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## Energy Sources and Colonization on Mars

Upon researching human habitation on Mars and space colonization, it can be proven that the best solution to provide energy, electricity, and allow for further scientific research is to use Kilopower nuclear reactors.

Space colonization and whether it's actually possible is a question that has been asked ever since we landed on the moon. It's something that everyone imagined the future would have but science has yet to reach. However, NASA recently found and is continuing to perfect what could quite possibly be the solution to that age-old question. They developed the idea of kilopower reactors. Kilopower reactors are mini nuclear reactors that are lightweight and reliable. These reactors are made up of a Uranium-235 core the size of a paper towel roll, sodium heat pipes, and a Stirling engine. The function of the nuclear reactors is similar to that of an automobile engine, as stated by NASA. The heat from the reactor is transferred via sodium heat pipes to be turned into electricity by the Stirling engine. The engine itself uses that heat to create pressure that powers a piston and, working with an alternator, produces electricity. These kilopower nuclear reactors started to become an achievable goal once they passed NASA's KRUSTY test, which is used to measure the reliability and validity of different ideas and projects that NASA has created. This was an important step for the reactors because it meant that their solution was that much closer to becoming a realistic and efficient solution to the problem of energy and electricity resources in space.

Kilopower reactors are a very coherent way to sustain life and continue to advance scientific exploration. They produce almost enough energy to power two homes here on earth. The average home runs on five kilowatts of power, whereas the largest kilopower reactors produce ten kilowatts of power. The potential for long-term research on Mars and other planets is extraordinary. Scientists, researchers, and astronauts would be able to study space for longer periods of time and make advancements in space exploration move significantly quicker than previous attempts at long-term projects. However, the amount of time that astronauts will be able to stay in space isn't the only reassuring prospect of the reactors. Simply the possibility to be able to have electricity and live without worry of energy shortage in space is a revolutionary progression. This could formulate the ability for astronauts to live in space and for scientists to be able to create ways to send and return people to and from Mars without the concern of the safety of the astronauts. It could also create what everyone has imagined: a civilization on Mars, and even the investigation of other planets. The limitless extension of solutions and ideas that could come from even just one kilopower reactor is very remarkable.

Although these reactors are a very probable solution to space exploration and inhabitation there are a few limitations that do need to be considered in order to truly complete this solution. One limitation is transportation. NASA has not yet stated how they plan on getting these reactors to space without breaking them or harming the passengers and transportation vessels. This could lead to significant problems if the reactors can't be transported to space at all. Not only is it a limitation in itself, but it would especially be a limitation if NASA is only able to transport one reactor at a time. This would create a timing problem, setting back the advancement possibly by a couple of years. Regardless of how the reactors get to Mars, scientists face a very serious

problem once they arrive that is causing current advancements to take longer. This disruption is the threat of nuclear catastrophe. Every nuclear power plant or nuclear facility faces a risk of nuclear mishaps and extreme destruction, however, nuclear catastrophe threat in space could be unpredictable and potentially a risk that scientists are unwilling to take. These limitations could be a set back to scientific improvement, but the reward of space inhabitation could quite possibly outweigh the risk.

Space colonization is very possible with the use of kilopower nuclear reactors. The wattage of the reactors enables science to extend beyond a time limit and allow for Mars inhabitation. The practicality and energy efficiency creates the potential for leaps in scientific advancement and space investigation. The limitations of the reactors include transportation and risk of nuclear disaster, however, with all the positive aspects of the project, NASA is willing to continue. These kilopower nuclear reactors are an extraordinary solution to advance science and allow for Mars civilizations to become a reality.

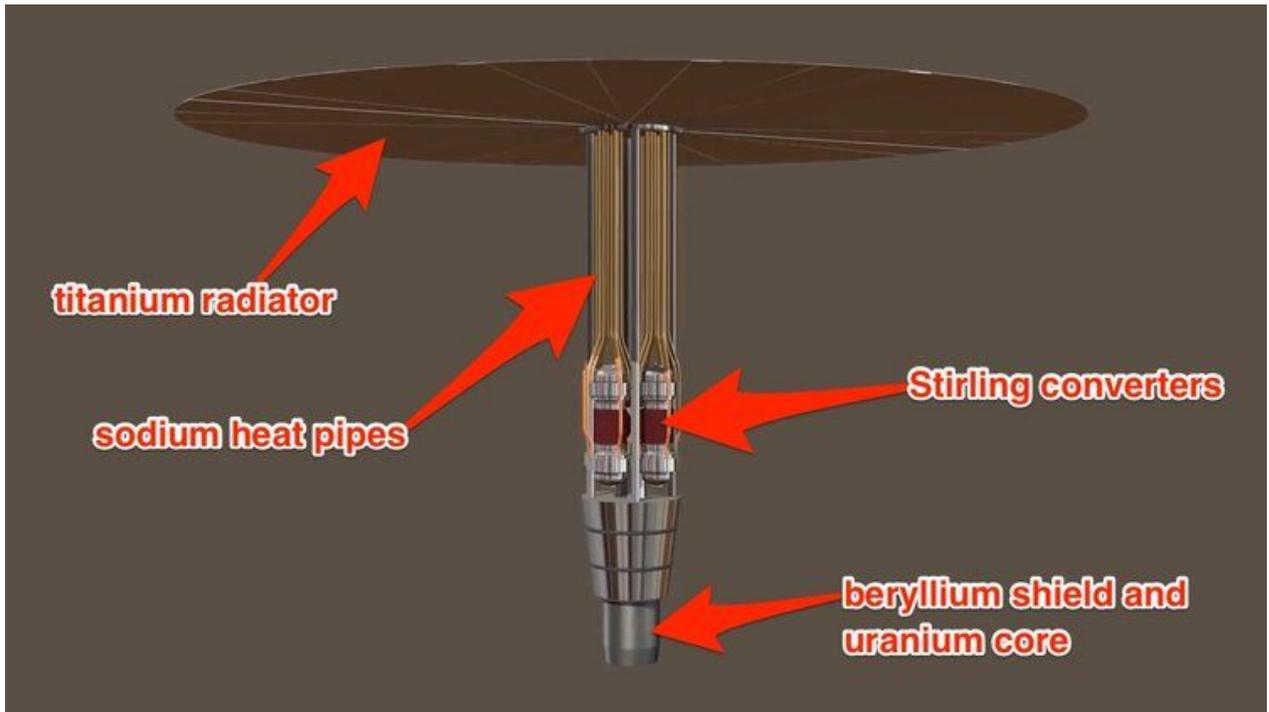


Image from Google: A diagram of a kilopower reactor

## Citations

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