

22nd IAA SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND
DEVELOPMENT (D3)Strategies & Architectures as the Framework for Future Building Blocks in Space Exploration and
Development (1)

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INTRODUCTION OF THE STUDY RESULTS OF THE MOON ELECTRICAL POWER SYSTEMS

Abstract

Humankind, now, is looking for the habitation and the activity on the Moon as the new frontier land, and also the beginning of the pioneering of the outer planet. For the realization of this objective, the electric power supply is the essential social infrastructure on the Moon surface.

Ministry of Economy, Trade and Industry (METI) started work on the energy issues on the Moon including the feasibility study of the electrical power system with Mitsubishi Research Institute, Japan Space Systems, Institute of Space and Astronautical Science of Japan Aerospace Exploration Agency (JAXA), the universities and the industries.

The architecture of the Moon electrical power infrastructure is found to be more like those of the power infrastructure of the earth than expected, and consisted of the power generation, power distribution grid and the power storage, and supplying electrical power to the consumer. The differences are that the power transmission cannot use high voltage power line due to the plasma discharge issues, and the weight efficiency exceed the power efficiency considering the transportation cost from the earth.

The power generation consisted of not only by the solar array on the surface of the Moon but also from the Moon orbiting power satellite. The power grid consisted of not only the wired power line but also via wireless power transmission for the long distant transmission case. The details of the findings and the outline of the configuration of the electrical power system will be presented.

The study also extended to more detailed element options which consisted of the subsystems, and studied whether their characteristics and adaptability for the Moon electricity power system. Finally, the possible system options for the phased development of the Moon manned activities from the year of the late 2020th to the 2040th will be introduced.