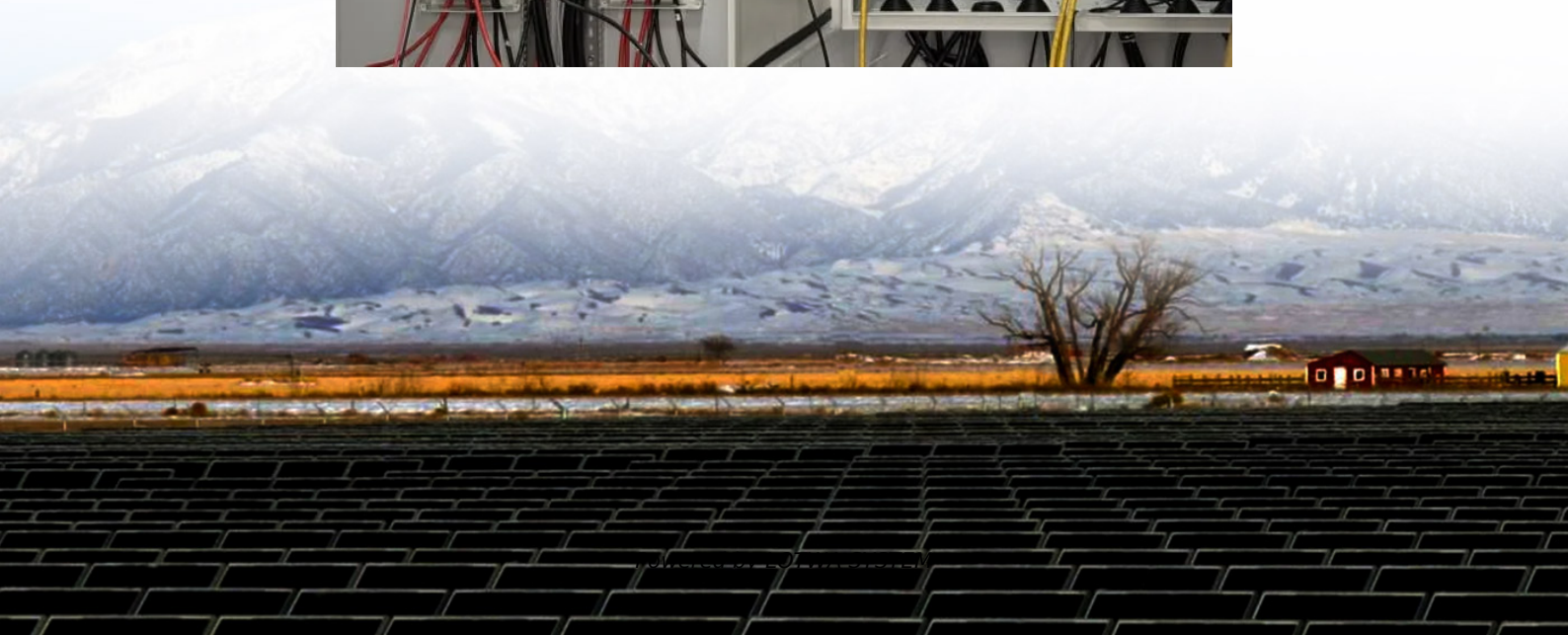


# Limitations of flywheel energy storage





## Overview

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How can flywheels be more competitive to batteries?

The use of new materials and compact designs will increase the specific energy and energy density to make flywheels more competitive to batteries. Other opportunities are new applications in energy harvest, hybrid energy systems, and flywheel's secondary functionality apart from energy storage.

Can flywheels be used in energy storage?

While several reviews have analyzed the application of flywheels in energy storage, they exhibit limitations in key areas, particularly in identifying critical application scenarios, such as their role in microgrids and isolated systems, and in providing a comprehensive techno-economic assessment based on real-world implementations.

How do flywheels store kinetic energy?

Beyond pumped hydroelectric storage, flywheels represent one of the most established technologies for mechanical energy storage based on rotational kinetic energy . Fundamentally, flywheels store kinetic energy in a rotating mass known as a rotor [ , , ], characterized by high conversion power and rapid discharge rates .

How does a flywheel energy storage system work?

The flywheel energy storage typically shares the DC bus with the grid-side converter in wind power or uninterruptible power supply systems, as illustrated in Fig. 20 [8, 82]. Fig. 20. Back-to-back plus DC-AC converter connected in DC-link. Source: Adapted from [27, 300].



## Limitations of flywheel energy storage

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