

## SolarInnovate Energy Solutions

# Basic structure of flow battery



## Overview

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A flow battery is a fully rechargeable electrical energy storage device where fluids containing the active materials are pumped through a cell, promoting reduction/oxidation on both sides of an ion-exchange membrane, resulting in an electrical potential. What are the components of a flow battery?

Flow batteries comprise two components: Electrochemical cell Conversion between chemical and electrical energy External electrolyte storage tanks Energy storage Source: EPRI K. Webb ESE 471 5 Flow Battery Electrochemical Cell Electrochemical cell Two half-cells separated by a proton-exchange membrane (PEM).

What is a flow battery?

Flow batteries allow for independent scaleup of power and capacity specifications since the chemical species are stored outside the cell. The power each cell generates depends on the current density and voltage. Flow batteries have typically been operated at about 50 mA/cm<sup>2</sup>, approximately the same as batteries without convection.

What are the different types of flow batteries?

There are different types of flow batteries. The main types are reduction-oxidation (redox) flow batteries, membraneless flow batteries, organic flow batteries, and hybrid flow batteries. Below we explain in more detail the common main types: The most common flow battery type is the redox flow battery, or also called: true redox flow battery.

What is a lithium ion battery with a flow system?

Lithium-ion batteries with flow systems. Commercial LIBs consist of cylindrical, prismatic and pouch configurations, in which energy is stored within a limited space<sup>3</sup>. Accordingly, to effectively increase energy-storage capacity, conventional LIBs have been combined with flow batteries.

What is the difference between power and power in flow batteries?

The key differentiating factor of flow batteries is that the power and energy components are separate and can be scaled independently. The capacity is a function of the amount of electrolyte and concentration of the active ions, whereas the power is primarily a function of electrode area within the cell.

Do flow batteries need a fluid model?

Flow batteries require electrolyte to be pumped through the cell stack. Pumps require power. Pump power affects efficiency. Need a fluid model for the battery in order to understand how mechanical losses affect efficiency. K. Webb ESE 471 29 RFB Fluid Model. Power required to pump electrolyte through cell stack. Pumping power is proportional to

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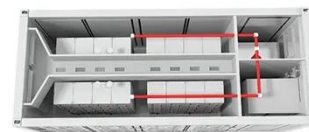


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