

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

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SPS-ALPHA: EVOLVING MARKETS, CAPABILITIES AND CONCEPTS OF OPERATIONS FOR
MODULAR & PRACTICAL SPACE SOLAR POWER (SSP)**Abstract**

Several new capabilities, changing market opportunities, and novel concepts have emerged during 2021-2022 that will positively impact prospects for economically feasible, hyper-modular space solar power (SSP) systems. These include (1) launch, (2) carbon-driven pricing, and (3) more sustainable concepts of operations (CONOPS) for both the space and ground segments. First, expected launch rates and costs, and a schedule to begin operations have now been announced by SpaceX for its planned 'Starship + Heavy Booster' reusable two-stage-to-orbit (TSTO) launch system. At the same time, a number of other countries and companies, including Blue Origin (from prior planning), China, Japan, the European Space Agency (ESA), Honda, and even Rocket Lab in New Zealand have all announced plans to follow with their own reusable launchers. It seems now inevitable that truly low-cost space access is coming – and before the end of this decade. In addition, ambitious carbon net-zero goals have been announced by multiple countries during the past two years or so. However, in late 2021 at the COP26 (Conference of the Parties) meeting in Glasgow, Scotland (UK) it was evident that there is no easy solution to the challenge of carbon emissions driving climate change. As a result, the prospects now appear likely for carbon policy-driven pricing on low emissions technologies, such as space solar power that will dramatically increase their economic attractiveness, making it more likely that perceived risks in such new technologies can be overcome. And, lastly there is continuing concern regarding orbital debris and operations risks that must be addressed by space solar power proponents in order for SSP to be realized. There are a number of new concepts and CONOPS that can improve expectations for the operations of future SSP systems.

This paper will review the changes of the past 1-2 years, and frame an integrated view of how they impact the technical viability and economic viability of modular SSP systems such as SPS-ALPHA (solar power satellite by means of arbitrarily large phased array).