SMALL RADIOISOTOPE POWER SYSTEMS FOR PLANETARY SCIENCE MISSION APPLICATIONS.

J. R. Green[1],L. A. Dudzinski[2], T. J. Sutliff[3], T. R. Spilker[1], and T. Arakelian[1], [1]Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Drive, Pasadena, CA, 91109-8099, Jacklyn.R.Green@jpl.nasa.gov, [2]National Aeronautics and Space Administration, [3]NASA Glenn Research Center.

Introduction: NASA's Radioisotope Power System (RPS) Program is considering development of a new, smaller class of RPSs that would enable a class of smaller and scientifically exciting missions to a large variety of solar system destinations. Larger RPSs have repeatedly demonstrated their value for obtaining high-priority science data from locations where sunlight is occulted, too weak, or otherwise unable to support solar photovoltaic power sources. To date, RPS-powered planetary science missions have used radioisotope thermoelectric generator (RTG) units producing more than 100 W electric each, providing power for large independent flight systems. Examples include the General Purpose Heat Source RTGs (GPHS-RTGs) that powered the Galileo and Cassini spacecraft, and the Multi-Mission RTG (MMRTG) slated to fly on missions in the near future. Both these RTGs use multiple General Purpose Heat Source (GPHS) units, the standard "building blocks" for RPS designs. But such large RPSs are impractically large for some high-priority mission applications, such as long-lived, widely-spaced networks of simple seismic or meteorological monitors that relay their data to Earth via other local platforms.

The RPS Program envisions new systems, still based on GPHSs, but that are smaller, lighter, and produce less power than previous flight systems, anticipating their use in a new class of missions that potentially spans the solar system. To this end, the Program seeks input from the scientific research and mission implementation communities to capture expectations and requirements for new RPS units.

Small RPS systems might use RTG technology, but there is another option to consider. The RPS Program is well along in developing, for space flight applications, an Advanced Stirling Radioisotope Generator (ASRG), an electromechanical device that uses GPHSs to drive a Stirling-cycle engine coupled to a generator. More efficient at converting thermal power to electric power, Stirling generator technology could be used for a small RPS system.

This presentation summarizes current RPS capabilities, outlines the context for possible future missions and the potential for future developments, and invites the community to actively participate in defining the requirements for potential future radioisotope power systems.