



## Green Design

### Data Service Provider Cost Estimation Tool

*Goddard Space Flight Center, Greenbelt, Maryland*

The Data Service Provider Cost Estimation Tool (CET) and Comparables Database (CDB) package provides to NASA's Earth Science Enterprise (ESE) the ability to estimate the full range of year-by-year lifecycle cost estimates for the implementation and operation of data service providers required by ESE to support its science and applications programs. The CET can make estimates dealing with staffing costs, supplies, facility costs, network services, hardware and maintenance, commercial off-the-shelf (COTS) software licenses, software de-

velopment and sustaining engineering, and the changes in costs that result from changes in workload.

Data Service Providers may be stand-alone or embedded in flight projects, field campaigns, research or applications projects, or other activities. The CET and CDB package employs a cost-estimation-by-analogy approach. It is based on a new, general data service provider reference model that provides a framework for construction of a database by describing existing data service providers that are analogs (or compara-

bles) to planned, new ESE data service providers. The CET implements the staff effort and cost estimation algorithms that access the CDB and generates the lifecycle cost estimate for a new data services provider. This data creates a common basis for an ESE proposal evaluator for considering projected data service provider costs.

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### Hybrid Power Management-Based Vehicle Architecture

**This ultracapacitor design is energy- and cost-efficient with measurably less environmental impact.**

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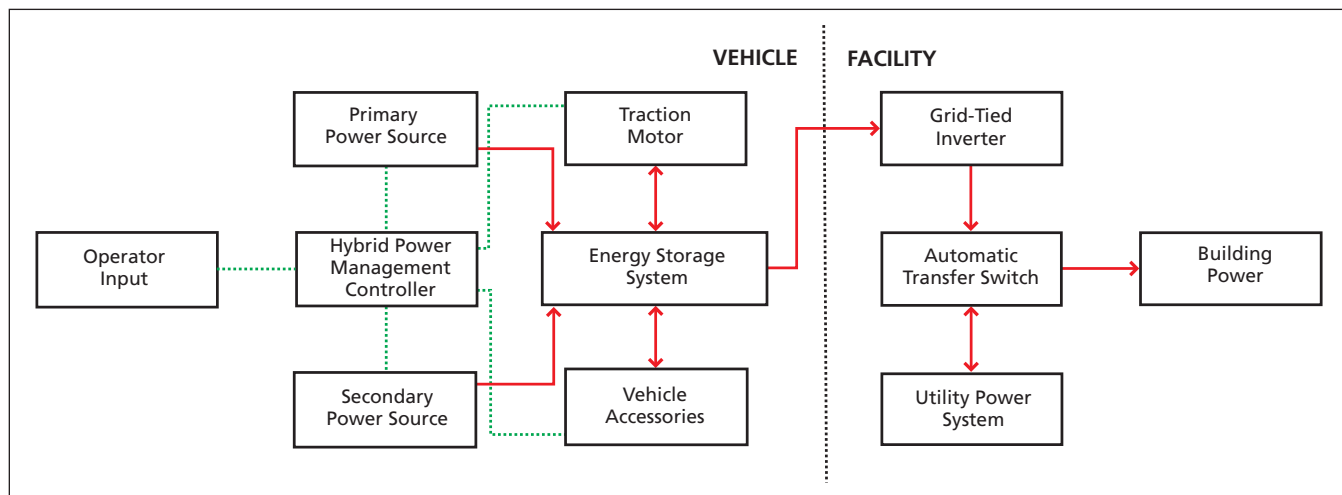
Hybrid Power Management (HPM) is the integration of diverse, state-of-the-art power devices in an optimal configuration for space and terrestrial applications (see figure). The appropriate application and control of the various power devices significantly improves overall system performance and efficiency. The basic vehicle architecture consists of a primary power source, and possibly other power sources, that pro-

vides all power to a common energy storage system that is used to power the drive motors and vehicle accessory systems. This architecture also provides power as an emergency power system.

Each component is independent, permitting it to be optimized for its intended purpose. The key element of HPM is the energy storage system. All generated power is sent to the energy storage system, and all loads derive their

power from that system. This can significantly reduce the power requirement of the primary power source, while increasing the vehicle reliability.

Ultracapacitors are ideal for an HPM-based energy storage system due to their exceptionally long cycle life, high reliability, high efficiency, high power density, and excellent low-temperature performance. Multiple power sources and multiple loads are easily



General HPM Vehicle Architecture.