America Underway in Space on Nuclear Power

SR-1 Freedom launches December 2028 — first fission nuclear-powered interplanetary spacecraft
LR-1 lands on the Moon in 2030 — first fission nuclear reactor on the Moon

In December 2028, NASA will launch Space Reactor-1 (SR-1) Freedom, the first spacecraft to use a nuclear fission reactor for propulsion beyond Earth orbit. In 60 years of spaceflight, no nation has ever accomplished this. SR-1 will be the first, and it will carry to Mars the Skyfall payload of three Ingenuity-class helicopters. This pathfinder mission will lay the groundwork and develop the technologies needed for future applications including surface power for the Moon, Mars, and outer solar system exploration.

These missions execute a core objective of the President's National Space Policy: Unleashing nuclear power in space and on the Moon.

Why Nuclear
Solar power works near Earth. It does not work everywhere America needs to go. On the Moon, solar power depends on where you stand — even the best polar sites face days of darkness, and the permanently shadowed craters where ice exists see no sunlight at all. Martian dust storms block sunlight for weeks. To sustain a presence on the Moon, send crews to Mars, and explore the outer solar system, the nation needs power that works everywhere, independent of the Sun. Nuclear fission is that power.

Mission
After launch SR-1 Freedom escapes Earth's gravity, and within 48 hours starts a nuclear fission reactor and powers electric thrusters. Three milestones, accomplished in two days, that close a 60-year gap in American space nuclear capability.

SR-1 will then navigate to Mars using nuclear electric propulsion and deliver the Skyfall scientific payload: three Ingenuity-class helicopters equipped with cameras, ground-penetrating radar, and radios to survey potential human landing sites, search for subsurface water, and relay navigation data for future landers.

SR-1 is the first step in a deliberate sequence. It will inform and enable Lunar Reactor-1 (LR-1), a fission surface-power system designed to keep the Moon Base operating through periods of darkness and in locations where solar power alone cannot reach. By flying a reactor first — without the added complexity of a lunar landing — SR-1 retires nuclear flight risk, stimulates and qualifies the supply chain, and builds the necessary workforce.

Together, SR-1 and LR-1 are the early beginnings of a domestic nuclear-space industrial base that scales to power permanent lunar outposts and secures American leadership in space for decades to come.

Space Reactor Development History
For six decades, the United States invested more than $20 billion across dozens of space nuclear programs and flew exactly one reactor — SNAP-10A, in 1965. It never left orbit. Billions spent, decades lost. SR-1 ends that pattern.

New Approach: Prioritize What Works, Accelerate
- **Real mission, real deadline.** A Mars launch window in December 2028 forces decisions that decades of study never did.

- **Existing hardware.** SR-1 would repurpose a nearly built, NASA-developed spacecraft bus — the Power and Propulsion Element — putting taxpayer investments already made to work.
- **Reactor technology.** Mature uranium fuel form and Brayton power conversion — delivering more than 20 kilowatts of electrical power.
- **Unified leadership.** NASA serves as prime integrator in close partnership with the Department of Energy and private sector innovators.
- **Incremental development.** SR-1 systems pave the way for LR-1 and follow-on efforts.