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

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SPACE SOLAR POWER - 2023 SURVEY OF PUBLIC AND PRIVATE INITIATIVES

Abstract

The urgency and relevance of exploring new green energy sources have never been greater. In addition to the decarbonization challenge, recent geopolitical crises have created turmoil in energy markets, leading to a surge in electricity prices. Space-based solar power (SBSP) has been proposed as an alternative energy source to address these challenges. By providing a virtually limitless source of clean energy and with the ability to reach remote areas around the world that currently lack access to reliable electricity, SBSP has the potential to revolutionize the energy sector.

The concept of Space-Based Solar Power (SBSP) has gained significant momentum in recent years, with various trends converging to make large-scale solar power plants more realistic. Factors such as Starship, in-space assembly, power beaming, and other performed and upcoming demonstrations in space coupled with key technological advancements on the ground have all contributed to this.

This paper presents a comprehensive analysis of the SBSP market, including existing private and public projects, funding schemes, and enabling technologies. To start, a short history and literature review for space solar power and power-beaming will be provided. Much has been written about it, however, this paper covers the latest publications and reports.

The first part examines enabling trends and technologies, including efficient solar panels, low-cost launch, advanced wireless power transmission technology, in-space robotics and assembly, energy storage, and distribution capabilities. Focusing on what has been done and what needs to happen for SBSP to be developed and with the right timing. This section will explain why the time for SBSP is imminent and how research and development in this field may have additional beneficial applications, particularly if economic sustainability is not achievable within the forecasted timeframe.

The second part of the paper presents a statistical overview of companies that are or intend to be active in the SBSP market. A combined table and a paragraph for each surveyed SBSP activity will be included. The findings include past companies, present-day startups, and government initiatives, such as those by ESA, UK, NASA, Japan, and China. This data will entail information such as founding years, planned demonstrations, funding amount, and geographic locations.

The third part looks at the financial landscape, including funding schemes proposed by institutional actors and the focus of private funds. The aim of the paper is to understand the current landscape and future opportunities for SBSP.