

## A-Core Container

# Botswana Communications Flywheel Energy Storage



## Overview

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Flywheel energy storage (FES) works by accelerating a rotor () to a very high speed and maintaining the energy in the system as . When energy is extracted from the system, the flywheel's rotational speed is reduced as a consequence of the principle of ; adding energy to the system correspondingly results in an increase in the speed of th.

What is a flywheel energy storage system?

First-generation flywheel energy-storage systems use a large steel flywheel rotating on mechanical bearings. Newer systems use carbon-fiber composite rotors that have a higher tensile strength than steel and can store much more energy for the same mass. To reduce friction, magnetic bearings are sometimes used instead of mechanical bearings.

What are the limitations of Flywheel design?

One of the primary limits to flywheel design is the tensile strength of the rotor. Generally speaking, the stronger the disc, the faster it may be spun, and the more energy the system can store.

How many spinning steel flywheels does NRStor use?

The flywheel system (developed by NRStor) uses 10 spinning steel flywheels on magnetic bearings. Amber Kinetics, Inc. has an agreement with Pacific Gas and Electric (PG&E) for a 20 MW / 80 MWh flywheel energy storage facility located in Fresno, CA with a four-hour discharge duration.

Are magnetic bearing flywheels better than batteries?

Magnetic bearing flywheels in vacuum enclosures, such as the NASA model depicted above, do not need any bearing maintenance and are therefore superior to batteries both in terms of total lifetime and energy storage capacity, since their effective service lifespan is still unknown.

How efficient is a flywheel compared to a gyroscope?

Conversely, flywheels with magnetic bearings and high vacuum can maintain

97% mechanical efficiency, and 85% round trip efficiency. When used in vehicles, flywheels also act as gyroscopes, since their angular momentum is typically of a similar order of magnitude as the forces acting on the moving vehicle.

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