

IAF SPACE POWER SYMPOSIUM (C3)
Solar Power Satellite (1)

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SPACE SOLAR PHASE 1A PROGRAMME – DEVELOPING SPACE-BASED SOLAR POWER

Abstract

Space Solar has established an expedient programme to develop, commercialise and scale Space-Based Solar Power (SBSP) in time to meet Net Zero commitments. The programme has been designed to mature and prove the various technologies that make up SBSP within 6 years, resulting in a megawatt scale orbital demonstrator. From year six to twelve, a 100 MegaWatt and GigaWatt class operational and commercial system will be delivered, alongside the required industrialisation facilities.

The programme approach is based on de-risking key aspects, delivering demonstrators in phases and developing the manufacturing infrastructure and supply chain logistics to scale up SBSP.

Space Solar is developing the patented CASSIOPeiA (Constant Aperture Solid State Integrated Orbital Phased Array) Solar Power Satellite, it offers the potential for distinct and unique advantages over other international designs including best in class specific power, baseload continuous power from a single system, a fully solid-state design and with a highly competitive Levelised Cost of Electricity (LCoE).

Over the past year Space Solar's has performed a series of design sprints to further develop the CASSIOPeiA architecture, investigating all subsystems and providing deeper dives into areas of risk within the concept such as thermal and structural design and dynamics. Alongside the design work a physical 360 retrodirective power beaming experiment called HARRIER has been constructed, demonstrating the unique CASSIOPeiA helical structure. This is providing valuable de-risking and validation of the RF analytical modelling, as well as developing the team and its partners for Space Solar's value-led, rapid development approach.

This paper will discuss these Phase 1A activities describing the current design baseline, it's subsystems and validation methods, and will provide an overview and the preliminary results from HARRIER.

These activities, in combination with the work conducted under the SBSP Innovation programme funded by the UK Space Agency and the Department of Energy Security and Net Zero, are delivering an in-depth study of CASSIOPeiA, providing greater levels of fidelity and further confidence that CASSIOPeiA is not only viable but one of the world's leading architectures for Space-Based Solar Power.