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The finding comes from the US Department of Energy"s (DOE) Pacific Northwest National Laboratory (PNNL), in a paper published last week in the scientific journal Joule. The study used for the first time a dissolved simple sugar called v-cyclodextrin, a derivative of starch, to boost battery longevity and capacity.

Through a series of experiments, the ratio of chemicals in the battery system was optimised so it achieved 60% more peak power. The battery was then repeatedly cycled for more than a year. During this time, the flow battery barely lost any of its recharging capacity.

"This is a brand-new approach to developing flow battery electrolyte," Wei Wang, PNNL battery researcher and study lead said in a statement. "We showed that you can use a totally different type of catalyst designed to accelerate the energy conversion. And further, because it is dissolved in the liquid electrolyte, it eliminates the possibility of a solid dislodging and fouling the system."

The v-cyclodextrin additive is the first to successfully speed up the electrochemical reaction that stores and then releases the flow battery energy, a process known as homogeneous catalysis. This means the sugar works while dissolved in a liquid solution, rather than as a solid applied to a surface.

Flow batteries comprise of two liquid-filled chambers to produce an electrochemical reaction that stores and releases energy when necessary. They are used primarily in grid energy storage and are considered critical to the energy transition as they provide stability to sometimes-intermittent renewable electricity capacity.

Many flow battery designs, and some commercial installations, rely on mined minerals such as vanadium, which are costly and difficult to obtain. Other metals currently critical to clean battery technologies, such as lithium and nickel, have come under increased scrutiny in recent years because their mining can harm the environment and local communities.

"We cannot always dig the Earth for new materials," said Imre Gyuk, director of energy storage research at DOE"s Office of Electricity. "We need to develop a sustainable approach with chemicals that we can synthesise in large amounts - just like the pharmaceutical and the food industries."

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