NASA STTR 2012 Phase I Solicitation

T3 Space Power and Energy Storage

Space Power and Energy Storage is divided into four technology areas: power generation, energy storage, power management and distribution, and cross cutting technologies. NASA has many unique needs for space power and energy storage technologies that require special technology solutions due to extreme environmental conditions. These missions would all benefit from advanced technologies that provide more robust power systems with lower mass.

Subtopics

T3.01 Energy Harvesting Technology Development

Lead Center: SSC

Participating Center(s): GRC, JSC, KSC

The NRC has identified a NASA Top Technical Challenge as the need to "Increase Available Power". Additionally, a NASA Grand Challenge is "Affordable and Abundant Power" for NASA mission activities. As such, novel energy harvesting technologies are critical toward supporting future power generation systems to begin to meet these challenges. This subtopic addresses the potential for deriving power from waste engine heat, warm soil, liquids, kinetic motion, piezoelectric materials or other naturally occurring energy sources, etc. (re: TA-3; 2.2.1.1). Development of energy harvesting (both capture and conversion) technologies would also address the national need for novel new energy systems and alternatives to reduce energy consumption.

Areas of special focus for this subtopic include consideration of:

- Innovative technologies for the efficient capture and/or conversion of acoustic, kinetic, and thermal energy types.
- Technologies which can work either under typical ambient environments for the above energy types and/or under high intensity energy environments for the above energy types as might be found in propulsion testing and launch facilities.
- Innovations in miniaturization and suitability for manufacturing of energy capture and conversion systems

so as to be used towards eventual powering of assorted sensors and IT systems on vehicles and infrastructures.

- High efficiency and reliability for use in environments that may be remote and/or hazardous and having low maintenance requirements.
- Employ green technology considerations to minimize impact on the environment and other resource usage.

Rocket propulsion test facilities within NASA provide excellent test beds for testing and using the innovative technologies discussed above because they offer a wide spectrum of energy types and energy intensities to capture and convert. Additional Federal mandates require the optimization of current energy use and development of alternative energy sources to conserve on energy and to enhance the sustainability of these and other facilities.