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Author: Mr. Armando Vittorio Atzori
Politecnico di Torino, Italy

Mrs. Martina Foschi
Italian Institute of Technology (IIT), Italy
Dr. Remo Proietti Zaccaria
Italian Institute of Technology (IIT), Italy
Prof. Marcello Romano
Politecnico di Torino, Italy

ORBITAL CAPACITY AND MAXIMUM POTENTIAL ENERGY OUTPUT FOR A SPACE-BASED SOLAR POWER CONSTELLATION

Abstract

As the global demand for sustainable energy solutions intensifies, the spotlight turns to innovative technologies, with Space-Based Solar Power emerging as a promising route. The aim of this paper is to achieve, to the best of Authors' knowledge, the first global assessment of the maximum power output of a network of Space-Based Solar Power stations in Earth's orbit. This paper draws inspiration from Cristina Archer's and Mark Z. Jacobson's work, "*Evaluation of global wind power, Journal of Geophysical Research: Atmospheres 110.D12 (2005)*", proposing a similar evaluation for wind-power systems.

First, a few baseline scenarios are chosen, based upon the existing literature, in terms of leading mission and system design. Selected orbital regimes will be chosen, together with possible architectures and related expected performance of each Space Based Solar Power Station along that orbital regime. Second, the maximum orbital capacity will be determined for each orbital regime chosen above, considering the characteristics of each station. Third, the maximum power output will be quantitatively evaluated for each orbital regime populated at maximum capacity.

The proposed study aims at establishing a framework for the evaluation of the potential energy output achievable for planet Earth through Space-Based Solar Power systems. This will enable comparison of Space Based Solar Power with other renewable energy systems, and foster further research and discussions on this promising technology.