

IAF SPACE EXPLORATION SYMPOSIUM (A3)
Moon Exploration – Part 3 (2C)

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LUNEX PROSPER: THE NEXT GENERATION'S BLUEPRINT TOWARDS A SUSTAINABLE
HUMAN PRESENCE ON THE MOON

Abstract

The growing international momentum toward establishing a sustained human presence on the Moon raises critical questions about its economy, ethics, and sustainability. The emergence of a lunar economy could be the next step in this exploration momentum and includes the potential for economic activities as part of a planned stay on the lunar surface. This report combines an evaluation of current trends of the lunar economy with insights from the next generation, revisiting the historical milestones of lunar exploration in order to understand the evolution of key sectors. It explores the economic motivations behind lunar exploration, covering both commercial and scientific interests, and delves into sectors like mining, agriculture, life support systems, tourism, manufacturing, and infrastructure. This project assesses each sector's environmental impact and its scientific and economic considerations.

Sustained lunar exploration requires solutions in resource management, environmental stewardship, and regulation, which is inadequately addressed in current space legislation. The paper proposes a regulatory framework that balances private-sector priorities with public-sector socio-ethical priorities. This framework aims to ensure the long-term viability of lunar activities and protect the Moon's environment for future generations of humankind. Sustainability is a key pillar of this strategy, incorporating principles of resource management, environmental protection, renewable energy, circular economy, and community engagement.

In collaboration with the Luxembourg Space Agency and Space Generation Advisory Council, the LUNEX PROSPER Project synthesizes strategies and recommendations from the next generation's perspective, shedding light on the mix of opportunities and challenges that current lunar exploration presents. This project provides an in-depth analysis of these challenges, including a future outlook of the lunar economy, potential industries, and technological advancements. The paper emphasizes the importance of sustainable strategies and thorough risk assessment, aiming to pave the way for a future where lunar exploration and habitation are both viable and economically prosperous.