

Dynamic Radioisotope Power Systems Development Status and Path to Flight

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Dynamic power conversion offers the potential to produce Radioisotope Power Systems (RPS) that generate higher power outputs and utilize the Pu-238 radioisotope more efficiently. Additionally, dynamic power conversion offers the potential of producing generators with minimal degradation resulting in more power at the end of the mission, when the power is needed. Dynamic power conversion technologies being developed for space applications include the Stirling and Brayton thermodynamic cycle machines. Machines can be built based on these cycles while eliminating wear mechanisms of the moving components, enabling long design life necessary for space missions. The Dynamic Radioisotope Power Systems (DRPS) project at NASA Glenn Research Center (Glenn Research Center) is pursuing the realization of this type of power source on a flight mission. The project currently has three convertor development contracts that will deliver prototype hardware in 2020. This hardware will undergo a gamut of experimental performance verification efforts at NASA GRC. In parallel, the project has also initiated generator design efforts based on these underlying convertor options, and is also on track to build an in-house version of a generator for laboratory system-level testing. The project is also funding control electronics technology, which are necessary to convert alternating current from the dynamic devices to direct current for use by a spacecraft. A lunar mission is being targeted as the first use of this new technology, as DRPS enables a wide range of high-return scientific missions on the moon, while the mission being short in duration (2 years rather than 10 years for an outer planets mission).