

# **Flow Battery Market by Battery Type (Redox, Hybrid), Material (Vanadium, Zinc Bromine, Organic, Iron), Storage (Large-scale, Small-scale), Application (Utilities, Commercial & Industrial, EV Charging Stations) and Region - Global Forecast to 2028**

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## **Abstracts**

The global flow battery market size is expected to grow from USD 289 million in 2023 to USD 805 million by 2028, at a CAGR of 22.8 % from 2023 to 2028. The flow battery market's growth can be attributed to the increasing investments in renewable energy and the benefits provided by the flow batteries over conventional ones, which are fueling their adoption in various applications.

' Hybrid flow battery segment is projected to grow at significant CAGR during the forecast period'

Hybrid flow batteries have an additional advantage over standard flow battery designs. The zinc bromine hybrid battery offers higher energy density than other flow batteries. Also, many manufacturers are adopting hybrid designs for their flow batteries due to the high extraction cost of vanadium material. In recent years, several research programs have been conducted in several countries to explore the potential of hybrid flow batteries and also to build more compact and cheaper systems. Also, in the past few years, some players in the market have commercialized their hybrid batteries for various applications such as utilities, commercial, residential, and others.

'Utilities application is expected to hold the largest share during the forecast period'

With the growing need for higher energy capacity, the need for grid modernization has become essential worldwide. Improved security, reduced peak loads, increased

integration of renewables, and lower operational costs are advantages of a modern grid system. Over the years, reliable energy and clean systems have become necessary worldwide. The increasing penetration of renewable energy across the power industry has, in turn, increased the need for efficient, flexible, and long-operating energy storage solutions. With all its attractive features, a flow battery has become the most preferred energy storage technology for utility-based storage, as large-scale utilities require technologies that can cost-effectively store renewable energy for future grid use at any location. Among all the applications, vanadium-based redox flow batteries are the most widely commercialized in the utility sector. The utility sector also holds the highest number of operational flow battery projects globally.

'The market in Asia Pacific is expected to grow at the highest CAGR during the forecast period'

Asia Pacific is expected to grow at the highest rate during the forecast period. Countries such as China, Japan, India, and Australia are striving to boost their large-scale energy storage capacity through adoption of advanced battery technologies that could, in turn, enhance electric stability. The governments of countries like Australia, India, China, and Japan have introduced regulations and reforms and are making initiatives to modernize the power sector. Asia Pacific has a large number of operational flow battery installations with high power ratings. Australia has a large number of flow battery projects for utilities, residential, industrial, and commercial applications. Sumitomo Electric Industries Ltd. (Japan) and Redflow Limited (Australia) are the major industry participants in the Asia Pacific flow battery market.

Breakdown of the profiles of primary participants:

By Company Type: Tier 1 - 25%, Tier 2 - 30%, and Tier 3 - 45%

By Designation: C-level Executives - 35%, Directors - 25%, and Others - 40%

By Region: North America - 35%, Europe - 25%, Asia Pacific - 32%, and RoW – 8%

Major players profiled in this report are as follows: Sumitomo Electric Industries, Ltd. (Japan), VRB Energy (Canada), Invinity Energy Systems (UK), Largo Inc. (Canada), Enerox GmbH (Austria), Redflow Limited (Australia), Stryten Energy (US), ViZn Energy Systems (US), Lockheed Martin Corporation (US), Jenabatteries GmbH (Germany),

SCHMID Group (Germany), Elestor BV (The Netherlands), Primus Power Solutions (US), ESS Inc. (US) and others.

## Research Coverage

The flow battery market has been classified by battery type, material, ownership, storage, application, and region. The market has been segmented into redox flow batteries and hybrid flow batteries, by type. Materials have segmented the market into vanadium, zinc-bromine, and others. By ownership, the market has been segmented into customer owned, third-party owned and utility owned. By storage, the segmentation is based on small-scale and large-scale storage. Furthermore, the market application segments include utilities, commercial & industrial, EV charging stations, and other applications. The study also forecasts the market size in four key regions—North America, Europe, Asia Pacific, and RoW.

## Key Benefits of Buying the Report:

The report provides insights on the following pointers:

Analysis of key drivers (Benefits of flow batteries over conventional technologies, Increasing investments in renewable energy, High demand for flow batteries in utilities, Surge in telecommunications tower installations), restraints (Requirement of high initial investment, Lack of proper standards for development of flow battery systems), opportunities (Growing demand for backup power in data centers, Growing adoption in residential applications, Increasing R&D practices to improve redox battery technology), and challenges (Presence of affordable alternative energy storage technologies) influencing the growth of the flow battery market

**Product Development/Innovation:** Detailed insights on upcoming products, technologies, research & development activities, funding activities, industry partnerships, and new product launches in the flow battery market

**Market Development:** Comprehensive information about lucrative markets – the report analyses the flow battery market across regions such as North America, Europe, Asia Pacific, Middle East & Africa, and South America.

**Market Diversification:** Exhaustive information about new products & technologies, untapped geographies, recent developments, and investments in the flow battery market

**Competitive Assessment:** In-depth assessment of market ranks, growth strategies, and product offerings of leading players like Sumitomo Electric Industries, Ltd. (Japan), VRB Energy (Canada), Invinity Energy Systems (UK), Largo Inc. (Canada), Enerox GmbH (Austria), Redflow Limited (Australia), among others in the flow battery market

**Strategies:** The report also helps stakeholders understand the pulse of the flow battery market and provides information on key market drivers, restraints, challenges, and opportunities.

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\*Details on Business Overview, Products/Services/Solutions Offered, Recent Developments, and MnM View (Key strengths/Right to Win, Strategic Choices Made, and Weaknesses and Competitive Threats) might not be captured in case of unlisted companies.

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\*Details on Business overview, Products/Solutions/Services offered, Recent developments, MnM view, Key strengths, Strategic choices, and Weaknesses and competitive threats might not be captured in case of unlisted companies.

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