

44th SYMPOSIUM ON SAFETY AND QUALITY IN SPACE ACTIVITIES (D5)  
A Big Challenge : Safety in Aerospace Missions (1)

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## ENERGY SUPPORT FOR MISSIONS IN NEAR EARTH SPACE

**Abstract**

For increasing safety a design concept of energy infrastructure for near Earth space based on coherent light is described. The approach is based on small numbers of spacecraft orbiting in highly specific configurations that are always in position to receive energy from our Sun and to deliver energy anywhere and anytime as a system in near Earth space. These configurations also offer the maximum possible performance and minimum cost of key elements, such as the optical systems and number of spacecraft. Methods for ensuring safe transmission of laser energy has been researched and tested at University of Alabama in Huntsville. Many more methods for insuring safety will be reviewed. The method we recommend only provides average intensity close to that of sunlight. The virtual absence of atmosphere provides an extremely favorable opportunity for delivery of energy in forms having the minimum possible uncertainty in both space and time. The unique capabilities offered by minimizing distortion and uncertainty creates an opportunity for an energy infrastructure offering close to the ideal infrastructure allowed by physical laws for both human and remotely controlled activities in space. Design criteria are also examined for assisting distressed space craft in need of trajectory change or energy. This includes the possibility of using the delivered energy to augment the performance of an air-breathing engine, such as a scram jet. General support of activities in space, such as raising and lowering of orbits and debris removal are also addressed. Our preferred system is intended to convert sunlight directly to coherent light at high efficiency. Alternatives are conversion of sunlight to electrical energy and then conversion of the electrical energy to laser light, or use of yet other sources of energy. We see this energy infrastructure as offering a function for near Earth space similar to the introduction of electrical energy infrastructures on Earth. The goal is to reduce dramatically the cost of accessing and working in space while also increasing the safety and overall capability.