Chapter 1

SUMMARY

Contents

LIST OF TABLES

SUMMARY

The solar power satellite (SPS) concepts envision using the constant availability of sunlight in space to generate baseload electricity on Earth. Orbiting satellites would collect solar energy and beam it to Earth where it would be converted to electricity. Three major alternative systems have been suggested.

- *Microwave transmission.* Solar radiation would be collected in space and converted to microwaves. Microwave energy would be beamed to a receiving antenna on Earth where it would be converted to electricity.
- *Laser transmission.* Solar radiation would be collected in space and converted to infrared laser radiation. The lasers would beam power to an Earth receiver.
- *Mirror transmission.* Orbiting mirrors would reflect sunlight directly to central locations on Earth. Terrestrial solar receivers would convert the resulting 24-hour illumination to electricity.

Since SPS would be a major future energy system with diverse potential impacts and implacations, this assessment of SPS technology is interdisciplinary. It includes the study of SPS interactions with society, the environment, the economy, and other energy systems. in addition, because space is an international realm and energy is a global need, this assessment also undertakes a broad look at the international aspects of SPS.

CURRENT STATUS

Too little is currently known about the technical, economic, and environmental aspects of SPS to make a sound decision whether to proceed with its development and deployment. I n addition, without further research an SPS demonstration or systems-engineering verification program would be a high-risk venture. An SPS research program could ultimately assure an adequate information base for these decisions. However, the urgency of any proposed research effort depends strongly on the perception of future electricity demand, the variety and cost of supply, and the estimated speed with which the major technical and environmental uncertainties associated with the SPS concept can be resolved. For instance, if future demand growth is expected to be low it may not be necessary to initiate a specific SPS research program at this time, especially if more conventional electric-generating technologies remain acceptable. If this is not the case or if demand growth is expected to be high, SPS might be needed early in the 21st century, and a timely start of a research effort would be justified.

Should it be decided not to start a dedicated SPS research effort now, it may be desirable to designate an agency to track generic research which is applicable to SPS, to review trends in electricity demand, and to monitor the progress of other electric supply technologies. Such a mechanism could provide the basis for periodic assessment of whether to begin an SPS research program. Information relevant to SPS could be derived from other research programs, microwave bioeffects, space transportation, laser, and photovoltaic development appear to be the most critical technical issues. However, it is unlikely that such "generic" research programs by themselves would adequately answer all of the high-priority questions on which SPS development decisions depend

If a dedicated SPS research effort is started now, the level of effort chosen would, to a large degree, determine the time it takes to obtain the information needed for a development decision. An effort set at $5 million to $10 million per year could be sufficient to gather the minimum necessary information while minimizing the risk of insufficient or untimely information. A $20 million to $30 million per year effort could gain the maximum necessary

Photo credit: National Aeronautics and Space Administration

Microwave concept

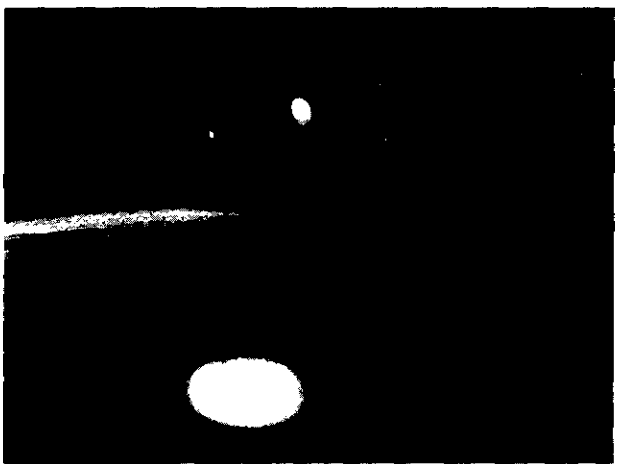
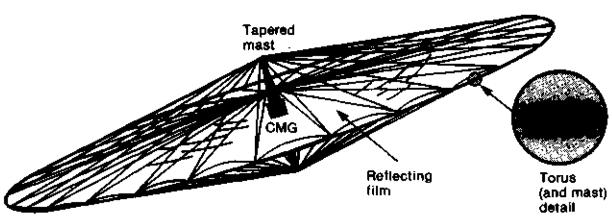


Photo credit: National Aeronaut/es and Space Administration



Mirrored concept

SOURCE: K. W. Billman, "Space Orbiting Light Augmentation Reflector Energy System: A Look at Alternative Systems," SPS Program Review, June 1979.

information at the earliest possible time. It reduces the risk of not generating enough information in time to make an adequate development decision. Whatever the level, if a re-

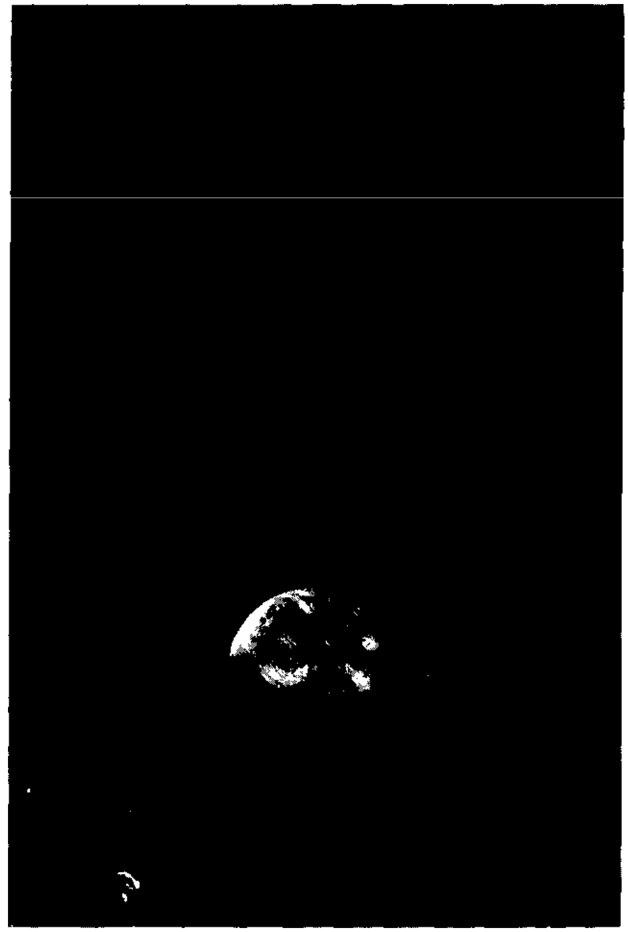


Photo credit: Painting by Frank G. Ellis, Lockheed Missiles and Space Co.

Laser concept

search program is instituted, it should investigate those areas most critical to SPS economic, technical, and environmental feasibility Particular attention should be given to studying and comparing the various technical alternatives; but the feasibility of SPS also ultimately depends on its social, political, and institutional viability. Thus, a research program should continue to explore these aspects of SPS development and deployment as well. The following are the major stages such a program would have to go through:

SPS Program Steps

Concept *feasibility stages*	*Development stages*
Basic research	Systems engineering
Component testing	Demonstration satellite
Concept definition	Deployment

ENERGY CONTEXT

Even if it were needed and work began now, a commercial SPS is unlikely to be available before 2005-15 because of the many uncertainties and the long leadtime needed for testing and demonstration. Therefore, SPS could not be expected to constitute a significant part of electricity supply before 2015-25. By that time, the United States will be importing very little foreign oil. Consequently, SPS cannot reduce our dependence on imported oil in this century. However, if efficient electric vehicles or other electric end-use technologies are developed by about 2010, electricity from SPS or other sources could substitute for synthetic liquid fuels generated from coal or biomass.

Along with other electric generating technologies, SPS has the potential to supply several hundred gigawatts of baseload electrical power to the U.S. grid by the mid-21st century. However, the ultimate need for SPS and its rate of development will depend on the rate of increase in demand for electricity, and the ability of other energy supply options to meet ultimate demand more competitively. SPS would be needed most if coal and/or conventional nuclear options are constrained and if demand for electricity is high.

An aggressive terrestrial solar and conservation program that could lead to an electricity demand level of only 8 Quads electric (Qe)* in 2030 (equal to current consumption) would make the development of SPS and other large new centralized generating technologies less urgent in the United States. In any event, coal could continue to fuel the greatest share of U.S. electrical needs well into the 21st century, provided no barriers to its use become evident. Coal, conventional nuclear, terrestrial solar in its many forms, and geothermal usage could satisfy the entire domestic electricity requirement for demands totaling 20 Qe (2.5 times current level) or less in 2030. If demand is higher than 20 Qe, then presumably one or more of the following, SPS, breeders, and/or fusion will be needed. Electricity demand will be strongly affected by the degree that efficient technologies for using electricity can be developed. Such technologies can have the effect of lowering the overall cost of electricity compared to competing energy forms.

If generation from coal on a large scale proves to be unacceptable, domestic electrical consumption of 8 Qe or less could still be met by nuclear, geothermal, and terrestrial solar (central plant and onsite) technology. For demands up to about 20 Qe, SPS could compete with terrestrial solar, breeders, and/or fusion for a share of the centralized baseload market. If electricity demand exceeds 20 Qe, it will be difficult to satisfy that demand without vigorous development of al l renewable or inexhaustible forms of generating capacity. For these higher demand levels, SPS, breeders, and fusion could all share in supplying U.S. electricity needs. A 30 Qe (3.8 times current consumption) total demand would create a market potential for up to 6 Qe of SPS-delivered energy (225,000-Mw-installed generating capacity at 90-percent capacity factor). *

Upper Range of Possible SPS Use**

Electric demand in 2030 (Qe]	SPS capacity (CW]	
	With coal	Without coal
75	0	0-30
20.0	0-60	100-200
30.0	100-200	100-200

*A Quad is equal to 1 quadrillion Btu. It is equivalent to the energy contained in 500,000 barrels of oil per day for 1 year, and is also approximately the electric energy produced by a 33,500-MW generator running without interruption for a year As used in this report, Quads electric (Qe) of demand refer to the energy equivalent of electricity at point of use Primary energy input at the generating source of electricity IS somewhat more than three times these figures

*Current U.S. generating capacity is about 600,000 MW. Current demand represents about 45 percent of this capacity operating 100 percent of the time,

**Coal is used as the swingfuel for our analysis because it has the largest resource base of any of the current forms of centralized, electric generating technologies It is expected that conventional nuclear would be available but its smaller resource base would prevent it from having the large effect on generation-mix choices that coal does It is assumed that breeders, which would greatly extend the nuclear fission resource base, would be comparable to SPS and fusion in terms of its rate of market penetration (ie, 5 to 10 GW/yr)

SPS is designed to provide baseload electricity. By contrast, except for ocean thermal energy conversion, terrestrial solar electrical generation is intermittent. Because our energy future will require a mix of baseload and intermittent generating technologies, without storage capability, terrestrial solar would not compete directly with SPS. However, the development of inexpensive storage, if achieved, could enable terrestrial solar electricity generation in all its forms-wind, solar thermal, and solar photovoltaics–to assume some share of baseload capacity.* These technologies are less complex, have fewer uncertainties, and are considerably nearer to commercial realization than SPS. Furthermore, they have the flexibility to be introduced into the electrical grid in small increments as needed to meet demand increases on a local scale.

*The percentage share of baseload capacity which would be feasible for these technologies to assume would depend on their geographical location and the time of year (see ch 6)

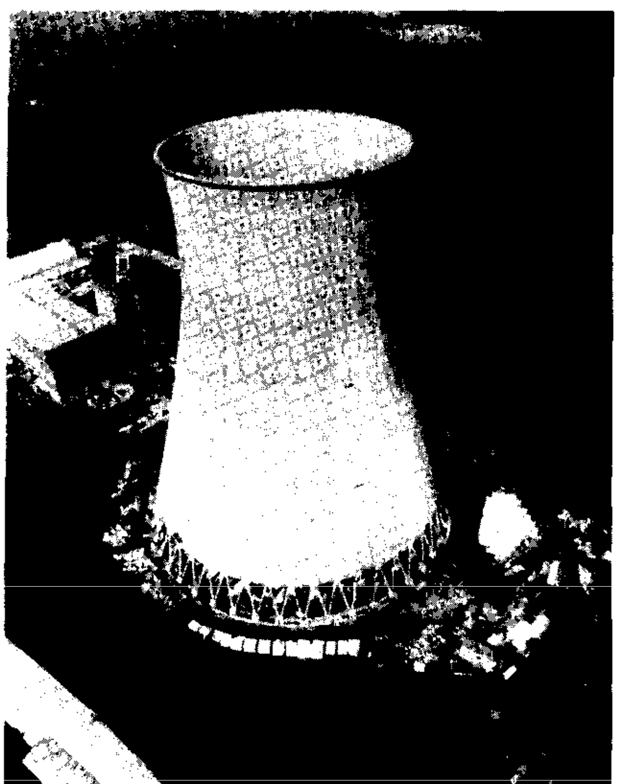


Photo credit: EPA-Documerica—Gene Daniels

Trojan nuclear powerplant on the Columbia River near Prescott, Wash., 1972

Even if inexpensive storage is not available, onsite generating technologies could compete indirectly with SPS. Total need for baseload power will decrease if a significant portion of total electrical demand can be met by a combination of dispersed technologies such as solar photovoltaics, wind, and biomass at costs that are competitive with centrally generated electricity. Low demand for centrally generated electricity would consequently reduce the need to introduce new, large-scale electrical technologies such as SPS, except as replacement capacity.

As an energy option for the first half of the 21st century, the potential electrical output and uncertainties of SPS are comparable to fusion. These energy options will proceed along different development paths. Except for a laser system, the basic SPS technologies have been proven technically feasible. Research would be needed to develop low-noise microwave tubes; high-efficiency, low-mass photovoltaics; efficient continuous-wave lasers; low-mass mirrors; and space construction and transportation capabilities. Although the fusion community is confident that fusion is feasible, "energy breakeven, " the production of more energy than is put into the fusion process, has

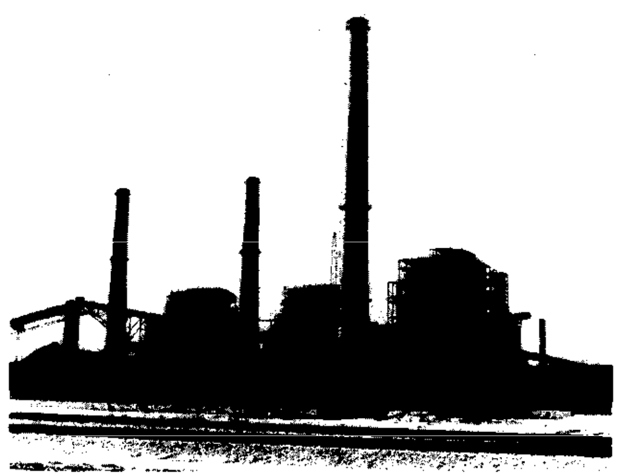


Photo credit: Texas Power & Light

Martin Lake electric generating plant in east Texas not been achieved. For both SPS and fusion, an economic generating plant would still have to be developed and demonstrated.

Both energy options are designed to produce baseload central station power in units from 500 to 5,000 MW. For both, development cost is high. For fusion, much of the manufacturing infrastructure for the balance of plant, i.e., other than the fusion device itself, is in place. Most of the supportive infrastructure for SPS, including the industrial plants and the transportation system, would have to be developed.

INTERNATIONAL AND MILITARY IMPLICATIONS

There could be important economic and political advantages to developing SPS as a multinational rather than a unilateral system. These include cooperation in establishing legal and regulatory norms, shared risk in financing the R&D and construction costs, improved prospects for global marketing, and forestalling fears of economic domination and military use. Although a multinational effort would face inevitable organizational and political difficulties, the strong potential interest of energy-poor, non-U. S. participants in increased electrical supplies could help make a multinational venture more feasible than a unilateral one by the United States. Global electricity demand may quadruple by 2030, and will be especially strong in developing countries. Western Europe and Japan would be likely partners for a joint project. Depending on the size and expense of the system used, a number of the more rapidly developing but less developed countries might also be interested in participating at lower levels of involvement.

The Soviet Union is carrying on an aggressive space program that may give them an independent capacity to develop SPS, but little is known about their long-range space or energy plans. Real or perceived competition with the Soviet Union could spur a U.S. commitment to SPS.

The development of fleets of launch and transfer vehicles (for SPS), as well as facilities for living and working in space, would enhance this Nation's military space capabilities. Such equipment would give the possessor a large breakout potential for rapid deployment of personnel and hardware in time of crisis, though for nonemergency situations the military would prefer to use vehicles designed specifically for military purposes. SPS itself could be used for military purposes, such as electronic warfare or providing energy to military units, but is technically unsuited to constitute an efficient weapon. Weapons-use of SPS would be prohibited by current bilateral and multilateral treaties. The satellite portion of SPS is vulnerable to various methods of attack and interference but the likelihood of its being attacked is only Slightly greater than for major terrestrial energy systems. The military effects of SPS will depend largely on the institutional framework within which it is developed; international involvement would tend to reduce the potential for use of SPS by the military sector,

SYSTEMS AND COSTS

The optimum SPS system has not been identified. A National Aeronautics and Space Administration/Department of Energy (NASA/DOE) microwave reference system* was developed to provide a basis for review and analysis but was not intended to represent the best possible system. An optimum system should be able to deliver power in smaller units (about 1,000 MW or less), use smaller terrestrial receivers, and cost less to develop than the reference system. Alternative systems may use

*See chs 3 and 5 for a description of the reference system

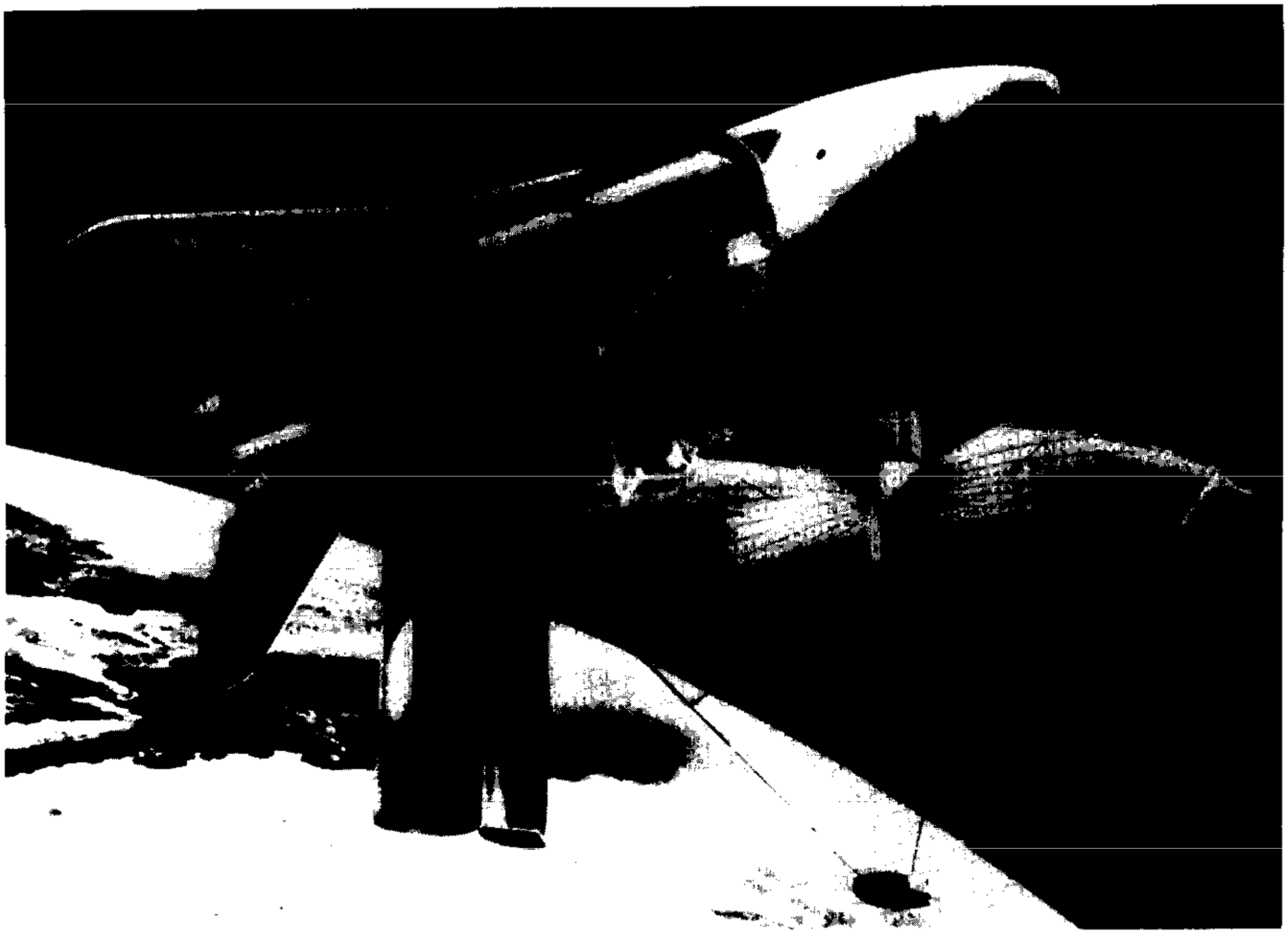


Photo credit: National Aeronautics and Space Administration

The Space Shuttle could serve as both transporter and as a test bed for orbital development work, but is too small to be used for full scale construction of an SPS

lasers or mirrors to transmit solar energy from space to Earth. Variants of the reference system or other completely different systems may offer certain improvements; each will need full study before choosing a system for development.

Current overall cost estimates for the SPS and its major components are highly uncertain. The assessments of up-front costs range from $40 billion to $100 billion. The most detailed estimates have been made by NASA for the reference design. These call for a 22-year investment of $102.4 billion (1977 dollars) (including transportation and factory investment costs) to produce the first 5-GW satellite, with each additional satellite costing $11.3 billion. The costs for most improvements to the reference design, or for alternative systems, are less certain due to the less developed state of nonreference technology. Preliminary studies indicate that the total reference system costs are likely to be significantly higher. On the other hand, alternative systems may well be cheaper than the reference system. The total costs estimated by NASA include major elements, such as space transportation and photovoltaic cells, whose development is likely to proceed regardless of SPS; these costs should not be charged solely to SPS. With the possible exception of fusion, the up-front costs for SPS would be significantly higher than competing base-load electric generating systems. Apportioning the various investment costs and management

Characterization of Four Alternative SPS Systems

Scale				
Satellite size	55 km²	18 km²	5 km²	50 km²
Number of satellites	60 (300 GW total)	Not projected	Not projected	916 (810 GW total)
Power/satellite	5,000 MW	1,500 **MW**	**500 Mw**	**135,000** MW
Mass	5 x104 tonnes/satellite; 0.1 kW/kg	Less mass than reference/O. 1 kW/kg	Less mass than reference/O.05 kW/kg	2 x 10^5 tonnes mirror system 2 kW/kg
Land use rectenna site	174 km² (including buffer) x **60=10,440** km²	50 km²	0.6 km²	1,000 km²
km²/1,000 MW	35	33	1.2	7.4
Energy	Electricity Fairly centralized 23 mW/cm² Gaussian distribution	Electricity Less centralized Unknown	Electricity, onsite generation. Less centralized Unknown (10 mW/cm² at edge)	Electricity, light Highly centralized 1.15 kW/m² (1 Sun)
Atmosphere				
Transmission	Ionosphere heating might affect telecommunications		Tropospheric heating might modify weather over smaller area; problems with clouds?	
Effluents	Possible effects include alteration of magnetosphere (AR+), increased water content; formation of noctilucent clouds; ionosphere depletion		LEO orbit, smaller size, smaller launch vehicles	
Electromagnetic Interference	RFI from direct coupling, spurious noise, and harmonics, Impacts on communications, satellites etc from 245 GHz Problem for radio astronomers (GEO obscures portion of sky always) optical reflections from satellites and LEO stations Will change the night sky		If visible light is used there may be problems for optical astronomy if Infrared is used may Increase airglow optical reflection from LEO satellite.	Problem for optical astronomy, optical reflec-hens and Interference from beam change night sky in vicinity of sites
Bioeffects	Microwave bioeffects midbeam could cause thermal heating, unknown effects of long term exposure to low-level microwaves Ecosystem alteratlon? Birds avoid/attracted to beam?		Direct beam ocular and skin damage ocular damage from reflections? Other effects? Birds flying through will burn up? If visible Will birds avoid? Ecosystem alterations?	Psychological and physiological effects of 24-hour illumination not known. Possible ocular hazard if viewed with binoculars? Ecosystem alteration
National security weapons potential	GEO gives a good vantage point over hemisphere –Provides a lot of power m space platform for surveillance, jamming– –Requires development of large space fleet with/military potential–		Direct weapon: as ABM, antisatellite, aimed at terrestrial targets Indirect: power killer satellite, planes space platform Laser defend self, best, LEO more accessible	Indirect: night illumination psychological–possible weather modification
Vulnerability	Satellites may need self defense system to protect against attack Size and distance strong defenses–			Less ground sites; a lot of mirrors-redun-dancy; individual mirrors fragile; ground sites still produce power in absence of space system
International	Will require radio frequency allocation and orbit assignment	Smaller parcels of energy make system more flexible Meet environmental and health standards?	LEO more accessible to U S S R and high-latitude countries, smaller parcels of energy make system more flexible	

[a] smaller SOLARES systems, e g , 10 GW/site would be possible and probably more desirable
[b] $I02 billilon–NASA estimate+ncludes Investment Costs
[c] Estimates by Argonne National Laboratory, Office of Technology Assessment, u.s. Congress

SOURCE Office of Technology Assessment.

responsibilities between the public and private sectors, and among potential international participants, would be an essential part of SPS development.

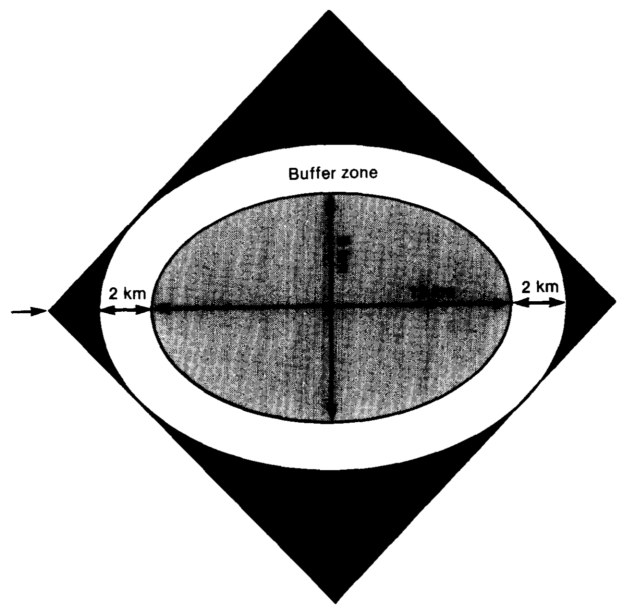
PUBLIC ISSUES

Public opinion about SPS is currently not well-formed. Discussion of SPS has been limited to a small number of public interest groups and professional societies. In general, those in favor of SPS also support a vigorous U.S. space program, whereas many of those who oppose SPS fear that it would drain resources from small-scale, terrestrial solar technologies. Assuming acceptance of a decision to deploy SPS, public discussion is likely to be most intense at the siting stage of its development. Key issues that may enter into public thinking include environment and health risks, land-use, military implications, and costs. Centralization in the decisionmaking process and in the ownership and control of SPS may also be important. From the standpoint of public perceptions, the siting of land-based receivers could be an obstacle to the deployment of SPS unless:

- the public is actively involved in the siting process;
- health and environment uncertainties are diminished; and
- local residents are justly compensated for the use of their land.

Offshore siting of receivers could minimize potential public resistance to SPS siting.

Reference System —Rectenna/ Washington, D. C., Overlay



SOURCE: Off Ice of Technology Assessment.

ENVIRONMENT AND HEALTH

Many of the environmental impacts associated with SPS are comparable in nature and magnitude to those resulting from other large-scale terrestrial energy technologies. A possible exception is coal, particularly if CO_2 concerns are proven justified. While these effects have not been quantified adequately, it is thought that conventional corrective measures could be prescribed to minimize their impacts. However, several health and environmental effects, which are unique to SPS and whose severity and likelihood are highly uncertain, have also been identified. These include effects on the upper atmosphere from launch effluents and power transmission, health hazards associated with non ionizing radiation, electromagnetic interference with other systems and astronomy, and radiation exposure for space workers. More research in these areas would be required before decisions about the deployment or development of SPS could be made. Little information is currently available on the environmental impacts of SPS designs other than the reference system. Clearly, environmental assessments of the alternative systems will be needed if choices are to be made between SPS designs.

Too little is known about the biological effects of long-term exposure to low-level microwave

Photo credit: National Aeronautics and Space Administration

An artist's concept of an offshore antenna that would receive microwave energy beamed from a large space solar power collector in geosynchronous orbit

radiation to assess the health risks associated with SPS microwave systems. The information that is available is incomplete and not directly relevant to SPS. Further research is critically needed in order to set human-health exposure limits. Currently, no microwave population exposure standard exists in the United States. The recommended limit for occupational exposure is set at 10 mW/cm^2 in the United States, 1,000 times less stringent than the present U.S.S.R. occupational standard. Public exclusion boundaries around the reference design have been established at one one-hundredth of U.S. occupational guidelines. It is anticipated that future maximum permissible U.S. occupational standards will be lower by a factor of 2-lo; population standards, if established, may well be lower than the occupational standards. Even more stringent microwave standards could increase land requirements and system cost or alter system design and feasibility. In light of the widespread proliferation of electromagnetic devices and the current controversy surrounding the use of microwave technologies, it is clear that increased understanding of the effects of microwaves on living things is vitally needed even if SPS is never deployed.

Exposure of space workers *to* ionizing radiation is a potentially serious problem for SPS systems that operate in geosynchronous orbit (CEO). Recent estimates indicate that the radiation dose of SPS reference system personnel in CEO would exceed current limits set for astronauts and could result in a measurable increase in

Summary of SPS Environmental Impacts

System component characteristics	Environmental impact	Public health and safety	Occupational health and safety
Power transmission			
Microwave	—[b]Ionospheric heating could disrupt telecommunications. Maximum tolerable power density is not known. Effects in the upper ionosphere are not known —Tropospheric heating could result in minor weather modification. —[b]Ecosystem: microwave bioeffects (on plants, animals, and airborne biota) largely unknown; reflected light effects unknown. —[b]**Potential interference** with satellite communications, terrestrial communications, radar, radio, and optical astronomy.	—[b]Effects of low-level chronic exposure to microwaves are unknown. — Psychological effects of microwave beam as weapon. —Adverse aesthetic effects on appearance of night sky.	—Higher risk than for . public; protective clothing required for terrestrial worker. —Accidental exposure to high-intensity beam in space potentially severe but no data.
Lasers	—Tropospheric heating could modify weather and spread the beam. — Ecosystem: beam may incinerate birds and vegetation. —[b]**Potential interference** with optical astronomy, some interference with radio astronomy.	—Ocular hazard? — Psychological effects of laser as weapon are possible. —Adverse aesthetic effects on appearance of night sky are possible.	—Ocular and safety hazard?
Mirrors	—[b]Tropospheric heating could modify weather. —Ecosystem: effect of 24-hr light on growing cycles of plants and circadian rhythms of animals. —[b]potential interference with optical astronomy.	—Ocular hazard? —Psychological effect of 24-hr sunlight. –[b]Adverse aesthictic effects on appearance of night sky are possible.	—Ocular hazard?
Transportation and space operation			
Launch and recovery HLLV PLV COTV POTV	—Ground cloud might pollute air and water and cause possible weather modification; acid rain probably negligible. —[b]Water vapor and other launch effluents could deplete ionosphere and enhance airglow. Resultant disruption of communications and satellite surveillance potentially important, but uncertain. —[b]possible formation of noctilucent clouds in stratosphere and mesosphere; effects on climate are not known.	—Noise (sonic boom) may exceed EPA guidelines. –Ground cloud might affect air quality; acid rain probably negligible. —Accidents-catastrophic explosion near launch site, vehicle crash, toxic materials.	—[b] Space worker's hazards: ionizing radiation (potentially severe) weightlessness, life support failure, long stay in space, construction accidents psychological stress, acceleration. —Terrestrial worker's hazards: noise, transportation accidents.

Summary of SPS Environmental Impacts—Continued

System component characteristics	Environmental impact	Public health and safety	Occupational health and safety
	—[b]Emission of water vapor could alter natural hydrogen cycle; extent and implications are not well-known. —[b]Effect of COTV argon ions on magnetosphere and plasma-sphere could be great but unknown. —Depletion of ozone layer by effluents expected to be minor but uncertain. —Noise.		
Terrestrial activities			
Mining	— Land disturbance (stripmining, etc.). —Measurable increase of air and water pollution. —Solid waste generation —Strain on production capacity of gallium arsenide, sapphire, silicon, graphite fiber, tungsten, and mercury.	—Toxic material exposure. —Measurable increase of air and water pollution. — Land-use disturbance.	—Occupational air and water pollution. —Toxic materials exposure. —Noise.
Manufacturing	—Measurable increase of air and water pollution. —Solid wastes.	— Measurable increase of air and water pollution. —Solid wastes. —Exposure to toxic materials.	—Toxic materials exposure. —Noise.
Construction	—Measurable land disturbance. —Measurable local increase of air and water pollution.	— Measurable land disturbance. —Measurable local increase of air and water pollution.	—Noise. —Measurable local increase of air and water pollution. —Accidents.
Receiving antenna	—[b]Land use and siting— —Waste heat and surface roughness could modify weather.	—[b]Land use—reduced property value, aesthetics, vulnerability y (less land for solid-state, laser options; more for reference and mirrors).	— Waste heat.
High-voltage transmission lines (not unique to SPS)	—[b]Land use and siting— —[b]Ecosystem: bioeffects of powerlines uncertain.	—[b]Exposure to high intensity EM fields—effects uncertain.	—[b]Exposure to high intensity EM fields—effects uncertain.

[a]**impacts based on SPS systems as currently** defined and do not account for offshore receivers or possible mitigating system modifications.
[b]Research priority.

SOURCE: Office of Technology Assessment.

cancer incidence. However, there are a large number of uncertainties associated with quantifying the health risks of exposure to ionizing radiation. More research would be required to reduce these uncertainties and to identify and evaluate system designs and shielding techniques that would minimize risks at an acceptable cost. In addition, acceptable SPS radiation limits would have to be determined. If CEO SPS systems are to be considered, an assessment of the health risks associated with space radiation is a top priority.

The potential for interference with other users of the electromagnetic spectrum could constitute a severe drawback for the microwave option. Satellite communications and optical and radio astronomy would be seriously affected. The effects on radio and optical astronomy would be the most difficult to ameliorate. The minimum allowable spacing between geosynchronous power satellites and geosynchronous communications satellites is not well-known. The optical interference effects of either the mirror or laser transmission options would be of great concern to ground-based astronomers. Any of the SPS options would alter the appearance of the nighttime sky. Some may find this esthetially objectionable.

SPACE CONTEXT

The hardware, experienced personnel, and industrial infrastructure generated by an SPS project would significantly increase U.S. space capabilities and, in conjunction with other major space programs, could lay the groundwork for the industrialization, mining, and perhaps the settlement of space. NASA is likely to play a major role, especially in the initial stages of development. Non-SPS programs could be aided by accelerated development of transportation and other systems; on the other hand, they could be harmed by the diversion of funds and attention to SPS. An SPS research and development program would be in accord with current space policy that calls for peaceful development of commercial and scientific space capabilities

Given the current absence of long-term program goals for the U.S. civilian space program, it is difficult to predict the effects of an SPS project on NASA plans or on private-sector capabilities These effects will need to be carefully considered.