

High-Orbit Solar-Power Satellites

A Contribution to America at the Threshold: The President's Space Exploration Initiative

1991

BRIEF DESCRIPTION (Ref. Remarks published in the *Los Angeles Times*, on March 7, 1989 by Gerard K. O'Neill, professor emeritus of physics at Princeton University, founder of the Geostar Satellite Corp., and appointee to the National Commission on Space): "A fully acceptable system for generating energy must add little to the Earth's heat load, burn no fossil fuels and avoid nuclear fission or fusion. There is only one method that satisfies all these conditions—the conversion of solar energy to electric power in high orbit, where sunlight is intense and continuous."

PAYOFF OR VALUE: "To meet all the energy needs of 2039, the market would be more than \$6 trillion a year annually (in today's dollars), larger than America's present gross national product. We as a nation cannot afford to be left out of a commercial program with so huge an export market. Above all, we who live in the biosphere cannot let it die." Fossil fuels can remain as profitable industrial sources of raw organic compounds for materials instead of energy.

ENABLING TECHNOLOGIES OR SYSTEMS: "Twenty years of study and experiments confirm that power in high orbit can be sent efficiently to Earth as low-density radio waves. Antennas in

fenced-off regions can transform the radio waves to ordinary electricity.

"A decade of study and experimentation by government agencies and private foundations confirms that satellite solar power is environmentally benign. It can compete economically with coal-fired and nuclear-power plants if we can avoid having to haul materials out of the Earth's strong gravity. Materials for the power satellites—metals, silicon and oxygen—can come from the moon, whose gravitational grip is less than a twentieth of the Earth's. Those materials are the most abundant elements of the lunar surface and can be mined using known space technology."

RELATION TO MAJOR MISSION

OBJECTIVES: "The Soviet Union and Japan are particularly aggressive now in working toward satellite solar power. A commercial multinational program, modeled on the successful Intelsat and Inmarsat consortia that provide satellite communications, would earn revenues of \$250 billion a year, satisfying today's needs for new electric generators" and allowing the space program to more than pay for itself. Also, international cooperation would be important in further space exploitation and exploration, in terms of both spreading financial burdens and

diminishing security risks in this ultimate "high ground".