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CURRENT AND FUTURE DEVELOPMENTS IN SOLAR ARRAY TECHNOLOGY FOR
SPACE-BASED SOLAR POWER.

Abstract

Space-based solar power (SBSP) is a potential renewable energy source that could provide power 24/7 without atmospheric interference, making it a promising option to meet global energy demands. This article presents a comprehensive review of current and future technological advancements in solar arrays for SBSP.

The review provides an overview of the advantages and disadvantages of each type of solar array in terms of efficiency, cost, durability, and weight. For example, single-junction silicon solar cells are the most commonly used type in SBSP due to their high efficiency and reliability, while thin-film solar cells offer the advantage of being lighter and more flexible, albeit at a lower efficiency.

The paper also discusses recent and upcoming advancements in solar array technology, including the use of new materials and designs to improve efficiency, durability, and reduce weight and cost. For example, researchers are developing materials capable of withstanding harsh space environments, such as radiation and extreme temperatures. Novel designs, such as bifacial and tandem solar cells, are also being explored to capture a wider range of the solar spectrum and improve efficiency.

Understanding the size and capacity of solar arrays used in space can help appreciate the potential of SBSP. For example, the International Space Station's array has eight solar panels with a total capacity of 84 kilowatts, whereas the Japan Aerospace Exploration Agency's proposed SBSP system would be a 1-gigawatt solar power station in geostationary orbit, capable of powering 500,000 homes.

In conclusion, this article provides a comprehensive review of various types of solar arrays for SBSP, including their current and future technological developments. By presenting an overview of the present state of solar array technology and future research directions, this article aims to contribute to the development of SBSP as a promising renewable energy source.