

SPACE POWER SYMPOSIUM (C3)
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BUSINESS CASE FOR A CONSTELLATION OF 6U SOLAR POWERED CUBESATS IN LEO

Abstract

This paper presents analysis of the business case for launching a constellation of 6U Solar Power CubeSats (SPCS) to low-Earth orbit (LEO) to provide power to other spacecraft. This approach may prove economically feasible as a business endeavor as it allows regulated power to be transmitted in a high-density manner (via high-frequency RF: 900 kHz or above), reducing the collection surface area required on the consumer spacecraft and removing (or significantly reducing) the requirement for energy storage and regulation hardware.

Several 6U SPCS units can target their energy streams on a single location to provide the aggregate level of power to a particular craft; alternately, each 6U SPCS can target up to three locations allowing each to use a portion of the energy capacity. By separating the solar collection hardware from the consumption, solar cells can be replaced once degradation has rendered them unsuitable for use. The constellation will be arranged so that the orbital customer base is provided with access to continuous power.

This paper presents a model of the economic value of a constellation of 6U SPCS as a source of power to orbital spacecraft. In-space activities represent a potentially large market that can perhaps be served by a constellation of 6U SPCS units. Value estimates are projected from previously published data. Prospective technological innovations that may compete with or be complementary to SPCS are detailed and their impact upon this model is considered. The impact of the current economic downturn and prospective actions of other nation-state actors is also evaluated and applicable changes to the model are discussed. The paper presents a prospective pathway to implementation in the near term, utilizing current technology. The paper concludes by presenting a road map indicating what technologies are required to create economic viability for the 6U SPCS constellation and identifying technologies that would significantly increase service return on investment (ROI).