

IAF SPACE POWER SYMPOSIUM (C3)
Wireless Power Transmission Technologies and Application (2)

Author: Mr. Harshit Goel
University of Petroleum and Energy Studies, India, hgoel412@gmail.com

SPACE BASED SOLAR POWER SYSTEM: SOLAR POWER COLLECTION IN LEO AND
TRANSMISSION VIA ELECTROMAGNETIC WAVES**Abstract**

Solar energy has been around since the times of ancient Romans. When they used to bounce back the sunlight to light up their flame torches. However, since the discovery of the first solar panels in the 1880s, everything changed. Nowadays, Solar energy is being used in almost every space mission, industry, power grid, etc, because it is clean and renewable. Even though Solar power plants are being built on a large scale, it is not enough to power our entire planet; Building more solar plants is not an appropriate solution to harness sufficient solar power; as access to sunlight is limited on ground level. However, If the solar panels are placed in LEO, the solar arrays will be exposed to 24 hours of sunlight. The captured solar energy can be propagated to the earth in the form of electromagnetic waves. These Electromagnetic Waves shall be transmitted to the Earth-Based Power Collectors that will further convert the Electromagnetic waves into Electrical Energy. These Collectors shall be located at various sites to track the orbit of the SBSP system. Several experiments and researches are being carried out to develop the SBSP technology by organizations such as JAXA (Japan Aerospace Exploration Agency); For such an efficient SBSP system, we need to place it in an appropriate orbit; from there it shall smoothly coordinate with the sun and the Earth-Based Power Collectors. This paper presents a futuristic study on Space-Based Solar Power Systems that can be the ultimate source of energy in the upcoming decades. Trade studies for the appropriate Solar PV modules and orbital design will be provided; Subsystems of the Space Based Solar Power System will be discussed in detail. This paper will also take a trade study on the most efficient Power transmission techniques from the Space based Solar power System to Earth-Based Power Collectors. Modelling and Simulation analysis will be performed to obtain the comprehensive tables and graphs, that will depict the estimated power generation and transmission efficiency of the system. In addition, prerequisites to such an advanced system will be given in detail. However, the possibility of such systems is very less for this decade. It is essential to do these exercises as they can be the key to an optimum source of energy.