SPACE SOLAR POWER

(Memo 6/10/99 from Lawrence Roberts, Chair of NSS Policy Committee setting forth latest position paper from Policy Committee )

The National Space Society encourages research and development in technologies to obtain power from space for use on Earth. Space solar power (SSP) can consist of solar collectors in geostationary Earth orbit, in other Earth orbits, or on the Moon. SSP-related operations may involve collection of solar power for use at the collection source, transmission from one point in space to another, or transmission from space to a stationary or mobile receiver on Earth.

SSP has the potential to provide abundant power for the Earth's growing population in a manner that is environmentally benign. Because solar energy in high Earth orbit is inexhaustible and continuous, the limitations of Earth-based conventional and renewable energy systems are overcome. Furthermore, no breakthroughs in physics are needed. Substantial technological and regulatory development, however, will be required in order to tkae full advantage of this tremendous resource.

SSP can provide the economy of scale necessary to lower the cost of access to space. Technologies such as beam-powered propulsion can benefit from SSP, and in turn, further lower launch costs. In the longer term, the cost and environmental impact of space launches can be minimized by constructing solar power satellites from materials obtained from the Moon and asteroids. The scope of human economic activity will thus move beyond the Earth.

As the space industrial infrastructure increases, the technology developed to provide Earth with power can further enable the exploration and development of space. The use of space resources and the technologies developed to build large structures can be applied to habitats on the surfaces of planetary bodies, as well as in free space. Wireless power transmission and efficient solar collectors can become an important part of the energy infrastructure for settlements. Beam-powered spacecraft can open up the outer solar system.

NSS suggests that a regulatory framework conducive to SSP development be put in place. The Industrial, Scientific, and Medical (ISM) bands in the radio spectrum, which can be used for power beaming, must not be reallocated for other purposes unless other bands are reallocated to ISM. Power beaming may cause some degree of unwanted radio emissions outside the currently allocated ISM bands. It may be advisable to shift these bands in such a way so that unwanted emissions from one ISM band fall within other ISM bands, rather than in communications bands. This will ensure that power beaming will not interfere with communications. Air traffic control regulations must consider the need to route aircraft around power beams. Moreover, U.S. and international regulatory agencies are urged to consider allocating frequencies for space-to-space power beaming.

Finally, certain locations in space, such as geostationary orbit or the regions where the Earth's and Moon's gravitational fields balance (e.g., L5), may be best suited to solar power satellites or space manufacturing facilities. Because such locations are a limited resource, legal regimes must be devised so that the rights to their use are allocated in a manner that is

equitable, while providing incentives for economic development. As the technology to build solar power satellites from lunar or asteroidal materials matures, legal regimes for space property rights will need to be put into place as well.

An appropriate combination of public and private sector funding can encourage SSP development. In the near term, government agencies such as NASA and the Department of Energy can lower the technological risk by funding technologies such as efficient solar cells, wireless power transmission, advanced space transportation systems, and space resource utilization. Whenever feasible, existing assets such as the International Space Station can be used. As the technologies are proven, private industry can then lead the way toward commercial development of space. SSP research and development will thus foster international cooperation in the short term, while increasing the wealth of nations and protecting the Earth's environment in the longer-term. As the quality of life on Earth improves, near-Earth space can be opened up to private citizens, while deep-space scientific missions can be made more affordable.