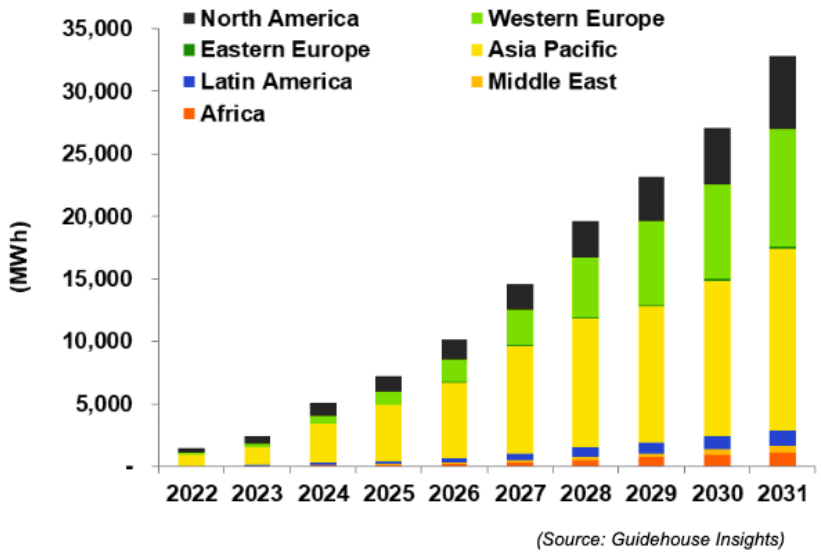
Vanadium set for “disruptive” demand growth as battery energy storage boom gains momentum: Vanitec

(Tuesday, 07 June 2022) The use of vanadium in the battery energy storage sector is expected to experience disruptive growth this decade on the back of unprecedented vanadium redox flow battery (VRFB) deployments.

According to an independent analysis by market intelligence and advisory firm, Guidehouse Insights, global annual deployments of vanadium redox flow batteries (VRFBs) are expected to reach approximately 32.8 GWh per annum by 2031. This represents a compound annual growth rate (CAGR) of 41% over the forecasted period.

Annual Installed VRFB Utility-Scale and Commercial and Industrial Battery Deployment Energy Capacity by Region, All Application Segments, World Markets: 2022-2031



(Source: Guidehouse Insights)

The VRFB deployment forecast by Guidehouse Insights would equate to between 127,500 and 173,800 tons of new vanadium demand per year by 2031, according to Vanitec calculations based off Guidehouse’s projection. That would be more than twice as much vanadium as is currently produced annually today.

In a report on the metals required for clean energy commissioned by Eurometaux - Europe’s metals association – VRFBs were identified as one of the alternative energy storage technologies that may grow in importance and might reach penetration rates of 20% of the market. These findings point towards significant vanadium demand increases equivalent to +110% of current demand, and echo Guidehouse Insights’ demand forecast.

Vanitec, the not-for-profit international global member organisation whose objective it is to promote the use of vanadium-bearing materials, says that while vanadium is mainly used within the steel industry, vanadium is increasingly being recognised for its use in VRFBs. These long duration batteries can store large amounts of electrical energy produced by solar

and wind power generators on a daily basis as a means to drive the deep decarbonization of electric power systems.

Vanadium has therefore been classified as a critical raw material by several countries around the world. The European Commission identified and formally registered vanadium on the 2017 list of Critical Raw Materials for the European Union, while the United States, Canada and Australia have also listed vanadium as critical to supporting their economies.

As power grids across the world continue to replace fossil fuel power plants with large scale renewable energy solutions, long-duration energy storage is critical to ensuring reliable grid operation. VRFBs assist by smoothing out peaks and deficits in power demand, thereby maintaining a consistent and uninterrupted flow of electricity to the grid.

Vanitec CEO John Hilbert says renewable energy has become one of the most talked-about topics in recent times. “Solar and wind power are fantastic sources of low-carbon energy. However, renewable energy is a variable power source that poses a key challenge in the global effort to displace fossil fuels with renewable energy generation. Energy storage solutions like VRFBs are essential in enabling the energy transition to a carbon neutral world, as they provide stationary, utility-scale and long-duration energy storage with low maintenance costs, safe operation, and little environmental impact.”

The VRFB market is poised for steeper growth in the coming years, especially as demand for long-duration storage capabilities increases, but also owing to the technology’s durability and safety. Other advantages of VRFBs include:

- Application: Stores large amounts of variable renewable energy to be used at other times of the day, when the electricity is demanded.
- Durability: Minimal capacity degradation resulting in significantly longer cycle lifetimes than Li-ion battery technology. VRFBs could be fully discharged multiple times each day without impacting the longevity of the system.
- Reusability: Liquid electrolytes used in VRFBs can be reused in another battery after the rest of the battery components have worn down. This improves the battery’s economics and sustainability.
- Safety: Flow batteries use aqueous electrolytes, which are largely composed of water and inherently non-flammable. VRFBs do not present the same explosion or fire risks that Li-ion systems do.

“VRFBs are also supported by existing industries in their scale up. Many vanadium industry stakeholders see VRFBs as a major source of new demand for the metal that has traditionally been used in steel alloys,” states Mikhail Nikomarov, Chairman of the Vanitec Energy Storage Committee (ESC) and CEO of Bushveld Energy.

VRFBs are a proven and rapidly growing commercial-scale technology that can store energy from renewable sources and provide on-demand, round-the-clock, carbon-free power.

About Vanitec

Vanitec brings together representatives of companies and organisations involved in the mining, processing, manufacture, research and use of vanadium and vanadium-containing products. The objective of Vanitec is to promote the use of vanadium bearing materials, and thereby to increase the consumption of vanadium.