

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

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THE UK SPACE ENERGY INITIATIVE – TOWARDS A PRACTICAL SPACE BASED POWER
SYSTEM FOR THE NET ZERO ERA**Abstract**

The UK has set out an ambitious national clean energy policy – Net Zero – aimed at fully decarbonising its economy by 2050. This future energy scenario requires clean and sustainable energy generation from renewable sources for homes and industry. This energy generation must at the same time remain affordable, reliable and secure if the economy is to thrive. Space Based Solar Power (SBSP) – the concept of harvesting free solar energy in space, beaming it to Earth safely as microwaves, for collection and distribution as electricity through the National Grid – offers a range of characteristics which could help the UK to deliver Net Zero, with a new source of abundant, sustainable power. The Space Energy Initiative (SEI) has brought together more than 100 participants from government, research and industry in the energy and space sectors to develop and deliver a coordinated programme of technology development and demonstration aimed at implementing a practical in-orbit demonstration by 2030, with the first of a kind operational system delivering power into the grid by 2040. The first generation of Solar Power Satellites (SPSs) would be in operation by the mid-2040s, replacing a substantial proportion of the UK's legacy fossil fuel energy generation capacity. In this paper we describe the SEI programme and its development approach, and we focus on the current Phase 0 technological baseline of the CASSIOPeiA SPS concept, with an analysis of several candidate orbits including Geostationary Earth Orbit (GEO), Highly Elliptical Earth Orbit (HEO/HEO-Cobra), Molnya Orbit and “sweet-spot” Medium Earth Orbit (MEO) from the perspective of practical construction in orbit and the impact of the radiation environment on mission longevity. Prospects for an early Low-Earth Orbit demonstrator are also discussed.