

SPACE POWER SYMPOSIUM (C3)
Space Power Experiments Applications and Benefits (4)

Author: Mr. Claude Cougnet
EADS Astrium, France, claude.cougnet@airbus.com

Mr. Bernard Gerber
EADS Astrium, France, bernard.gerber@airbus.com

Mr. Frank Steinsiek
EADS Astrium Space Transportation GmbH, Germany, frank.steinsiek@airbus.com

Mr. Robert Lainé
EADS Astrium, France, Robert.LAINE@airbus.com

Mr. Matthew Perren
EADS Astrium, France, Matthew.Perren@airbus.com

THE 10 KW SATELLITE: A FIRST OPERATIONAL STEP FOR SPACE BASED SOLAR POWER

Abstract

A SBSP system aims to provide on Earth a renewable source of energy. It relies on the solar energy collected by the space element and transmitted, via laser or RF, to Earth on adapted receivers. It will be in general a complementary source of energy. Such a system is very challenging in terms of technology, environment constraints, safety aspects and implementation. It is however a significant step toward the development of future energy sources. This paper proposes the roadmap for such achievement. A first step will be the development of a satellite providing about 10 kW to the ground end user. Such a satellite will be a prototype used both for an overall system demonstration and as a first operational system at 2020 horizon. Indeed, it will allow to demonstrate both enabling technologies and system performances and operations. It will also be used to provide a service on demand to potential users. This satellite will be compatible of an AR5 single launch in GTO and will be positioned in GEO. The power transmission is ensured by a high power laser, working at 1.55μ for safety reasons and providing an emitted power of more than 10 kW. Such a laser has to be developed. Apart from the laser, a large diameter telescope is used to minimise the laser beam foot-print on ground and thus the receiver size. The satellite has to provide a very high power as input to the laser system, thus requiring very large solar arrays, much beyond what is currently done in Europe. Another critical technology is the heat extraction and rejection systems, needed to ensure the thermal control of the laser system. The required pointing accuracy of the laser system will require closed loop control between the satellite and the receiver. Thus, a road map has been established in order to identify the main steps of the needed technology development and the demonstration strategy, relying on both ground and in-orbit tests. A first in-orbit demonstration could rely on existing telecom platform to support the demonstration of key technologies, such as the power laser. In this demonstration, the laser will be limited in power to remain compatible with the hosting platform capabilities, the objective being the validation of the technology and also a first demonstration of the capability to provide power from space to ground.