



NASA's Plan to Use Nuclear Power for Mars Gateway

Description

A new nuclear-electric propulsion system, called SR-1, will replace solar power with electricity from a nuclear reactor to energise plasma thrusters. This system aims to improve efficiency in space travel.

Isaacman, a key figure in the project, explained that SR-1 does not seek billions of dollars for a new mission. He emphasised the project will use existing hardware, including a reactor that is mostly built. This approach saves time and money, as some costs for the fuel have already been paid.

NASA has not announced how much the SR-1 mission will cost. Isaacman mentioned that proving nuclear propulsion can work may lead to more funding in the future. Sinacore, another project leader, highlighted that SR-1 mainly adds the nuclear reactor to an already existing spacecraft design. The timeline aims for launches during the next Mars opportunity in December 2028, which is critical based on orbital mechanics.

Preparing for a large space mission like this is challenging. Sinacore pointed out that they need to avoid "mission creep," which means keeping the project focused on its main goals. The timeline includes completing mission design by June and starting assembly in early 2028. If they miss the 2028 launch, the next chance won't be until 2031.

NASA will lead the SR-1 project, but launching radioactive fuel into space requires coordination with various federal agencies, including the Department of Energy. Selected rockets must also pass special certification for nuclear launch missions.

Vocabulary List:

1. **propulsion** //prə'pʌlʃən// (noun): power that moves a vehicle forward
2. **reactor** //ri'æktə// (noun): machine that makes energy from nuclear material
3. **plasma** //plæzmə// (noun): hot, charged gas used for high-speed travel
4. **orbital** //ˈɔrbɪtəl// (adjective): relating to the path around a planet
5. **radioactive** //,reɪdɪəʊ'æktɪv// (adjective): giving off dangerous energy from atoms
6. **certification** //,sɜrtɪfɪ'keɪʃən// (noun): official approval that something meets rules

Comprehension Questions



Multiple Choice

1. What will the SR-1 system replace with electricity from a nuclear reactor?
 - Option: Solar power
 - Option: Wind power
 - Option: Fossil fuels
 - Option: Chemical propulsion
2. Who is a key figure in the SR-1 project?
 - Option: Elon Musk
 - Option: Jeff Bezos
 - Option: Jared Isaacman
 - Option: Bill Gates
3. What is the main goal of the SR-1 project?
 - Option: To develop solar-powered thrusters
 - Option: To improve efficiency in space travel
 - Option: To send humans to Mars in 2024
 - Option: To create a new spacecraft design
4. When is the target launch window for the SR-1 mission?
 - Option: July 2028
 - Option: December 2028
 - Option: March 2031
 - Option: October 2028
5. What must selected rockets pass for nuclear launch missions?
 - Option: Environmental review
 - Option: Special certification
 - Option: Cost analysis
 - Option: Safety audit
6. Which department requires coordination for launching radioactive fuel into space?
 - Option: Department of Defense
 - Option: Department of Energy
 - Option: Department of Transportation
 - Option: NASA Headquarters



True-False

7. The SR-1 mission will use entirely new hardware.
8. NASA has disclosed the cost of the SR-1 mission.
9. Isaacman believes that demonstrating nuclear propulsion may not attract future funding.
10. Mission creep refers to the expansion of project goals beyond the original intent.
11. The next chance for launching SR-1 after December 2028 is in 2032.
12. The timeline for the SR-1 mission includes design completion by June.

Gap-Fill

13. The SR-1 system is designed to use _____ from a nuclear reactor.
14. Isaacman stated that some costs for the fuel have already been _____ paid.
15. The timeline for SR-1 aims for launches during the next Mars opportunity in _____
2028.
16. Preparing for large space missions is often fraught with _____ challenges.
17. The next chance to launch after 2028 won't be until _____ 2031.
18. NASA will lead the SR-1 project while coordinating with _____ federal agencies.

Answer

Multiple Choice: 1. Solar power 2. Jared Isaacman 3. To improve efficiency in space travel 4. December 2028
5. Special certification 6. Department of Energy

True-False: 7. False 8. False 9. False 10. True 11. False 12. True

Gap-Fill: 13. electricity 14. paid 15. December 16. challenging 17. March 18. various



Vocabulary quizzes

Multiple Choice (Select the Correct answer for each question.)

1. What is a core sample mainly used for in geological studies?
Option: To measure temperature
Option: To analyze sediment layers
Option: To assess wildlife
Option: To determine weather patterns
2. Which type of vehicle can complete tasks without human intervention?
Option: Manual
Option: Semi-autonomous
Option: Autonomous
Option: Unmanned
3. What is the primary function of propulsion systems in vehicles?
Option: To aid in steering
Option: To provide navigational support
Option: To generate movement
Option: To enhance passenger comfort
4. Which of the following is a primary component in nuclear power generation?
Option: Turbine
Option: Reactor
Option: Boiler
Option: Generator
5. What typically accumulates at the bottom of lakes and oceans?
Option: Sand
Option: Sediment
Option: Fish
Option: Plants
6. What is measured in pascals in fluid dynamics?
Option: Temperature
Option: Velocity
Option: Pressure
Option: Density
7. What is a common issue observed in ice sheets due to climate change?



- Option: Thickening
- Option: Stability
- Option: Thinning
- Option: Cooling

8. Which of the following describes the speed of an object in a specific direction?

- Option: Acceleration
- Option: Velocity
- Option: Distance
- Option: Momentum

9. What do vehicles emit that contributes to air pollution?

- Option: Odors
- Option: Emissions
- Option: Noise
- Option: Vibrations

10. What type of materials are often used in medical treatments and energy generation?

- Option: Thermal
- Option: Electrical
- Option: Chemical
- Option: Radioactive

Gap-Fill (Fill in the blanks with the correct word from the vocabulary list.)

11. In physics, _____ is described as the force applied per unit area.
12. An _____ vehicle can operate independently without human intervention.
13. A sediment _____ provides valuable information about the geological history of an area.
14. Modern ships rely heavily on GPS for accurate _____.
15. The layers of _____ in the riverbed can indicate the ecological changes over time.
16. The _____ of polar ice caps is a significant concern for scientists studying climate change.



17. Reducing carbon _____ is essential for improving air quality.
18. The nuclear _____ is a critical component for generating electricity in power plants.
19. Earthquakes can produce _____ that travel through the ground.
20. A _____ of species can be found in diverse ecosystems across the globe.

Matching Sentences (Match each definition to the correct word from the vocabulary list.)

21. The construction project was halted upon discovering exposed bedrock beneath the site.
22. Engineers assess the stability of structures to ensure safety during earthquakes.
23. The outflow from the river increased significantly during the rainy season.
24. There were several unaccounted expenses in the financial report that needed clarification.
25. The software returned to its default settings after the error occurred.
26. The difficulty of the test surprised many students who were unprepared.
27. The project had a limited budget, restricting its scope and ambitions.
28. Sailors use stars to navigate their way across the open ocean.
29. Plasma is often referred to as the fourth state of matter, distinct from solids, liquids, and gases.
30. The satellites maintained their orbital paths around the Earth for years.

Answer

Multiple Choice: 1. To analyze sediment layers 2. Autonomous 3. To generate movement 4. Reactor
5. Sediment 6. Pressure 7. Thinning 8. Velocity 9. Emissions 10. Radioactive

Gap-Fill: 11. pressure 12. autonomous 13. core 14. navigation 15. sediment 16. thinning 17. emissions
18. reactor 19. shockwaves 20. variety

Matching sentence: 1. bedrock 2. stability 3. outflow 4. unaccounted 5. default 6. difficulty 7. limited 8.
navigate 9. plasma 10. orbital

CATEGORY

1. Sci/Tech - LEVEL3



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