The Pylon: Near-Term Commercial LEU Nuclear Fission Power for Lunar Applications. C. G. Morrison[1], W. Deason[1], M. J. Eades[1], S. Judd[1], V. Patel[1], M. Reed[1], P. Venneri[1], [1]Ultra Safe Nuclear Corporation, Seattle, WA, 98199 (c.morrison@usnc.com)

Introduction: Nuclear energy provides not only the ability to survive the 354-hour lunar night, but the ability thrive. The exploration of Lunar resources in permanently shadowed craters and utilization of thermal energy to process local resources are task well-suited to nuclear energy. Yet, despite exceptional potential, nuclear energy is often omitted from further consideration due to technology development and policy considerations. However recent developments demonstrate that the technology development and policy challenges are surmountable and a near-term solution for nuclear energy in the Lunar environment is available.

Terrestrial Technology Suited for Lunar Environments: USNC is a commercial company that is developing a terrestrial gas-cooled micro-modular reactor (MMR) for off-grid and rugged locations on Earth. The MMR utilizes a novel refractory carbide nuclear fuel technology designed to optimize safety.

For the same reasons why the technology excels in remote terrestrial regions, it also excels in the space environment. The Pylon is a low enriched uranium (LEU) fission reactor system utilizing the core technology of the MMR for electricity on the Moon.

The Pylon is a near-term technology building upon the expertise and success of the MMR. The Pylon is a 4500 kg 125-150 kWe radiatively-cooled system Approximately 800 kW of waste heat at temperatures between 300-500 K is available for in-situ resource exploration and acquisition. In addition, up to 1150 K process heat is available. The Pylon design is such that it can be delivered to the Lunar Surface on a large CLPS class lander such as the Blue Moon. The temperature ranges are well-suited to utilize currently available directly-cycle Brayton energy conversion technology.

Conclusion: The Pylon fission power system can enable sustainable, power-abundant exploration, and lead to meaningful development on the Lunar surface.

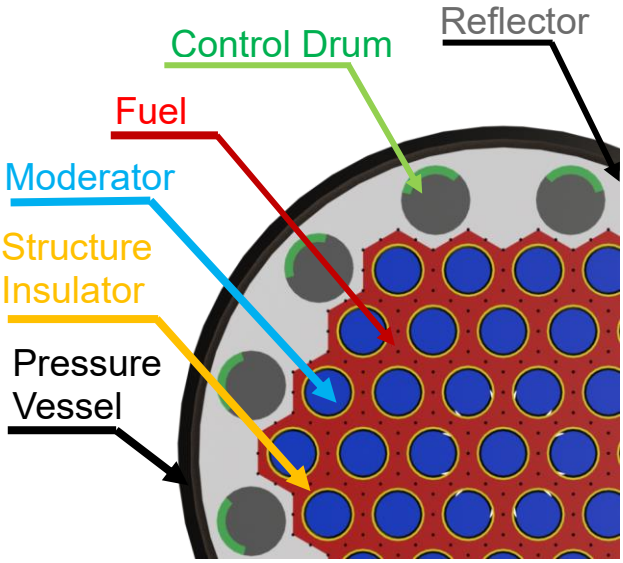

Figure 1: Reactor Core Design

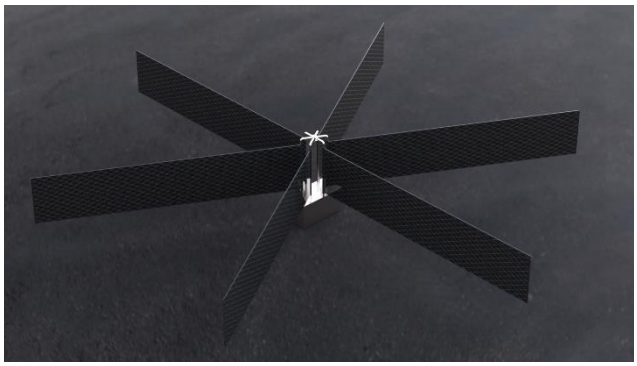

Figure 2: Notional Lunar Configuration