hydropower sector has witnessed significant development in run-of-river and tidal projects, showcasing the industry's commitment to harnessing clean and renewable energy sources. Run-of-river hydropower projects, which utilize the natural flow of rivers without large-scale reservoirs, have gained prominence due to their environmental benefits and lower impact on ecosystems.

The Kruonis Hydro Pumped Storage Power Plant in Lithuania, located in the Kaisiadorys district, aims to ensure stable electricity provision by serving as a storage facility within the grid. The project consists of four units with 225 MW capacities, totaling 900 MW. With an efficiency factor of 0.74, each unit can operate from 0-225 MW. The plant operates in pump mode during low electricity demand, raising water from the lower Kaunas Lagoon to the upper reservoir, which spans 303 hectares and is 100 meters above the lagoon's water level. During peak electricity demand, the plant functions like a conventional hydroelectric plant, allowing water to flow from the upper reservoir to the

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lower one to generate additional electricity.

Asia-Pacific Region Dominates Global Demand for Renewable Hydropower

The Asia-Pacific region maintained the largest market share in 2022, primarily driven by the cost-effectiveness of renewable energy production and substantial reductions in infrastructure costs. The growing electricity demand has been successfully met through the implementation of hydropower projects, establishing the region as a leading player in the market. Furthermore, establishing micro and mini hydropower stations throughout the region has emerged as a significant opportunity for its continued growth. Key market players have invested substantially in electricity generation and rural electrification, generating considerable revenue growth.

China's installed hydropower capacity reached 395.6 GW by 2021, accounting for nearly one-third of the global total. In 2022, China added 2 GW of new capacity. The National Energy Administration (NEA) released a mid-term and long-term plan in September 2021, aiming to achieve a minimum installed capacity of 62 GW by 2025 and 120 GW by 2030, representing 75% of the current global installed capacity. The Asia-Pacific region, particularly China, is driving the global hydropower market growth.

Government Policies Promote Renewable Hydropower Expansion

Governments worldwide have recognized the importance of renewable energy, including hydropower, in addressing energy security, reducing GHGs (greenhouse gas emissions), and promoting sustainable development. As a result, they have implemented various measures and policies to support the growth and development of renewable hydropower sources actively.

Feed-in-Tariff (FiT) schemes are government policies designed to encourage investments in renewable power generation. They provide financial incentives to small hydropower plants for their electricity generation activities. There are two main categories: Market-dependent or Feed-in Premium (FiP) model and Market-independent or Fixed Price model. The critical difference between these models is their reliance on the actual electricity market price. Market-dependent models offer an additional premium on top of the market price, while Market-independent models guarantee a minimum payment for each unit of electricity supplied to the grid. FiTs are long-term financial incentives for generation companies (GenCos) that contribute renewable electricity to the grid. Unlike the current unit-based pricing system, the pricing under FiT contracts is based on predetermined conditions agreed upon with the utility company.

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Impact of COVID-19

The Covid-19 pandemic has significantly impacted the global hydropower market, causing construction delays, increased costs, and financial challenges. Supply chain disruptions, electricity demand fluctuations, travel restrictions, and social distancing measures have impacted operations and maintenance. Despite these challenges, the hydropower sector has shown resilience, focusing on energy security, and transitioning to clean energy. Supportive policies, renewable investments, and technological advancements are being pursued to overcome the pandemic's impact.

The recovery of the global hydropower market will depend on effectively controlling the pandemic, economic rebound, and sustained commitment to renewable energy. Moreover, hydropower's reliability, low carbon footprint, and water storage capabilities position it as a crucial component of the world's energy mix in a post-pandemic era prioritizing green recovery.

Impact of Russia-Ukraine War

The Russia-Ukraine war significantly impacted the global hydropower market, causing energy supply disruptions, geopolitical risks, financing challenges, market volatility, and regional cooperation shifts. This conflict has increased uncertainty for hydropower producers and raised concerns about energy security, potentially leading to delays or cancellations of hydropower projects.

Furthermore, financing difficulties and market volatility in conflict-affected areas have impacted hydropower projects' profitability. Countries are re-evaluating energy policies to reduce dependence on conflict-affected regions and focus on domestic renewable energy sources like hydropower. The war emphasizes regional energy cooperation and diversification, with specific impacts varying on proximity, interconnections, and individual policies. The duration and escalation of the conflict will determine the full extent of the hydropower market's impact.

Key Players Landscape and Outlook

The global hydropower market's rapid expansion has attracted multinational corporations that recognize the importance of maintaining market share and establishing a solid presence. They allocate resources to research, development, marketing, and distribution networks to achieve this. By studying consumer behavior,

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manufacturers gain insights into consumer preferences and requirements, enabling them to continuously innovate and introduce new products like wind turbines and solar panels that align with evolving consumer demands.

In September 2022, GE Renewable Energy signed a five-year agreement with Norte Energia to provide maintenance services for the Belo Monte hydropower plant and its Pimental powerhouse. The contract covers routine, planned, and corrective activities. With a capacity of over 11 GW, the Belo Monte project can generate enough electricity for 60 million people. This initiative demonstrates GE Renewable Energy's commitment to sustainable clean energy production and reliable hydropower facility operation.

In December 2020, Bharat Heavy Electricals Limited secured USD 390 million contracts for Electro-Mechanical (E&M) works in two projects. The first involves a Hydro Electric Project in Andhra Pradesh and the second involves Pump-Motor sets in Lift Irrigation Schemes in Telangana. The Andhra Pradesh project involves manufacturing and supplying India's highest unit-rating Kaplan hydro turbines for the Polavaram HEP.

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Contents

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8. GLOBAL HYDROPOWER MARKET OUTLOOK, BY REGION, 2016-2030F

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9. MARKET MAPPING, 2022

10. MACRO ENVIRONMENT AND INDUSTRY STRUCTURE

+357 96 030922
info@marketpublishers.com

11. MARKET DYNAMICS

11.1. Growth Drivers
11.2. Growth Inhibitors (Challenges, Restraints)

12. KEY PLAYERS LANDSCAPE

12.1. Competition Matrix of Top Five Market Leaders
12.2. Market Revenue Analysis of Top Five Market Leaders (in %, 2022)
12.3. Mergers and Acquisitions/Joint Ventures (If Applicable)
12.4. SWOT Analysis (For Five Market Players)
12.5. Patent Analysis (If Applicable)

13. PRICING ANALYSIS

14. CASE STUDIES

15. KEY PLAYERS OUTLOOK

15.1. General Electric (GE) Renewable Energy
  15.1.1. Company Details
  15.1.2. Key Management Personnel
  15.1.3. Products & Services
  15.1.4. Financials (As reported)
  15.1.5. Key Market Focus & Geographical Presence
  15.1.6. Recent Developments
15.2. Voith Hydro
15.3. Andritz Hydro
15.4. Toshiba Energy Systems & Solutions Corporation
15.5. Bharat Heavy Electricals Limited (BHEL)
15.6. ABB Limited
15.7. National Hydro Electric Power Corporation (NHPC) Limited
15.8. RusHydro
15.9. Norconsult AS
15.10. Gilkes Energy Ltd
*Companies mentioned above DO NOT hold any order as per market share and can be changed as per information available during research work

16. STRATEGIC RECOMMENDATIONS

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17. ABOUT US & DISCLAIMER

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