A Comparison of Flywheels and Batteries as a Solution for Energy Instability

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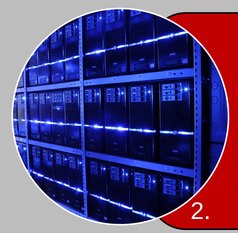
Problem Statement

Electrical instability is one of the main issues that the modern electrical grid faces today. This instability affects a number of different sectors that rely on constant uninterruptable power to function. The current solution to this problem is the use of batteries which have a number of disadvantages that could be improved upon with the use of alternative energy storage systems. This project will advocate for the use of flywheels over batteries as a better solution to the problem of energy instability.

Project Goals & Methodology

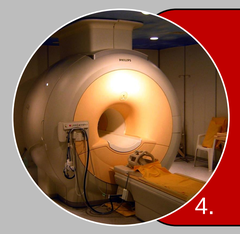
- Research needs and demands of energy sensitive facilities
- Gather quantitative information on different uninterruptable power sources
- Make a numeric comparison between flywheels and batteries
- Make an argument for the implementation of flywheels in power sensitive facilities



2.

Data Center

- Downtime leads to revenue loss
- Damaged computer hardware
- Program data corruption
- Long recovery time



4.

Health Care

- Operation schedule thrown into disarray
- Refrigerators, Chillers, CT/MRI Scanner damage
- Corruption of data records

5.

Industrial Manufacturing

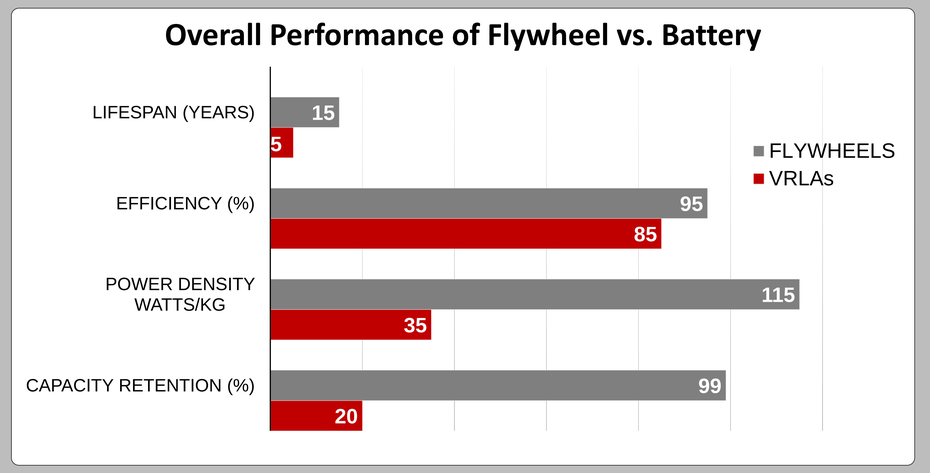
- Equipment shutdown is in slow stages to prevent damage
- Machinery may take days to start up properly
- Revenue loss from down time

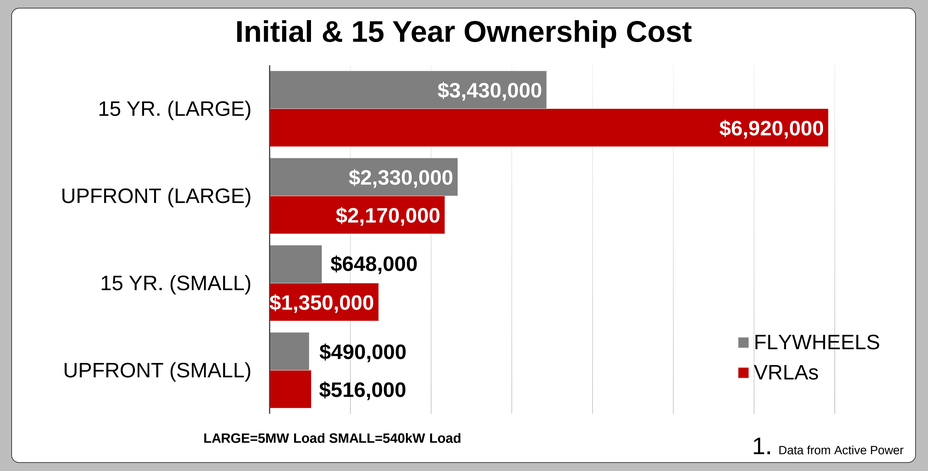
Flywheel Vs. Valve Regulated Lead Acid Battery (VRLA)

3.

7.

Comparative Data of Systems





1. Data from Active Power

Generator Backup System

8.

Backup generators assist with long term backup power, but startup times are longer than both batteries and flywheels and thus cannot act as a buffer to electrical instability. Valve Regulated Lead Acid batteries (VRLA) and flywheel systems can work with generators to mitigate startup times.

Conclusion & Next Steps

Flywheel based uninterruptible power supply (UPS) systems are overall superior to battery based systems with regards to the majority of the established criteria. They are applicable to the needs of industry, data centers, and hospitals.

The next steps would be to present our findings to perspective facilities, and calculate the cost-benefit analysis for the transition from a battery to a flywheel UPS system.

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