THE MOON AS A SOLAR POWER SATELLITE

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Abstract

This paper discusses a modified version of the Satellite Solar Power System, (SPS), originally proposed in 1968 by Dr. Peter Glaser of MIT, as a series of large, photovoltaic solar collector satellites orbiting at geosynchronous (22,500 mile) altitude. The solar energy collected would be beamed to the earth surface 24 hours a day, using microwave energy (which can pass through cloud cover). This system was studied extensively by several large aerospace companies under the joint sponsorship of the D.O.E and NASA between 1977 and 1980.

The proposed modifications to this concept presented herein uses the moon as the "satellite". This allows a much larger system to be built at lower cost, because it allows the use of materials making up the lunar surface to be used to construct the solar power system, thereby eliminating the requirement for lifting them up from the earth. In addition, this approach results in a much greater ease of assembly because of the gravity of the moon.

Two configurations of such a system are described:

1. A series of photovoltaic collectors situated near the lunar poles, which can generate a net electrical energy on the earth of 60 billion Kwatt-hours per year.
2. A series of concentrating trough collectors using lunar gravity to shape a catenary cylindrical concentrator, driving Stirling Cycle electric generators, situated at the lunar equator, which can generate a net electrical energy on the earth of greater than 5.3 trillion Kwatt-hours per year.

Both systems are described in detail, and their advantages and disadvantages relative to the original geosysnchronous SPS are discussed. The expected performance of these systems is analyzed based upon direct extrapolations from the analyses presented in the 1980 D.O.E. and NASA study reports, combined with recent performance measurements obtained with Stirling Cycle electric generators by NASA Lewis Research Center and others.

A method of funding this proposed project by the U.S. Government is also discussed which would cause no increase in any current U.S. taxes. Furthermore, by distributing the electrical energy generated by this system on to existing electrical power grids as a “World TVA”, the receipts from electrical energy consumers at the current rate of 10 cents per Kwatt-hour could be used to retire the U.S. National Debt, and/or reduce income taxes.

Finally, the implementation of such a system, which could be accomplished within a period of less than 10 years, would reduce the world emission of greenhouse gases, not to the Kyoto-desired level of 1990, but to the level of 1890.