

IAF SPACE POWER SYMPOSIUM (C3)
Solar Power Satellite (1)

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SPACE-BASED SOLAR POWER: AN AMBITIOUS SPACE PROJECT FOR HUMANITY

Abstract

Space-based Solar Power (SBSP) is a novel approach to energy production that represents a significant shift in the way we think about and utilize energy. SBSP offers several advantages over traditional forms of energy generation, such as its availability 24/7 and its ability to provide a stable and reliable energy source that can power homes, businesses, and industry, mitigating the impacts of climate change and reducing our dependence on fossil fuels. Additionally, SBSP presents the potential to improve access to power in remote or hard-to-reach areas. To unlock the full potential of SBSP, modular systems engineering is essential. This innovative approach enables the development of SBSP in a flexible, scalable, and manageable manner, making it easier to achieve and maintain the project. The modular design enables the development of the entire system in stages, minimizing risk and facilitating the overall maintenance of the project. Furthermore, modular systems are more easily maintained and upgraded over time, ensuring the long-term sustainability of the SBSP system. Contrary to popular belief, the implementation of SBSP does not necessitate the introduction of breakthrough technologies. Instead, all necessary technology already exists and can be integrated into a modular system. The main challenge in the SBSP system is the engineering of massive structures, which can be overcome with the right approach. This paper will discuss the critical engineering challenges of SBSP, such as the development of massive structures required for SBSP, and how modular systems engineering can overcome these challenges. We will provide a high-level analysis of modular systems engineering, highlighting its benefits in developing a flexible, scalable, and manageable SBSP system that can be built and tested in stages, minimizing risks and enabling its overall maintenance. Additionally, we will examine the available technology required for developing SBSP and discuss how it can be integrated into the modular system. Finally, we will explore the potential of SBSP in providing energy to remote or hard-to-reach areas for terrestrial, cislunar economy and beyond.