VANADIUM REDOX FLOW BATTERIES (RFB)

CASES

FACT SHEET

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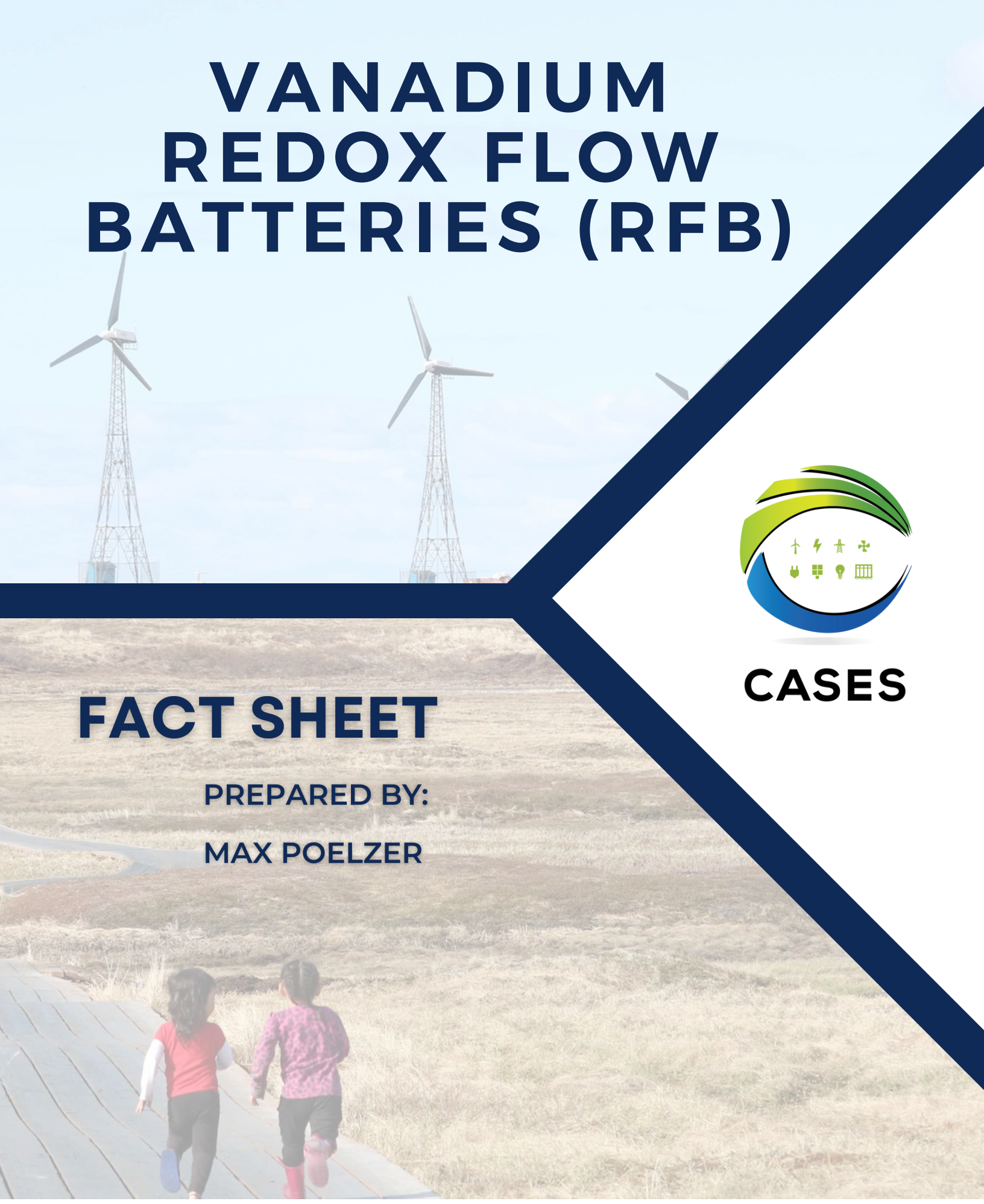

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What Are Vanadium Redox Flow batteries (RFB)?

Redox flow batteries work according to the same electrochemical principles of traditional batteries. Electrons travel from a negatively charged electrode (anode) to a positively charged electrode (cathode) through a medium called the electrolyte.

In a traditional battery, the electrolyte is stored within the same cell as the electrodes. However, in a vanadium redox flow battery, electrolytes are stored in two separate tanks, one with a positively charged vanadium solution and the other with a negatively charged vanadium solution. The electrolytes flow through a cell where the interaction between the positive and negative vanadium ions causes the release of electrons and creates electricity.

The separation of the electrolytes provides flow batteries with a longer lifespan than traditional batteries in which the materials that create an electrochemical reaction are contained in the same cell. This aspect also prevents self-discharge of energy that is not currently being used. The tanks can also be scaled to contain larger amounts of electrolyte and thus generate more electricity.

However, the disadvantages of flow battery structure include lower energy density and efficiency, the lack of portability, and the toxicity of the electrolyte fluid.

What Are RFB Used For?

In Oxford, United Kingdom, a vanadium redox flow battery is used alongside lithium-ion batteries in a hybrid energy storage system. Since flow batteries can endure a much greater number of charge cycles than lithium-ion batteries, the flow batteries provide power on a regular basis while the lithium-ion batteries are reserved as back-up, which reduces usage and extends their lifespan.

RFB and Renewable Energy

The economies of scale and technological development of flow batteries have not achieved the same maturity as lithium-ion batteries, which have become ubiquitous as a source of power for portable applications like electric vehicles and consumer electronics. However, since solar and wind have surpassed coal and natural gas as the cheapest source of power, the demand for stationary energy storage systems that support intermittent renewables is increasing. Flow batteries are becoming an attractive option due to their scalability and durability.

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