

SPACE POWER SYMPOSIUM (C3)

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SOLAR ENERGY FROM SPACE: THE RESULTS FROM AN INTERNATIONAL ASSESSMENT OF OPPORTUNITIES, ISSUES AND POTENTIAL PATHWAYS FORWARD

Abstract

During the past decade, international concerns have grown regarding the issues of climate change, sustaining global economic development and the increasing cost of energy. These have resulted in dramatically increased interest in topic of space solar power (SSP). At the same time, a wide range of impressive advances in key component and subsystem technologies have enabled new, highly promising SSP systems concepts. Despite the numerous SSPS efforts of individual countries and programs, and regardless of the need for greater understanding of the prospects for, and limitations of this concept, there has never been an integrated international assessment of the technological, market and legal conditions under which SSPS might become economically viable. In particular, the International Academy of Astronautics (IAA) has never conducted a technical study addressing the concept of SSP and/or solar power satellites (SPS). As a result of these considerations, in 2008 the IAA (through Commission 3, which addresses space systems and technologies) initiated a focused review and assessment of the SSPS concept.

The overall goals of this study were to determine what role solar energy from space might play in meeting the rapidly growing need for abundant and sustainable energy during the coming decades, to assess the technological readiness and risks associated with the SPS concept, and (if appropriate) to frame a notional international roadmap that might lead the realization of this visionary concept. Because significant advances in space solar power systems could have a profound and positive impact on human and robotic space exploration capabilities as well as a range of space applications, the study identified such opportunities and evaluated the potential for synergies (if any) between these benefits for space missions and SSP for terrestrial markets. Finally, there have long been discussions of the potential role that extraterrestrial resources might play in SPS architectures; the study also sought to identify these opportunities and assess potential connections between international space exploration programs and SSP.

This paper will review the results of this Academy study, including key findings, a high-level technology assessment and a conceptual international roadmap for a potential path forward during the coming years.