

MEDIA RELEASE

Global Market Growth for Vanadium Redox Flow Batteries Presents Significant Opportunity for South African Industrialisation

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The global market for Vanadium Redox Flow Batteries (VRFBs) is projected to experience rapid growth in the coming years, driven by the growing need for Long Duration Energy Storage (LDES) to support renewable energy integration and the accelerating shift towards net-zero targets. This is according to a new study commissioned by the Localisation Support Fund (LSF).

The study, undertaken by Customised Energy Solutions (CES), projects that global installed VRFB capacity will increase tenfold by 2030 — from 4 GWh to 40 GWh under the base case scenario. While growth is expected to be gradual in the near term, significant acceleration is projected from 2027 onwards, with annual installations reaching 12 GWh in the base case and up to 50 GWh in an accelerated net-zero scenario by 2030. This expansion presents a substantial opportunity for South Africa to advance its vanadium mining, refining, and downstream processing capabilities.

This scale-up is expected to cause a surge in VRFB-related vanadium demand, transforming the metal's role from a primarily metallurgical input to a key enabler of the energy transition. The share of vanadium consumed by VRFBs is projected to rise from 5% of total global demand in 2024 to nearly 27% by 2030, supporting a doubling in global vanadium production.

The study attributes this growth to the convergence of global energy trends and the unique suitability of VRFBs for LDES applications. As renewable energy deployment accelerates, storage systems capable of stabilising grids and storing excess energy for extended periods are becoming increasingly essential.

VRFBs offer a combination of performance, safety, and sustainability advantages that make them particularly well-suited for these applications. They provide exceptionally long cycle life (10,000 to 20,000+ cycles) and operational lifespans of 25–30 years, with no degradation even at 100% depth of discharge. The technology is also inherently safe and thermally stable, using a non-flammable electrolyte that can operate across wide temperature ranges. Moreover, the vanadium electrolyte itself is nearly 100% recoverable and retains its value over decades, supporting circular business models and long-term cost stability. Capital expenditure is projected to decline from approximately \$380/kWh in 2025 to \$230/kWh by 2030 — positioning VRFBs to achieve cost parity with lithium iron phosphate (LFP) batteries for applications exceeding eight hours of storage.

South Africa is strategically well-placed to benefit from this growth, given its significant reserves of high-grade vanadium — among the largest and richest in the world. The country's recent policy alignment on critical minerals and the applicability of VRFB technology for domestic and regional energy storage applications further enhance its potential to develop a globally competitive downstream industry.

However, the study cautions that while South Africa has a strong resource base and supporting policy environment, the global VRFB value chain remains highly concentrated. As of 2024, the top eight vanadium electrolyte manufacturers — predominantly based in China — account for 93–95% of global capacity. This concentration presents both opportunities and risks: while Chinese leadership has driven technological maturity, it also underscores the need for regional diversification to mitigate supply chain vulnerabilities.

Earlier this year, the Department of Mineral and Petroleum Resources published its Critical Minerals and Metals Strategy, identifying vanadium as a “moderate-to-high criticality” mineral. This designation adds further impetus to beneficiation efforts and the development of domestic energy storage manufacturing capacity.

The study emphasises that policy intent alone will not be enough to establish South Africa as a VRFB leader. A more targeted, multi-layered policy framework is needed — one that leverages the country’s mineral endowment while promoting local manufacturing, domestic demand, and export competitiveness. Recommended interventions include the creation of Energy Storage Special Economic Zones (SEZs) dedicated to battery technology production, alongside tax incentives, grants, and preferential procurement for locally produced VRFB components. These measures align closely with the policy directions set out in the South African Renewable Energy Masterplan (SAREM), which was adopted by social partners earlier this year.

“Storage solutions will increasingly form a large part of the green industrial opportunity, and countries that build capability early will define the next wave of clean energy manufacturing. South Africa has long recognised the importance of mineral beneficiation in policy — but to unlock the vanadium opportunity, we must now make the business and economic case work just as strongly. If we don’t move decisively, we risk seeing this value migrate to other global players who are acting faster,” said Irshaad Kathrada, CEO of the Localisation Support Fund.

Building on this, Deputy Minister Samantha Graham-Maré of the Department of Electricity and Energy emphasised that beneficiation and localisation must be anchored in the country’s broader industrialisation agenda:

“The South African Renewable Energy Masterplan (SAREM) sets out a clear roadmap for how localisation in the renewable energy and storage value chains can drive industrial growth and energy security. Vanadium beneficiation and VRFB manufacturing align squarely with this vision — offering an opportunity to convert our mineral wealth into sustainable jobs, exports, and technological capability.”

Echoing this sentiment, Deputy Minister Zuko Godlimpi of the Department of Trade, Industry and Competition highlighted the role of localisation in job creation and economic transformation:

“Localisation is not just about producing more goods at home — it’s about building the industrial base that creates lasting jobs and competitiveness for South Africa. By investing in technologies like vanadium redox flow batteries, we can turn our natural resource advantage into real industrial capability, supporting manufacturing growth and decent work across the energy value chain.”

In 2020, the Industrial Development Corporation (IDC) and Bushveld Minerals co-invested in the creation of Bushveld Electrolyte Company (BELCO) in East London, with the goal of developing local vanadium electrolyte production capacity of up to 8 million litres or 200MWh per year. However, financial challenges at Bushveld Minerals have led to a pullback from downstream processing activities, slowing the development of this strategically important asset.

South Africa now stands at a pivotal juncture to transform its natural resource advantage into an industrial one. With global demand for long-duration energy storage rising sharply and vanadium recognised as a critical mineral, the country has both the rationale and the policy foundation to act. A deliberate, coordinated push to support beneficiation, refining, and manufacturing could anchor South Africa within emerging global VRFB supply chains — ensuring that it captures meaningful value from the global energy transition while strengthening its own industrial base.

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About the Localisation Support Fund (LSF)

The LSF is a non-profit company (NPC) and public benefit organisation (PBO) that was established in 2021 by private sector contributors, in partnership with the South African Government, in support of strategic localisation of manufacturing in South Africa.

The LSF operates with a focused mandate: to identify and address barriers to industrialisation through evidence-based research, industry engagement, and strategic interventions. Our approach ensures that localisation is not merely about import substitution but about scaling South African firms into competitive, high-growth markets.