

Extravehicular Activity and Human Surface Mobility & Surface Infrastructure Power Technologies

A NEW PARTNERING OPPORTUNITY

Reference No: 80JSC023EHP_PPD

Purpose:

The NASA Power and Propulsion Division (PPD) in support of the Extravehicular Activity (EVA) and Human Surface Mobility (HSM) Program (EHP), seeks to work with partners to advance the power generation, distribution, and storage technologies associated with human mobility and lunar surface infrastructure in support of NASA's Artemis missions and industrial presence on the moon. The EHP vision is to provide safe, reliable, and effective EVA, HSM, and infrastructure capabilities that allow astronauts to survive and work outside the confines of a spacecraft on and around the Moon and support the growth of Industry. Artemis missions will return humans to the surface of the Moon using innovative technologies to explore more of the lunar surface than ever before. We will collaborate with commercial and international partners and establish the first long-term presence on the Moon. Then, we will use what we learn on and around the Moon to take the next giant leap: sending the first astronauts to Mars.

The PPD and partners will collaborate on developing lunar capabilities to increase power technology readiness allowing crew to accomplish more during Artemis missions and establish the groundwork for the Lunar Surface Power Infrastructure. Focus will be on high-risk technologies such as energy storage-batteries and regenerative fuel cells (RFC), and reliable power distribution & management. In pursuing these types of capabilities, NASA and potential partners will develop new and improved technologies that will provide additional options for terrestrial applications in multiple industries.

Technology:

Technology goals include, but are not limited to: cable deployment equipment, low mass transformers (>60 Hz), lightweight electrical switchgear and circuit protection, dust mitigation capabilities, high voltage and low temperature long distance cables and corresponding connectors, low temperature battery modules, increased battery capacity and reduced charge time, radiation hardened power electronics, regenerative fuel cells, and advanced power generation, distribution, and storage concepts capable of sustained operation while minimizing maintenance in a lunar environment for an extended service period. Technology will be required to operate in the extreme environment of cis-lunar orbit and/or the lunar south pole, including inside Permanently Shadowed Regions (PSRs) and onto Mars.

Intellectual Property (IP):

This potential Partnership may produce new IP that could be jointly owned by NASA and the partner or may become the property of the partner. Standard clauses for partnership agreements are provided in the appendices of the Space Act Agreements Guide, NAI 1050-1. These standard clauses are usually used without any changes. Any deviations from the standard intellectual property clauses are reviewed by NASA Office of the General Counsel at the Headquarters and/or Center-level, as appropriate and approved by NASA Partnerships Office.

Potential Commercial Applications:

Lunar, undersea, automotive, nuclear, space tourism, security.

Keywords:

Mobility, spacesuit, rover, vehicle, power infrastructure, power architecture, power generation, solar array, power distribution, energy storage, battery, regenerative fuel cells, radiation, power electronics, radiation hardened, cable, connector, transformer, switchgear, sustainable, dust, regolith, lunar terrain vehicle, Lunar Terrain Vehicle (LTV), pressurized rover (PR), lunar, Artemis, moon, International Space Station (ISS), Lower Earth Orbit (LEO).