IAF SPACE POWER SYMPOSIUM (C3)
Space Power Systems for Ambitious Missions (4)

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SOLAR POWER FOR ON-SITE ORBITAL USE : THE SPACE DATA CENTERS SYSTEM CONCEPT

Abstract

Data centers are fast becoming one of the topmost energy consumers of the planet. Given the exponential development of the digital sector, they could account for up to 20The deployment of data center infrastructures in orbit would prompt the rapid development of key technologies needed for space based solar power (SBSP), such as high power solar generation and distribution, robotics for in-orbit assembly, maintenance, servicing, debris mitigation, etc. These large space infrastructures would also justify the development of a European heavy lift, green, and reusable launcher, and the space logistics ecosystem necessary for the transport, assembly, and operations of such infrastructures in orbit. Significant space data center capacity would not only contribute to Europe's energy independence and carbon neutrality; it would also allow for global information management, faster reaction to environmental events, and contribute to European data sovereignty and security. The standard and modular nature of data center electronic servers would allow for incremental on-orbit installation, which would give Europe a head start in operational on-orbit infrastructure assembly, operations and maintenance. An end-to-end demonstration system could rapidly be deployed, bypassing potential regulatory and political hurdles associated with beaming power from space towards Earth. This paper will present the results of the European Commission ASCEND (Advanced Space Cloud for European Net Zero Emissions and Data Sovereignty) study, started in January 2023, which assessed the potential effectiveness of space data centers, in Europe's effort to reach the Green Deal objective.