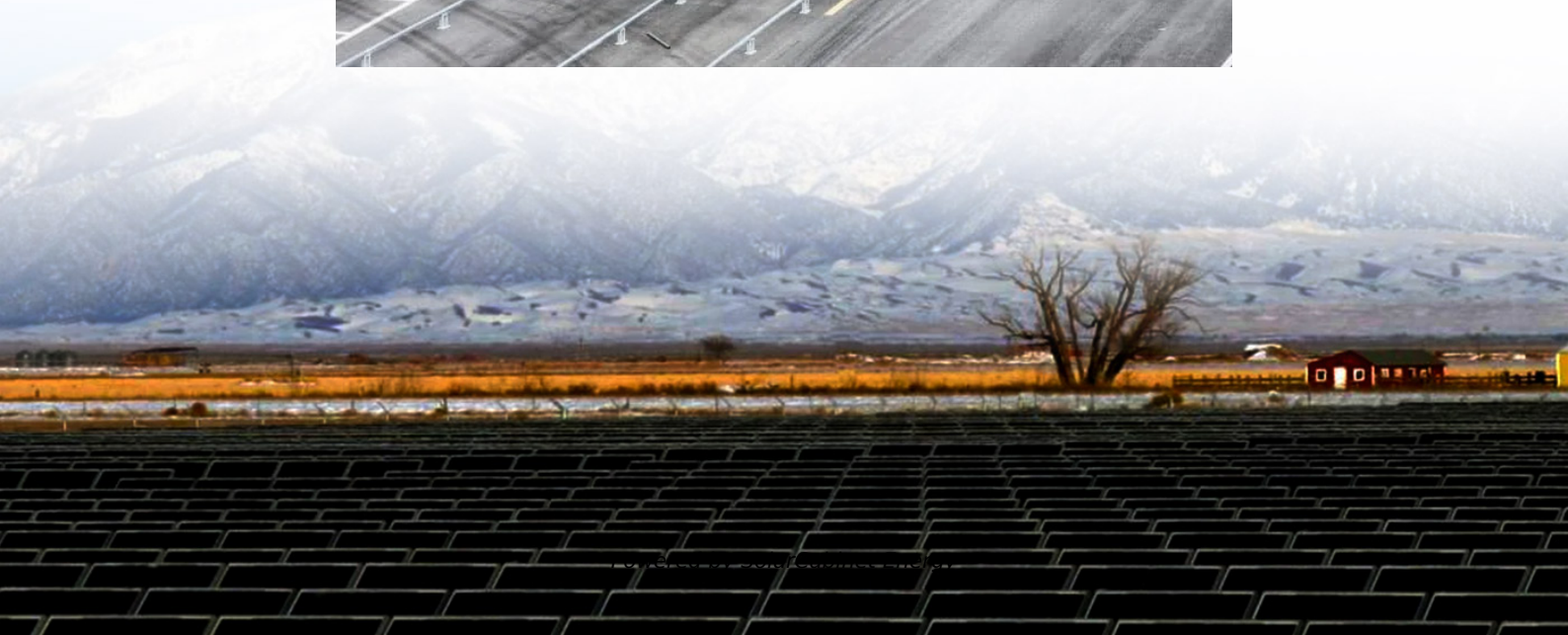


# High-pressure high-temperature flow battery





## Overview

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What is a flow-type battery?

Other flow-type batteries include the zinc-cerium battery, the zinc-bromine battery, and the hydrogen-bromine battery. A membraneless battery relies on laminar flow in which two liquids are pumped through a channel, where they undergo electrochemical reactions to store or release energy. The solutions pass in parallel, with little mixing.

Why are flow batteries a compelling grid-scale energy storage technology?

Flow batteries are a compelling grid-scale energy storage technology because the stored energy is decoupled from the system power. Conventional flow batteries have aqueous solutions on both sides, and thus are constrained in voltage by water splitting ( $\sim 1.5$  V).

What are the different types of flow batteries?

Flow battery design can be further classified into full flow, semi-flow, and membraneless. The fundamental difference between conventional and flow batteries is that energy is stored in the electrode material in conventional batteries, while in flow batteries it is stored in the electrolyte.

Do aqueous flow batteries produce hydrogen?

As with some other aqueous flow batteries, they can experience significant rates of hydrogen generation (ca. 1–10% of the nominal operating current density). This hydrogen evolution represents a loss of protons from the electrolyte and it also leads to a chemical imbalance with each charge-discharge cycle.

Are flow batteries better than conventional rechargeable batteries?

Flow batteries have certain technical advantages over conventional rechargeable batteries with solid electroactive materials, such as independent scaling of power (determined by the size of the stack) and of energy



(determined by the size of the tanks), long cycle and calendar life, and potentially lower total cost of ownership.

What is a redox flow battery?

Flow batteries are a compelling grid-scale energy storage technology because the stored energy is decoupled from the system power. Aqueous redox flow batteries (RFBs), however, are limited by low open-circuit voltages (OCVs).



## High-pressure high-temperature flow battery

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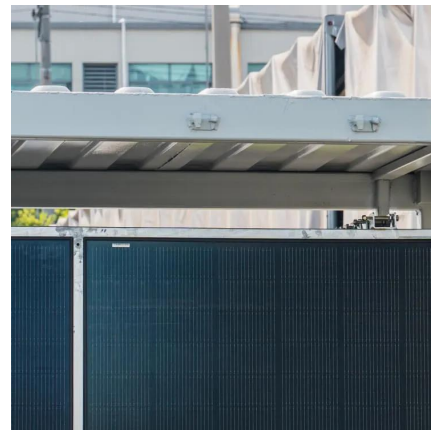


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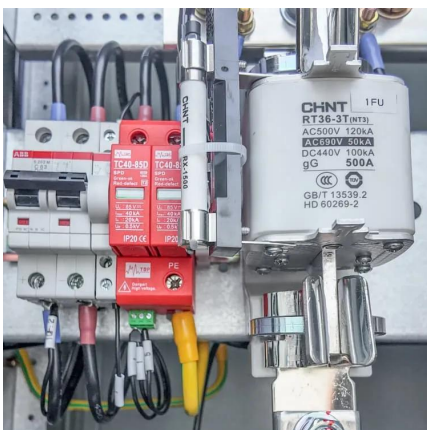
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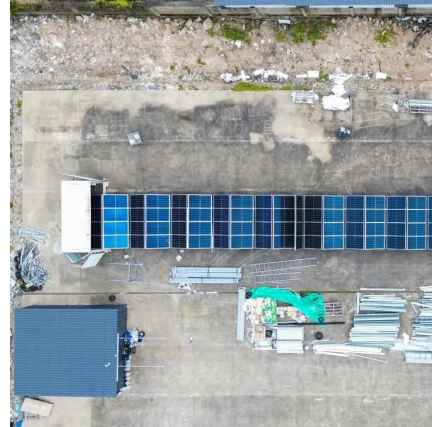


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