Balancing momentary mismatches between power generation and load is a critical system requirement

Temporal Power can help utilities by providing cost-effective support for power system stability

power grid   **demand**

Flywheels for Grid Balancing

A Solution for the Power Grids of Today...and Tomorrow

Grid balancing has historically been achieved by conventional power generators that reserve capacity in order to provide a range of ancillary services. For real-time balancing such as frequency and voltage control, the speed at which a generator is able to ramp up and down dictates the value of the service being provided. Recently, alternative technologies are being sought which can provide many of these services more effectively than conventional generators, thereby reducing costs for grid operators. The rapid response time and high ramp rate of Temporal Power's flywheel results in more energy being delivered precisely when it is needed.

Flywheel Energy Storage Capabilities

Temporal Power has advanced the state of the art in flywheel technology dramatically and has developed a 1MW flywheel, which is the highest energy flywheel in the world. This, combined with the ability to provide both real and reactive power, along with the inherent advantages of fast response and unlimited cycling due to no degradation makes Temporal Power's flywheel a leading technology for providing real-time grid balancing services that include:

‣ **Frequency control and regulation reserve:** Whether providing direct frequency control or contributing to area balancing, the speed and ramping capabilities of Temporal Power's flywheel results in more energy being delivered when it is needed. MW for MW, this provides a higher and more effective regulation capacity than traditional generation sources, decreasing the cost to provide these ancillary services.

‣ **Voltage and power quality support:** Fast response and the ability to provide both real and reactive power are critical to balance local power fluctuations caused by industrial loads or renewable energy sources, helping to improve power quality and stabilize voltage levels at the local distribution level.

temporal
high-performance energy storage

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Temporal Power's flywheel technology lowers costs, is environmentally friendly and boasts utility grade durability

Lowers the cost to operate the grid

▸ **Millisecond response** means Temporal Power delivers power exactly when it's needed, making Temporal Power flywheels 3 to 5 times more effective than typical generators

▸ **Balancing of the grid** allows for more expensive generators to be turned off, saving money, fuel and emissions

▸ **Low lifecycle cost** with minimal maintenance over Temporal Power flywheel's 20 year operating life

An environmentally friendly energy storage solution

▸ **Fully recyclable and uses non-exotic materials,** allowing for low cost and high availability of components

▸ **No harmful chemicals or emissions are used as** Temporal Power utilizes fully recyclable components, offering significant environmental benefits compared to competing technologies

▸ **Use of recycled steel** positions Temporal Power's flywheel as one of the greenest solutions for energy storage worldwide

The grid demands utility grade durability

▸ **Highest energy** flywheels in the world, ideal for utility scale use for multi-megawatt energy storage projects

▸ **Full depth of discharge capability** with unlimited cycling, making use of the full range of energy capacity, without any loss in performance

▸ **Scalable design** offering tremendous flexibility as flywheels are typically arrayed in modules of 10 flywheels, but can be combined to provide almost any system size required

Flywheel Energy Storage at a Glance

Rated output power range	500 kW/1 MW
Energy storage capacity per flywheel	50 kWh
Duration at rated power	6-15 min
Operational life	>20 years

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