

# NASA Glenn Technology Fact Sheet

## Hybrid Power Management System and Method

NASA Glenn Research Center (GRC) innovators have developed and patented a unique Hybrid Power Management (HPM) system, integrating diverse power devices in an optimal configuration for space and terrestrial applications. An “ultracapacitor” technology is used to store energy in GRC’s system. Consisting of two or more conducting electrodes, separated from one another by an insulating dielectric, the ultracapacitor possesses extremely high volumetric capacitance energy due to high surface area electrodes, and very small electrode separation. GRC’s HPM system provides power for surges as required, and absorbs system power as needed to smooth system load. The system can also be configured with energy absorbing systems optimized for specific applications, ranging from nanowatts to megawatts.

## Benefits

- **Long life:** Can be charged and discharged (using the ultracapacitor) over 1 million times, greatly improving system reliability and cost savings over time
- **Environmentally friendly:** Reduces impact on Earth’s resources, since the ultracapacitor is recyclable and will never need replacement for most applications, as opposed to batteries which require frequent replacement and disposal
- **Efficient:** Offers high power density during surges and the ability to absorb high power for recharging
- **Low maintenance:** Boasts a rugged, reliable, and easy-to-maintain design
- **Reliable:** Provides consistent performance over time, even in low-temperature conditions
- **Safe:** Can be discharged easily, and left in a safe discharged state for indefinite periods of time, unlike batteries and other power devices

## Applications

### Electric power generation:

- Aiding peak-power needs
- Alternative for traditional batteries

### Automotive:

- Traditional battery supplementation or replacement
- Electric or hybrid-electric vehicles

### Biotechnology:

- Medical power systems
- Wheelchairs
- Hearing aid battery alternative

### Aerospace:

- Space power systems

## Patent

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