

# ARTEMIS MOON AND MARS NUCLEAR POWER

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## INTRODUCTION

Competing with Russia and China the USA is announcing plans to fast-track the building of a nuclear fission reactor on the moon and later on Mars. NASA administrator Sean Duffy, who is also Transportation Secretary issued a directive:

“To properly advance this critical technology to be able to support a future lunar economy, high power energy generation on Mars, and to strengthen our national security in space, it is imperative the agency move quickly.”

## ARTEMIS PROJECT

The USA lunar program is called Artemis. In Greek mythology, Artemis is the sister of Apollo. She allowed him to be born before her. \$93 billion are allocated to NASA for this project.

Its first major milestone is supposed to return American astronauts to the moon in 2027. However there is little chance of hitting that target, as critical components are still in development. China is planning to land an astronaut on the moon by 2030.



Figure 1. USA depiction of a lunar base. Source: NASA.

Micro-nuclear reactors are considered essential to a sustained presence on the moon because lunar days and lunar nights last for two weeks each, rendering photo-voltaic solar panels and batteries insufficient. If you stay in one spot on the moon, you do not experience day and night.

NASA is assigning a leader of the nuclear-reactor project and gathering industry perspectives. The overarching goal is to launch a nuclear reactor with at least 100 kilowatts of generation power by late 2029.

Earlier NASA design work had a lesser, 40 kilowatt reactor tipping the scales at more than five metric tons. The contracted designers for that effort with about an initial \$5 million apiece were Lockheed Martin, Westinghouse and IX, a joint venture of Intuitive Machines and X-Energy. In May 2025, Rolls-Royce said it was soliciting space-industry partners to develop a micro-nuclear reactor suitable for Artemis.

The United States tested the SNAP-10A nuclear reactor in space for 43 days in 1965. The USSR sent about 40 nuclear-electric satellites into space, mostly powered by the BES-5 reactor. The more powerful TOPAZ-II reactor produced 10 kilowatts of electricity.

## **NEW SPACE STATION**

An accelerated project to replace the fading International Space Station (ISS), awarding contracts to at least two companies within six months of NASA issuing a request for proposals.

The current ISS is scheduled for decommissioning at the end of 2030, after which it will be sent into a controlled de-orbit that should see most of it burned up, with the remaining hunks of glowing-hot metal landing in the empty part of the Pacific Ocean.

If it is not immediately replaced, China would have the only operational space station. Companies who have pursued space station business include Axiom Space, Vast and Blue Origin.

## **INTERNATIONAL LUNAR RESEARCH STATION ILRS RUSSIA CHINA PROJECT**

A joint Russian-Chinese plan to build a lunar nuclear reactor of their own is in progress. In May 2025, the countries signed a memorandum of cooperation by which they will collaborate on a reactor to power the planned International Lunar Research Station (ILRS), which they hope to have operational by 2036.

Led by China, but part of a collaboration with many other countries including Venezuela, Belarus, South Africa, Pakistan, Egypt and Kazakhstan, the facility is intended to conduct scientific research within a 62-mile radius of the lunar south pole. Other outposts are to follow over the following decades.

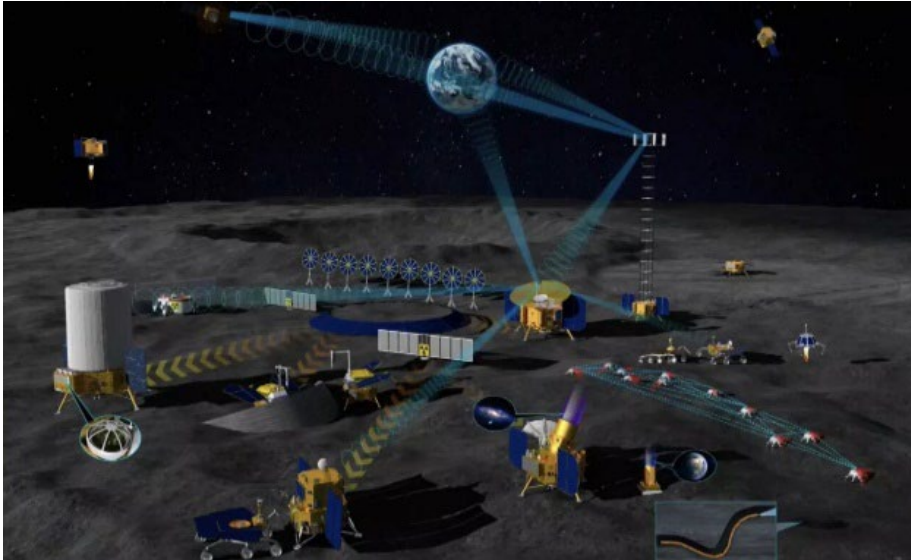


Figure 2. Chinese National Space Agency depiction of an International Lunar Research Station ILRS.

In 2024, the Chinese retrieved the first soil and rock samples from the far side of the moon and returning them to Earth. The Chang'e-6 craft used a drill and scoop to mine more than four pounds of material from the moon's deepest crater. Their study of the material raised the possibility that the far side may be significantly drier than the near side, but the single sample is not conclusive.

## DISCUSSION

The moon and Mars are going to change the course of human events, whether for good or for ill. The sociopolitical ramifications of control of access to outer space are consequential. The moon is the gateway to the solar system, and the future of humanity exists there.

## REFERENCES

1. [https://www.youtube.com/watch?v=ish\\_ycyS4JU](https://www.youtube.com/watch?v=ish_ycyS4JU)
2. <https://www.nasa.gov/humans-in-space/artemis/>