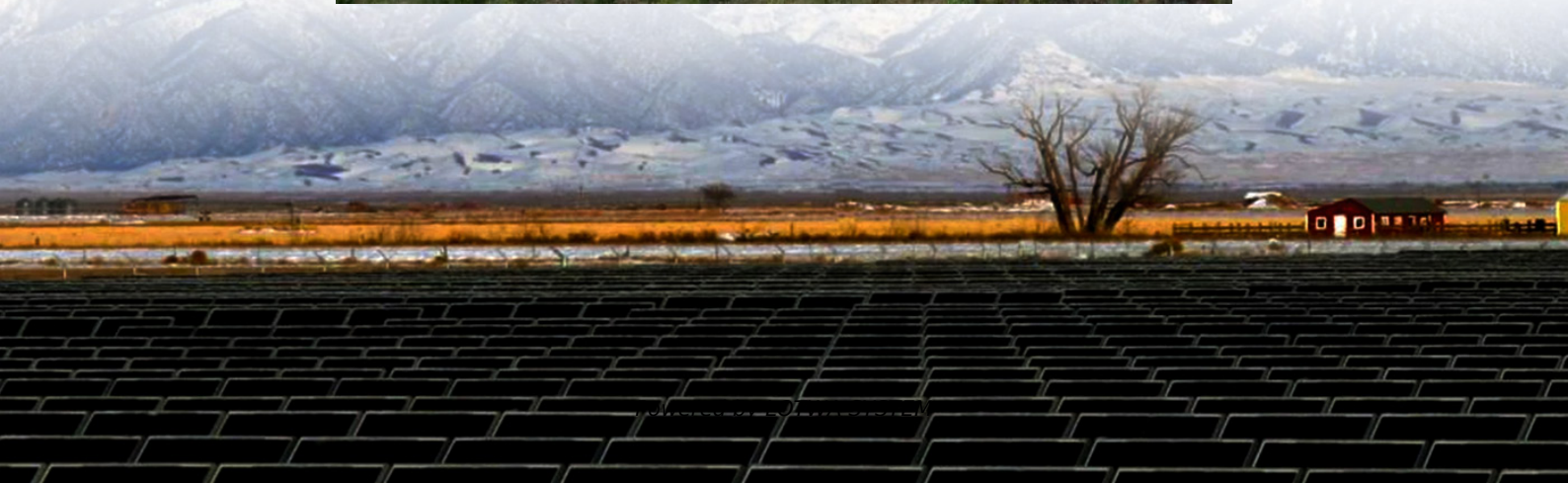


Stockholm Vanadium Liquid Flow Energy Storage Power Station





Overview

What is a vanadium redox flow battery?

To address this specific gap, Vanadium Redox Flow Batteries (VRFBs) have emerged as a powerful and promising technology tailored for large-scale energy storage. The defining characteristic of a VRFB is the unique decoupling of its power and energy capacity.

How does vanadium cross a membrane?

During operation, all four species cross the membrane in both directions, but the net flux is unbalanced. The total amount of vanadium crossing from the negative half-cell (as V^{2+} and V^{3+}) is typically greater than the amount crossing from the positive half-cell (as VO^{2+} and VO^{3+}).

How does the permeability of vanadium ions unfold?

The mechanism unfolds through a sequence of events: As established, the permeability of vanadium ions through a typical CEM follows the order $V^{2+} > VO^{2+} > VO^{3+} > V^{3+}$. During operation, all four species cross the membrane in both directions, but the net flux is unbalanced.

Why is Vanadium ion crossover important?

Crossover provides an internal short-circuit path, causing the CE to be less than 100%. Understanding the mechanistic basis and consequences of vanadium ion crossover is essential for rational membrane design, performance prediction, and the long-term viability of large-scale VRFB systems.



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