

## SPACE-BASED SOLAR POWER: A TECHNICAL, ECONOMIC, AND OPERATIONAL ASSESSMENT

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The concept of generating electrical power from solar energy using satellites and then transmitting that power to Earth is decades old and is generally considered to be technically feasible. If successful, such systems could provide constant access to almost unlimited power and thus could play a significant role in U.S. national and international energy security strategies. However, the practical application of this method of power generation requires economical and operational feasibility as well. This monograph examines the current progress of space-based power in three areas: technology, economy, and operations. The scope of discussion is at the survey level of detail to provide senior policymakers, decisionmakers, military leaders, and their respective staffs an overall appreciation for the challenges, opportunities, and risks associated with space-based solar power systems.

This monograph has three main sections:

1. Technical Assessment. This section introduces the basic concept of space-based solar power (SBSP). It then summarizes the evolution of the concept's development as documented in six major reports written over the past 37 years. Finally, this section examines the critical technologies required for the successful development of the space, ground, and support elements of the system.

2. Economic Assessment. This section examines SBSP system cost estimates from a variety of sources. It then compares these costs to competing alternative energy solutions such as terrestrial-based photovoltaic power plants. The section also addresses regulatory factors that may affect the development and operation of SBSP systems as well as current international efforts in this field.

3. Operational Assessment. This section explores the strategic considerations for SBSP systems within the general context of national space operations. It then examines potential garrison-level applications and compares these to the current plans of the Army's Energy Initiatives Task Forces to integrate terrestrial-based photovoltaic power into the energy systems of several major installations. Finally, the section briefly explores possible SBSP applications to support remote operating locations.

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