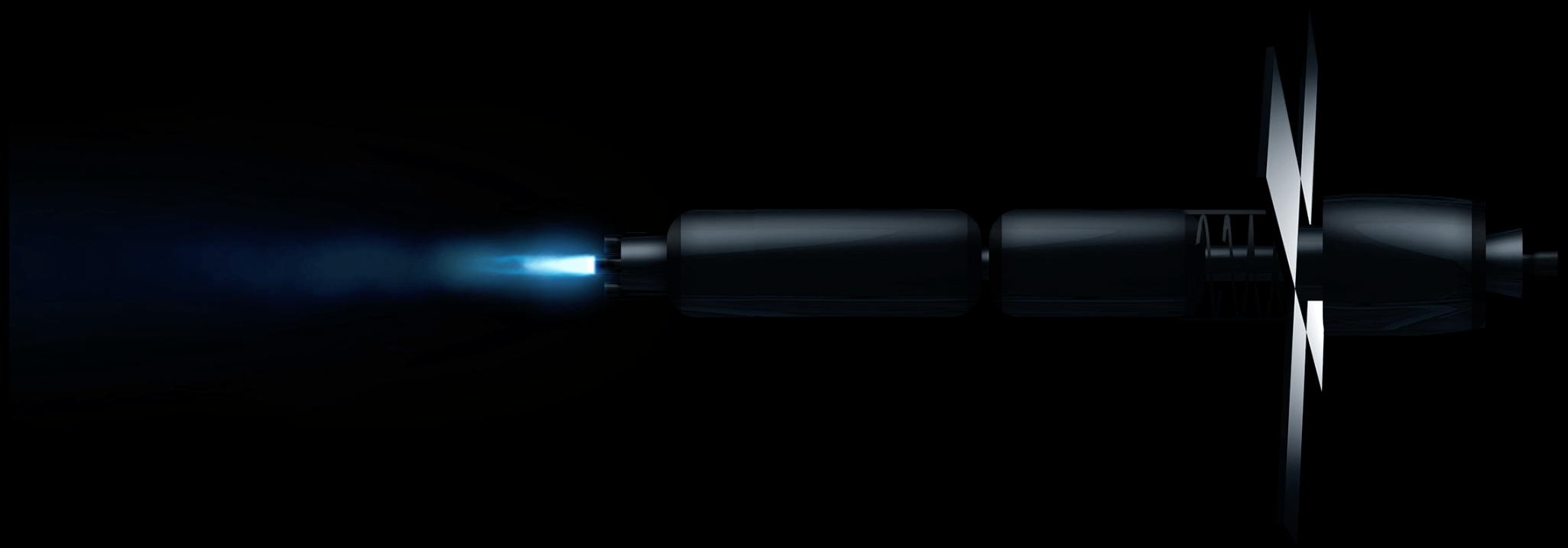


X-energy's Space Nuclear Portfolio

Dr. Bradley Rearden, Director

X-energy Government R&D Division

brad.rearden@x-energy.us

Presented to:
The New Space Race is Going Nuclear
American Nuclear Society Webinar
August 4, 2022

We design & build reactors and the fuel that powers them

Reactor: Xe-100

We're focused on Gen-IV High-Temperature Gas-cooled Reactors (HTGR) as the technology of choice, with advantages in sustainability, economics, reliability and safety.

Fuel: TRISO-X

Our reactors use tri-structural isotropic (TRISO) particle fuel, developed and improved over 60 years. We manufacture our own proprietary version (TRISO-X) to ensure supply and quality control.

Reactor: Xe-Mobile

To address the need for ground, sea and air transportable small power production. We've developed reactor concepts with potential civilian, government, remote community, and critical infrastructure applications.

Space Applications

NASA, DOE, and DOD are exploring our technology and fuel for nuclear thermal propulsion and fission power for the lunar surface.

X-energy Headquarters – Rockville, MD

350 full-time employees
35 full-time PhDs
45 full-time Masters Degrees
60+ employees with Secret Clearance

TRISO-X Pilot Fuel Facility
Oak Ridge National Laboratory

TRISO-X R&D Center – Oak Ridge, TN

320 MWe Xe-100 Deployment in Washington State by 2028 under $2.43B DOE Advanced Reactor Demonstration Program

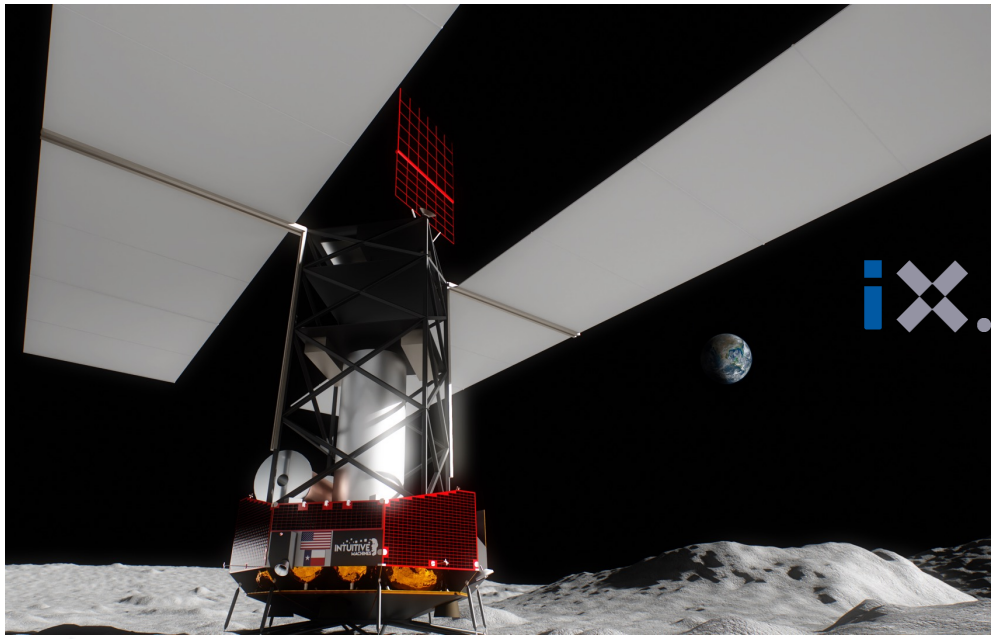
TRISO-X Fuel Fabrication Facility (TF3) – Oak Ridge, TN by 2025

Establishing Permanent Human Presence on the Moon

Lunar temperatures range from 233 °F(112 °C) in daylight down to -276 °F (-171 °C) during the lunar night. Sustainable power is required to enable permanent habitats and activities on the Moon.

Artemis Habitat Concept
NASA

IX = Intuitive Machines + X-energy



BOEING MAXAR

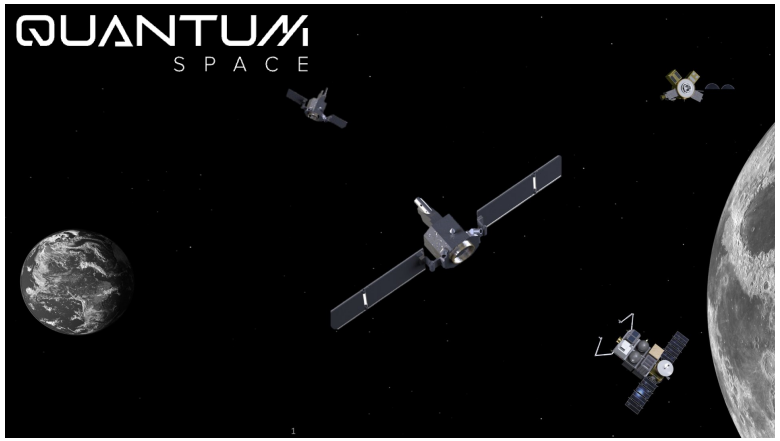
A joint venture of Intuitive Machines (IM) and X-energy, two companies founded by Dr. Kam Ghaffarian, IX assembled a best-of-industry team for a 1-year NASA funded study, combining capability in reactor design and operations, power conversion design, thermal management systems, and integrated space flight systems design with agility and an innovative culture to deliver a complete Fission Surface Power solution ready for spaceflight in the late 2020s.

IM has won three of the seven NASA Commercial Lunar Payload Services (CLPS) contracts, developed a lunar lander in 38 months, integrating 21 NASA and 6 commercial payloads.

Intuitive Machines mission control room
Houston, TX

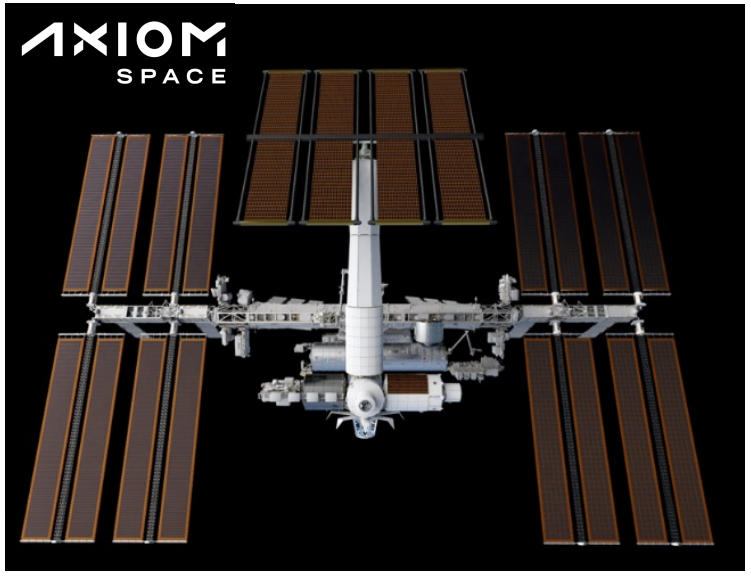
Cislunar Space Opportunities

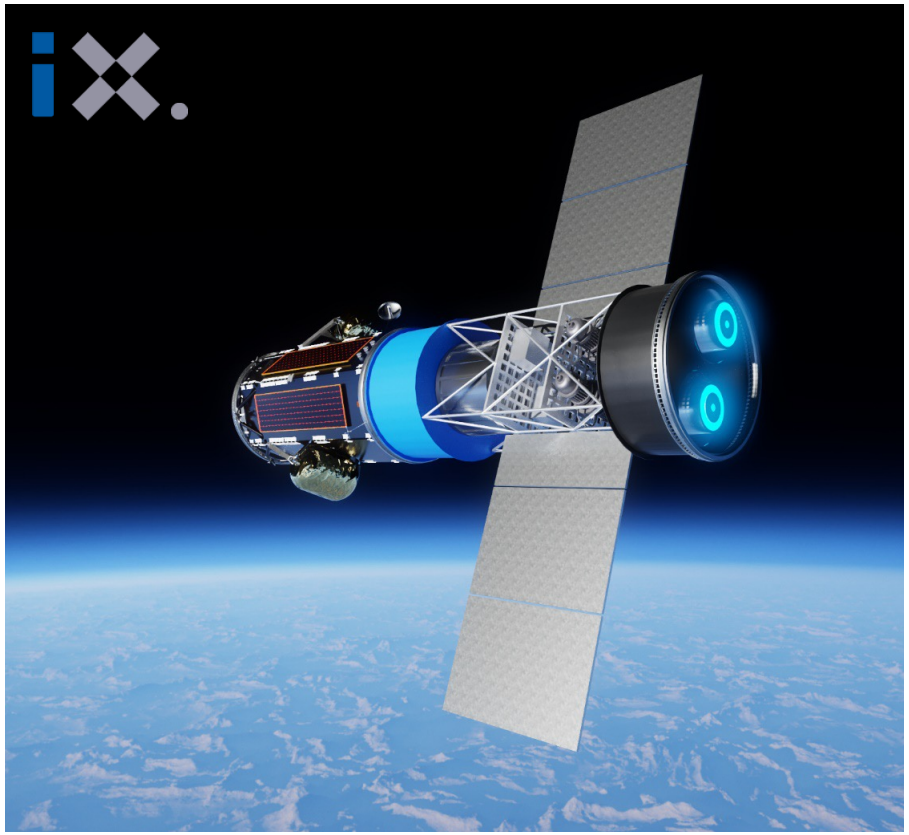
As of September 1, 2021, there were 4,550 operating satellites in proximate space to the Earth and only 2 satellites proximate to the Moon. Unique science, distinctive observations, untapped markets all await companies willing to venture into that blue ocean.



Quantum Space QS-1 mission is deploying to Earth-Moon L1 in 2024 and establishing a robotic outpost afterwards.

Axiom Space hosted the first commercial mission to the International Space Station and is developing Axiom Station with the first modules launching in 2024.

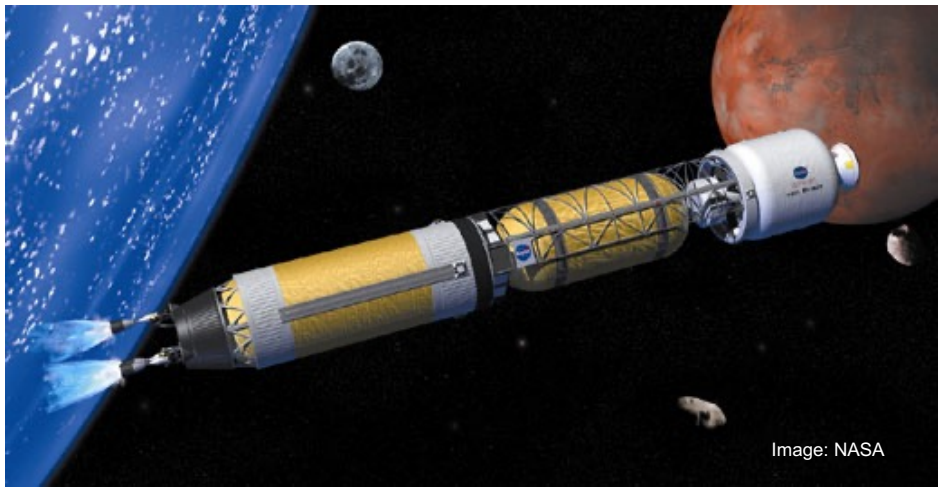




When integrated with a spacecraft and plasma ion thrusters, our mass efficient, long-lived FSP reactor also supports nuclear electrical propulsion (NEP) cislunar activities.

Our deep space NTP concept is also scalable to meet cislunar activity requirements.

Interplanetary and Deep Space Exploration



X-energy's Digital Twin Simulator

Our comprehensive modeling and simulation capabilities, advanced materials and nuclear fuels with TRISO-X, and digital twin simulators provide the needed expertise for mass efficient reactors and missions for sustainable power and propulsion.

X-energy's uniquely capable nuclear thermal propulsion technology solves numerous historical complications by taking a first principles approach to achieving a 900s I_{sp} and sustaining 12,500 lbs_f of thrust while avoiding core damage.

Our long-lived MW class HTGR with integrated direct Brayton power conversion system provides sustained power for interplanetary NEP missions.

Interplanetary MW-class NEP System