

Solar Power Satellites: Reconsideration Based on Novel Approaches

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Abstract : Solar power satellites (SPS), despite their promise as a clean energy source, have been relegated out of consideration due to their enormous cost and technological challenge. It has been suggested that for solar power satellites to become economically feasible, launch costs must decrease from their current \$20,000/kg to < \$200/kg. Even with the advent of single-stage-to-orbit launchers which propose launch costs dropping to \$2,000/kg, this will not be realized. Yet, the advantages of solar power satellites are many. Here, I present a novel approach to reduce the specific cost of solar power satellites to ~\$1/kg by leveraging two enabling technologies - in-situ resource utilization and 3D printing. The power of such technologies will open up enormous possibilities for providing additional options for combating climate change whilst meeting demands for global energy. From the constraints imposed by in-situ resource utilization, a novel approach to solar energy conversion in SPS may be realized.

Keywords : clean energy sources, in-situ resource utilisation, solar power satellites, thermionic emission

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