

Vanadium Redox Battery - Market Share Analysis, Industry Trends & Statistics, Growth Forecasts (2025 - 2030)

Market Report | 2025-04-28 | 110 pages | Mordor Intelligence

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Report description:

The Vanadium Redox Battery Market is expected to register a CAGR of greater than 9.5% during the forecast period.

COVID-19 moderately impacted the market in 2020. Currently, The market has reached pre-pandemic levels.

Key Highlights

- Factors such as the lower environmental impact of battery disposal and the high energy capacity of having larger electrolyte storage tanks are likely to drive the market in the coming years. With a life span of more than 20 years and no presence of fire hazards and highly reactive or toxic substances, vanadium redox batteries are more environmentally friendly than lithium-ion and lead-acid batteries.
- However, low energy density and high capital costs are likely to hinder the market growth during the forecast period.
- With the rapid growth of renewable energy applications, different organizations have made continuous efforts to have better energy density and efficient energy storage facilities. Numerous research and developments are taking place on the development of the membrane that separates the positive and negative terminals and prevents cross mixing of vanadium ions while providing required ionic conductivity. Development of Cation Exchange Membrane (CEM), Anion Exchange Membrane (AEM), and Amphoteric Ion Exchange Membrane (AIEM) membranes are likely to increase the ionic exchange in between the terminals. Moreover, it is expected to improve the battery's cyclability performance of the battery. Thus, it is expected to render an opportunity for the growth of the market in the near future.
- The Asia-Pacific is expected to dominate the market with majority of the demand coming from China and Japan.

Vanadium Redox Battery Market Trends

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Utility Sector to Witness Significant Growth

- With the growing carbon emissions around the world, the deployment of both solar panels and wind turbines are increasing over the years. Both technologies require energy storage facilities during peak hours. A vanadium redox battery is an ideal solution to store the surplus energy generated by both technologies.
- During 2021, solar and wind energy have an installed capacity of around 849.4 gigawatts (GW) and 824.8 GW, respectively. With government initiatives, these capacities are likely to witness significant growth during the forecast period.
- On account of its technical advantages over lithium and lead-acid batteries, it is likely to find more use in the installation of solar panels and wind turbines.
- Vanadium redox battery is suitable for grid and off-grid connections. Unlike a lithium-ion battery, it can be discharged completely, and the electrolyte can be reused and doesn't need to be disposed of. Moreover, the electrolyte used is aqueous and inherently safe, and non-flammable.
- According to the International Energy Agency (IEA), the solar photovoltaic and wind energy sectors are likely to increase their capacity to more than 970GW and 830GW by 2025, which is expected to expand the vanadium redox battery market during the forecast period.

Asia-Pacific Likely to Dominate the Market

- The Asia-Pacific is expected to dominate the vanadium redox battery market as the region has several operational flow battery installations with large power ratings.
- Countries such as China, India, Japan, and Australia are striving to boost their large-scale energy storage capacity through battery technologies that could, in turn, enhance electric stability.
- As of 2022, China holds the highest capacity of flow batteries installed compared to other countries in the Asia-Pacific region.
- In September 2022, The Energy Storage from the Flow Battery in northeast China's Dalian, the peak-shaving power station, has recently been wired into the grid. The vanadium flow battery will eventually increase its present 100 MW/400 MWh capacity to 200 MW/800 MWh. The Chinese Academy of Sciences estimates that it can provide enough electricity to cover the daily needs of 200,000 inhabitants.
- This project represents a key step in utilizing China's rich vanadium resources for renewable energy development that will transform the energy industry and help alleviate environmental problems.
- Moreover, with existing and upcoming solar and wind projects in the region, many companies are keen on deploying and expanding their business in Asia-Pacific, which is expected to develop the market in the future.

Vanadium Redox Battery Industry Overview

The vanadium redox battery market is consolidated. The key players in the market (not in a particular order) include VRB Energy, VanadiumCorp Resource Inc., Invinity Energy Solutions, Solibra Energy Storage Technologies GmbH, UniEnergy Technologies, H2 Inc, and Big power Electrical Technology Xiangyang Inc. Co. Ltd., among others.

Additional Benefits:

- The market estimate (ME) sheet in Excel format
- 3 months of analyst support

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