

INTERNATIONAL ASTRONAUTICAL CONGRESS

TOULOUSE, FRANCE, OCTOBER 1-5, 2001

19<sup>th</sup> IAA/IISL SCIENTIFIC-LEGAL ROUNDTABLE  
ON

SCIENTIFIC AND LEGAL IMPLICATIONS OF ESTABLISHING SOLAR POWER  
SYSTEMS ON THE GEOSTATIONARY ORBIT

October 3, 2001, 14.00-17.00

Coordinator: Bryan Erb (Canada)

Chairpersons: Bryan Erb (Canada) and Marcia Smith (USA)

Rapporteur: Kai-Uwe Schrogl (Germany)

Preparing for the design and future operation of solar power systems (SPS) responds to the task to further meet the energy needs of a growing world population. SPS have been conceptualized as early as the late 60s. Since then, numerous studies on technology as well as economic aspects have been produced and experiments on various technologies have been conducted. This roundtable intended to provide a fresh look on the scientific and legal implications of establishing SPS in particular on the GSO. It was conducted as a complement to a Space Power Symposium, which was held in parallel at the International Astronautical Congress and which encompassed four sessions of primarily technology and economics oriented issues.

The roundtable was introduced by the Chairman of the IAA/IISL Scientific Legal Liaison Committee, Vladimir Kopal. It was co-chaired by Bryan Erb and Marcia Smith. Four papers were presented, two dealing with technical aspects, two dealing with legal, regulatory and economic issues. Considerable time was given to a discussion in which, at some time, around forty participants actively engaged.

**Speakers:**

**Topics:**

John C. Mankins (USA)

The International Spectrum Management Process and Selected Technical Background for Space Solar Power  
(the paper was presented by Richard M. Dickinson)

Richard M. Dickinson (USA)

Wireless Power Transmission Technology: Basics, Frequency Choices and Issues

A.C. Charania (USA)/  
Yuri Takaya (Japan)

Legal Constituencies and Economic Efficiencies of Space Solar Power: A Joint Japanese and American Perspective

Patrick A. Salin (Canada)

Legal Implications of the Co-Habitation of Space Solar Power Systems and Satellite Communication Systems

## SUMMARY OF THE DISCUSSION

A number of interventions lead to an in-depth discussion of the status of SPS in the overall framework of world energy supply in the first half of the new century. The point was made that local decentralized ground based solar power systems would more immediately and also in the future more efficiently meet the demand in particular in developing countries. From the side of the proponents of space based SPS the latest studies and analyses were quoted, which showed that the dramatically growing need for energy could, in the year 2050, only be met with the introduction of GSO-based SPS – which of course would be part of a diversified set of energy supply sources.

Some other questions of fundamental character were raised. One voiced the expectation that the introduction of SPS would be conducted under the observation of the provisions of international law, in particular the principles of space as a “province of mankind” contained in the Outer Space Treaty and the “common heritage of mankind principle” contained in the Moon Treaty as well as the obligation for using outer space for peaceful purposes. The fear was also expressed that SPS could be mis-used as a weapon or for terrorist actions but it was pointed out that, while this fear was understandable, the physics of the situation prevent power beaming at high intensity.

A broad part of the discussion was dedicated to the problem of interference with other space services, particularly with regard to the use of the radio frequency spectrum or physical interference as well as creating “shadows”, where other satellites depending on solar power for their energy supply cannot operate. The audience was informed that the International Telecommunication Union (ITU) has now been engaging in studying the issue in a formal expert group. Results of these deliberations (where the US, Canada, China, Japan and Russia are the most actively participating delegations) should be presented in around two years. It was also proposed to ask the ITU to perform a coordination exercise with a properly defined solar power system; administrations could then react in the commonly used coordination process by determining and pointing out possible harmful interference with existing space systems. In this context, also the question was raised, whether GSO is the most appropriate orbit for SPS or whether LEOs would be more advantageous. The audience was informed on this issue that the most recent studies clearly show that GSO is in fact the most efficient orbit for SPS but that the ITU establishment is reluctant to embrace the idea that the already large problems for communication services from the overcrowded GSO would be potentially become even greater through the implementation of SPS.

Besides the regulatory aspects, the issue of the institutional framework for an operational SPS was discussed. Various models like intergovernmental organizations, intergovernmental agreements and public private partnership were presented. The opinion was expressed that there will have to be a considerable public engagement combined with additional measures like tax cuts for the then privately run operations. New space systems like Galileo could serve as models for the purpose of further developing organizational concepts.

As a final observation, the point was made that the advocates of SPS will have to increase their efforts in marketing their idea. Expecting a competition between Mars and SPS as the next step following ISS, SPS would from today’s perspective only be the second priority. Its virtues as a promising technology for creating global benefits and sustainable development and its character as providing a solution for a truly global need have to be more aggressively promoted in the public and policy debate.