

15th IAA SYMPOSIUM ON VISIONS AND STRATEGIES FOR THE FUTURE (D4)
Space Mineral Resources, Asteroid Mining and Lunar/Mars insitu (5)

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A FEASIBILITY STUDY ON IN-SITU RESOURCE UTILISATION ON THE MOON FOR SOLAR
PANEL PRODUCTION: A TECHNICAL AND ECONOMIC ANALYSIS

Abstract

Renewed interest in the Moon requires the analysis of the feasibility of several key technologies, of which one is in-situ power generation capabilities. This paper analyses the lunar environment and its advantages and disadvantages for lunar solar cell production. The abundances of elements on the lunar surface are reviewed with a focus on elements used in current solar cell technologies.

Earth based solar cell technologies and their production processes are also discussed, with a focus on utilising the elemental abundances found on the Moon. Based on the findings from the lunar environment and solar cell technologies, the preferred technology for use on the Moon is suggested and expanded upon. From the research, it is concluded that it is possible to produce solar cells from the lunar regolith with our current technologies. A conceptual design for a lunar production facility is proposed and justified.

Finally the economic viability of a lunar production facility is analysed. To be able to make an economic model and compare a production facility to sending solar cells from Earth, some key assumptions are made on the mass, cost and production rate of such a facility. Based on these assumptions it is clarified at which point it becomes economically feasible to send a production facility rather than sending the solar cells directly from Earth. Finally it is concluded that the economic viability is largely dependant on the energy consumption and population of a lunar base.