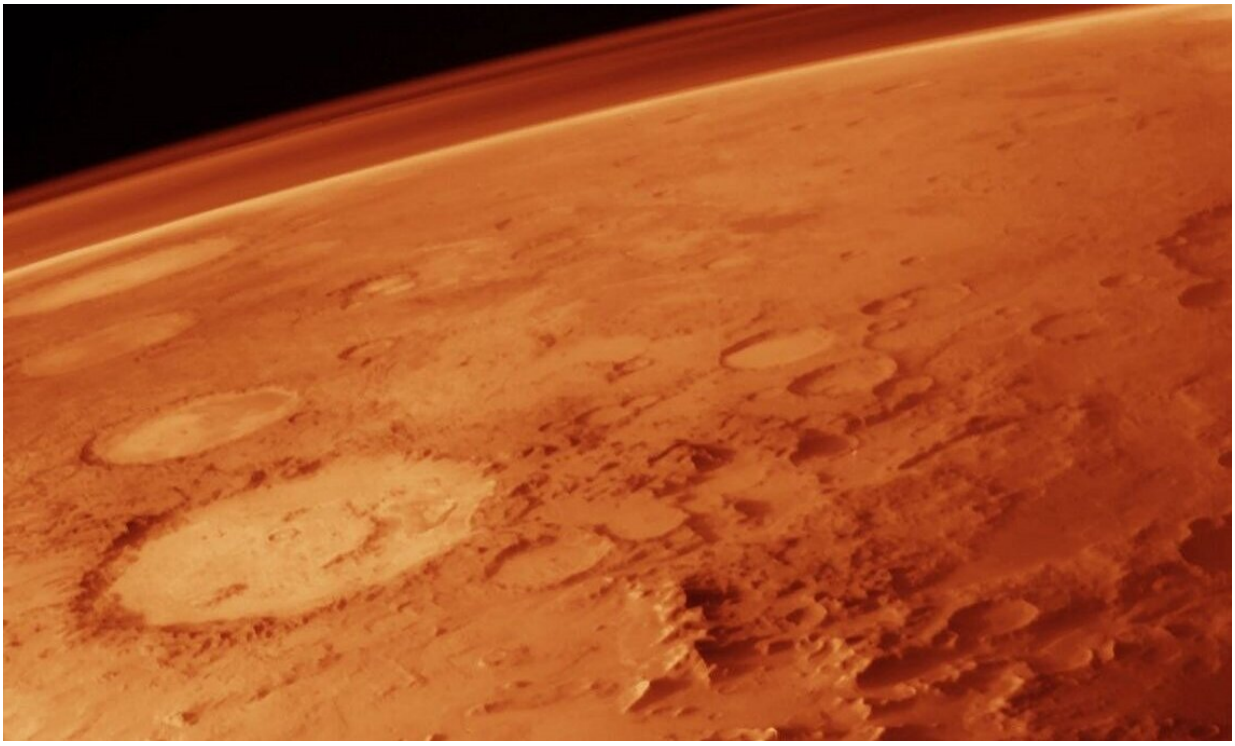
Going nuclear on the moon and Mars

May 20 2020



Credit: CC0 Public Domain

It might sound like science fiction, but scientists are preparing to build colonies on the moon and, eventually, Mars. With NASA planning its next human mission to the moon in 2024, researchers are looking for options to power settlements on the lunar surface. According to a new article in *Chemical & Engineering News*, the weekly newsmagazine of the American Chemical Society, nuclear fission reactors have emerged as

top candidates to generate electricity in space.

When it comes to powering an astronauts' settlement, there are many factors to consider, writes correspondent Tien Nguyen in collaboration with *ACS Central Science*. The power source must be capable of being transported safely from Earth and of withstanding the harsh conditions of other worlds. Past space missions have used solar power as a scalable and renewable source of electricity, but the dark craters of the moon or the dusty surface of Mars may not offer enough light. The limited lifespans of battery and fuel cell technologies typically relegate them to backup options. Nuclear devices that run on decaying plutonium-238 have been used to power spacecraft since the 1960s, including Mars rovers and the space probes Voyager and Cassini, but they don't provide enough energy for a settlement. In contrast, nuclear fission reactors that split uranium-235 atoms, which are used by power plants here on Earth, could provide a reliable power source for a small space settlement for several years, scientists estimate.

Despite funding and design setbacks, researchers are reinvigorating efforts to create a nuclear reactor for space travel and settlement. In the early 2010s, a team of scientists from Los Alamos National Laboratory, NASA and the U.S. Department of Energy came together with the goal of developing a new nuclear fission system that could produce at least 10 kilowatts of energy. With a core containing molybdenum and highly enriched uranium, the reactor uses nuclear fission to generate heat, which is converted to electricity by simple piston-driven engines. The prototype, which was tested in 2018, produced up to 5 kilowatts of electricity. The researchers hope to optimize the technology to achieve the desired 10-kilowatt output. They also say that transporting uranium in space can be done safely, as the alpha particles emitted by the core are weak and can be fully contained by proper shielding.

More information: "Why NASA Thinks Nuclear Reactors Could

Supply Power for Human Colonies in Space," cen.acs.org/energy/nuclear-pow … actors-supply/98/i19

Provided by American Chemical Society