National Aeronautics and Space Administration

Fission Surface Power (FSP) Project Overview

Prometheus and Constellation Nuclear Systems Workshop

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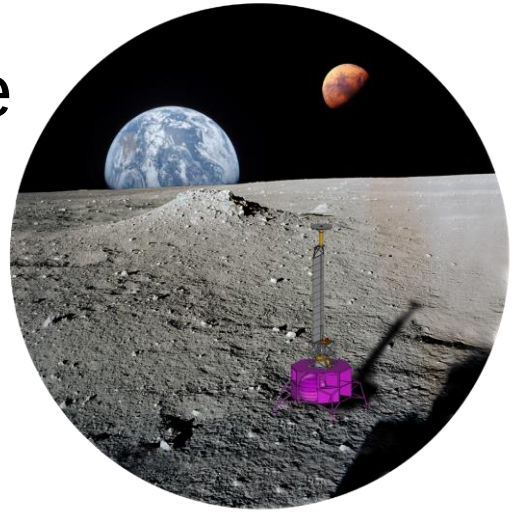
Nuclear Power for the Moon and Mars

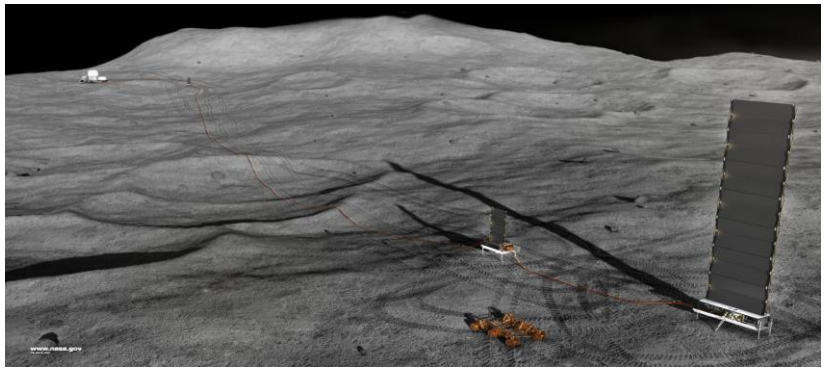
Nuclear power systems enable robust exploration of the Moon and Mars

- Reliable energy production is essential to exploration missions
- Fission power systems can provide abundant and continuous surface power in all environmental conditions on the Moon and Mars
  - Lunar night is 14.5 Earth days long
  - Mars has recurring planet-wide dust storms that can last for weeks
- A fission system designed for a demonstration on the Moon will be directly applicable to human Mars exploration



Fission Surface Power (FSP) Project Overview

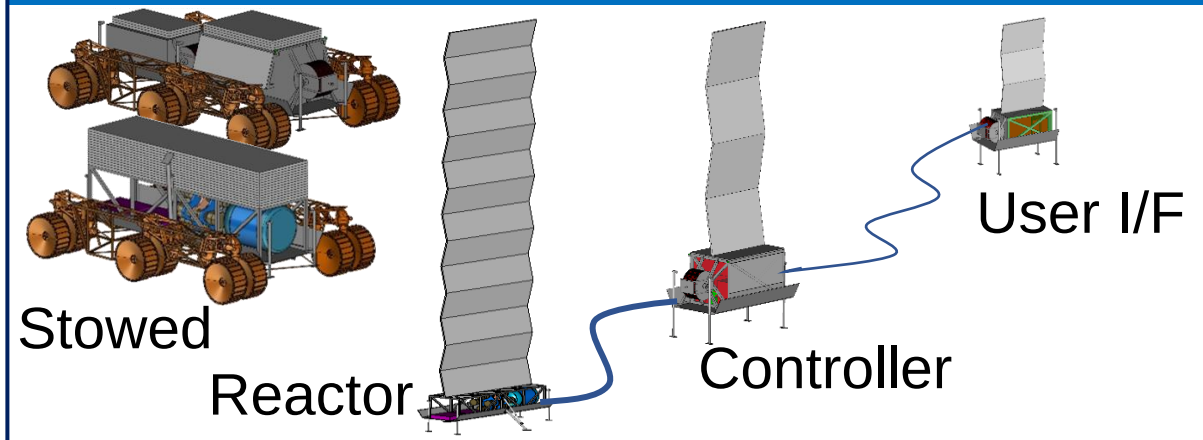
- Develop a space qualified fission surface power flight unit before the end of 2028
- Collaborate with the Department of Energy, Idaho National Lab (INL), Los Alamos National Lab (LANL)
  - INL manages the industry contracts.
    - LANL provides reactor expertise
  - Develop a government concept
  - Conduct power conversion maturation
  - Conduct nuclear technology maturation



Key Design Characteristics

- 40 kWe output at 120 Vdc
- 6000 kg mass limit, fits on a lander
- 5 rem/year above background at 1km
- Operate on the lander, or be transported

Government Reference Concept

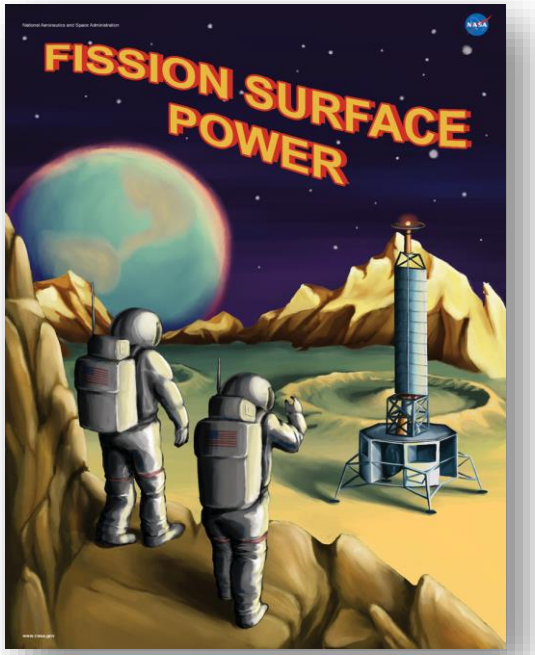


Note: Industry will determine the design

Fission Surface Power Development Approach

Industry will design and develop the system in two phases

- Phase 1:
  - Contractor teams working 1-year contracts for initial designs
    1. IX; Intuitive Machines and X-Energy – partnering with Maxar and Boeing
    2. Lockheed Martin – partnering with BWXT and Creare
    3. Westinghouse – partnering with Aerojet Rocketdyne
  - Deliverables include design documents, requirements, schedule and cost estimates for Phase 2
- Phase 2:
  - Will be a separate, open and competitive procurement
  - Deliverables include a qualification unit and flight unit



NASA and DOE are collaborating on a fission surface power system development