

### 2018 Top 5 Vanadium Redox Battery (VRB) (All-Vanadium Redox Flow Batteries) Players in North America, Europe, Asia-Pacific, South America, Middle East and Africa

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#### **Abstracts**

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The vanadium redox battery (VRB) (or Vanadium flow battery) is a type of rechargeable flow battery that employs vanadium ions in different oxidation states to store chemical potential energy. The vanadium redox battery exploits the ability of vanadium to exist in solution in four different oxidation states, and uses this property to make a battery that has just one electro active element instead of two. For several reasons, including their relatively bulky size, most vanadium batteries are currently used for grid energy storage, such as being attached to power plants or electrical grids.

Unlike other RFBs, vanadium redox flow batteries (VRBs) use only one element (vanadium) in both tanks, exploiting vanadium's ability to exist in several states. By using one element in both tanks, VRBs can overcome cross-contamination degradation, a significant issue with other RFB chemistries that use more than one element. The energy density of VRBs depends on the concentration of vanadium: the higher the concentration, the higher the energy density.

The global average price of Vanadium Redox Battery (VRB) is in the decreasing trend, from 4505 USD/KW in 2012 to 1916 USD/KW in 2016. With the situation of global economy, prices will be in decreasing trend in the following five years.

The classification of Vanadium Redox Battery (VRB) includes Carbon Paper Electrode and Graphite Felt Electrode, and the proportion of Graphite Felt Electrode in 2016 is about 55%, and the proportion is in increasing trend from 2012 to 2016.

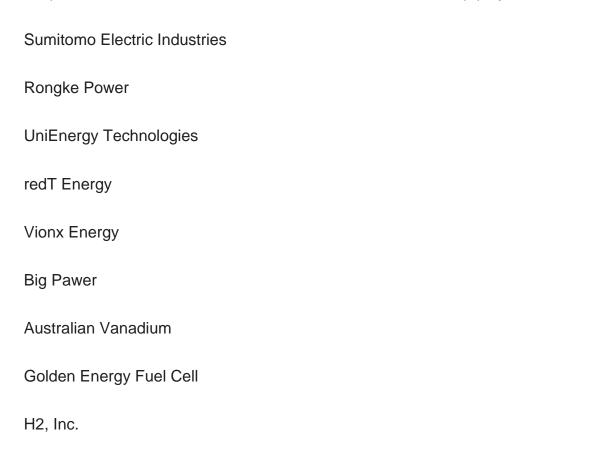
Vanadium Redox Battery (VRB) is widely used for Large-Scale Energy Storage,



Uninterruptible Power Supply and other field. The most proportion of Vanadium Redox Battery (VRB) is Large-Scale Energy Storage, and the proportion in 2016 is 52%.

Over the next five years, LPI(LP Information) projects that Vanadium Redox Battery (VRB) (All-Vanadium Redox Flow Batteries) will register a 43.7% CAGR in terms of revenue, reach US\$ 2800 million by 2023, from US\$ 320 million in 2017.

This report studies the global market, especially in North America, Europe, Asia-Pacific, South America, Middle East and Africa, focuses on the top 5 players in each region, with sales, price, revenue and market share from 2013 to 2018, the top players:



Market Segment by Regions, this report splits Global into several key Regions, with sales, revenue, market share of top players in these regions, from 2013 to 2018 (forecast), like

North America (United States, Canada and Mexico)

Asia-Pacific (China, Japan, Southeast Asia, India and Korea)

Europe (Germany, UK, France, Italy and Russia etc.)



South America (Brazil, Chile, Peru and Argentina)

Middle East and Africa (Egypt, South Africa, Saudi Arabia)

Split by Product Types, with sales, revenue, price, market share of each type, can be divided into

Carbon Paper Electrode

Graphite Felt Electrode

Split by applications, this report focuses on sales, market share and growth rate in each application, can be divided into

Large-Scale Energy Storage

Uninterruptible Power Supply

Others



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