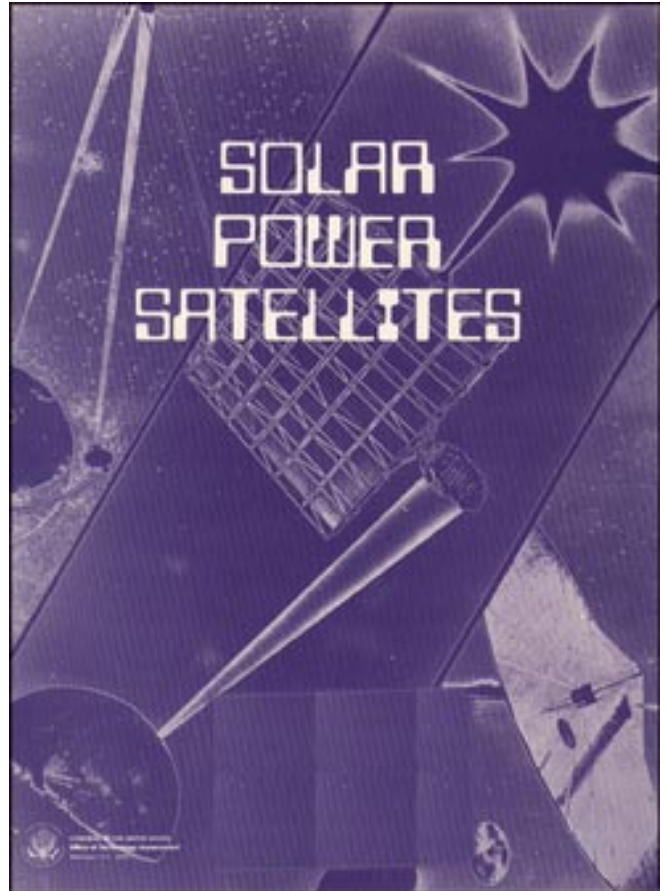


*Solar Power Satellites*

August 1981

NTIS order #PB82-108846



**Library of Congress Catalog Card Number *81-600129***


**For sale by the Superintendent of Documents,  
U.S. Government Printing Office, Washington, D.C. 20402**

# Foreword

The energy difficulties the Nation has faced over the past decade have given rise to an increased awareness of the potential long-term, inexhaustible, or renewable energy technologies. This assessment responds to a request by the House Committee on Science and Technology for an evaluation of the energy potential of one of the most ambitious and long-term of these technologies, the solar power satellite (SPS).

In assessing SPS, OTA has taken into account the preliminary nature of SPS technology by comparing four alternative SPS systems across a broad range of issues: their technical characteristics, long-term energy supply potential, international and military implications, environmental impacts, and institutional effects. The SPS options are also compared to potentially competitive future energy technologies in order to identify how choices among them might be made. In addition, OTA developed a set of Federal research and funding options to address the central questions and uncertainties identified in the report.

We were greatly aided by the advice of the SPS advisory panel, as well as by the participants in three specialized workshops: one on alternative SPS systems, one on public opinion, and another on competing energy supply technologies. The contributions of a number of contractors, who provided important analyses, and of numerous individuals who gave generously of their time and knowledge, are gratefully appreciated.

A handwritten signature in black ink that reads "John H. Gibbons". The signature is written in a cursive style with a large, looping initial "J".

JOHN H. GIBBONS  
*Director*

# Solar Power Satellites Advisory Panel

**John P. Schaefer**, *Chairman*  
*University of Arizona*

**Paul Craig**

*University of California*

**S. David Freeman**

*Tennessee Valley Authority*

**Eilene Galloway**

*Consultant*

**Karl Gawell**

*Solar Energy Research Institute*

**Peter G laser**

*Arthur D. Little, Inc.*

**Jerry Grey**

*American Institute of Aeronautics  
and Astronautics*

**Grant Hansen**

*SDC Corp.*

**Russell Hensley**

*Aetna Life & Casualty*

**Maureen Lamb**

*Consultant*

**J. C. Randolph**

*University of Indiana*

**John J. Sheehan**

*United Steelworkers of America*

**Graham Siegel**

*Tennessee Valley Authority*

**Robert Uhrig**

*Florida Power & Light*

**Frank von Hippel**

*Princeton University*

**Charles Warren**

*Attorney*

## Workshop on Technical Options

**John W. Freeman, Jr.**, *Chairman*  
*Rice University*

**Kenneth Billman**

*Electric Power Research Institute*

**Hubert P. Davis**

*Eagle Engineering*

**Henry M. Foley**

*Columbia University*

**Joe G. Foreman**

*Naval Research Laboratories*

**Jerry Grey**

*American Institute of Aeronautics  
and Astronautics*

**Abraham Hertz berg**

*University of Washington*

**John D. G. Rather**

*The B.D.M. Corp.*

**Fred Sterzer**

*RCA Laboratories*

**Frank von Hippel**

*Princeton University*

**Gordon Woodcock**

*Boeing Aerospace Co*

## Workshop on SPS Public Opinion Issues

**Ken Bossong**

*Citizens Energy Project*

**Ben Bova**

*OMNI*

**Clifflyn Bromling**

*Bromling and Associates*

**Mike Casper**

*Carlton College*

**Earl Cook**

*Texas A&M*

**Leonard David**

*National Space Institute*

**Chris E If ring**

*Office of Technology Assessment*

**Joe Foreman**

*Naval Research Laboratories*

**Jerry Grey**

*American Institute of Aeronautics  
and Astronautics*

**Skip Laitner**

*Community Action Research Group  
of Iowa, Inc.*

**Maureen Lamb**

*Consultant*

**Jenifer Robinson**

*Office of Technology Assessment*

**Louis Slesin**

*Natural Resources Defense  
Council, Inc.*

## Workshop on Energy Context of Solar Power Satellites

**Clark Bullard**, *Chairman*  
*University of Illinois*

**Charles Baker**

*Argonne National Laboratory*

**Piet Bos**

*Electric Power Research Institute*

**Glen Brandvold**

*Sandia National Laboratory*

**Clifflyn Bromling**

*Bromling & Associates*

**Paul Craig**

*University of California*

**Peter Drummond**

*McDonnell-Douglas Astronautics*

**Lessly Goudarzi**

*International Energy Associates,  
Limited*

**Kenneth Hub**

*Argonne National Laboratory*

**Jerry Karaganis**

*Edison Electric Institute*

**John Lamarsh**

*Polytechnic Institute of New York*

**Kenneth Ling**

*Applied Solar Energy Corp.*

**William Metz**

*Consultant*

**David Morris**

*Institute for Local Self Reliance*

**James Moyer**

*Southern California Edison*

**Larry Ruff**

*Brook haven National Laboratory*

**Frank von Hippel**

*Princeton University*

**Gordon Woodcock**

*Boeing Aerospace Co.*

## Solar Power Satellites Project Staff

**Lionel S. Johns**, *Assistant Director, OTA  
Energy, Materials, and International Security Division*

**Richard E. Rowberg**, *Energy Program Manager*

**David Claridge**, *Project Director (until January 1980)*

**Ray A. Williamson**, *Project Director (from January 1980)*

**Stefi Weisburd**      **Adam Wasserman**

### *Administrative Staff*

**Marian Grochowski**      **Lisa Jacobson**      **Lillian Quigg**

**Edna Saunders**      **Yvonne White**

### *Contributors*

**Clifflyn Bromling**      **Alan Crane**

**Arlene Maclin**      **William Metz**

### *Contractors and Consultants*

**Eric Drexler**

**International Energy Associates, Ltd.**

**John Furber**

**David Morris**

**Mark Gersovitz**

*Institute for Local Self Reliance*

*Princeton University*

**Barry Smernoff**

**Jerry Grey**

*Smernoff & Associates*

## OTA Publishing Staff

**John C. Holmes**, *Publishing Officer*

**John Bergling**

**Kathie S. Boss**

**Debra M. Datcher**

**Joe Henson**

## Acknowledgments

OTA thanks the following people who took time to provide information or to review part or all of the study.

**Martin Abromavage**, Argonne National Laboratory

**Edwin Beatrice**, Letterman Army Institute of Research

**Richard Beverly and William Brown**, Raytheon

**Tom Bull**, Office of Technology Assessment

**Daniel F. Cahill**, U.S. Environmental Protection Agency

**Don Calahan**, National Aeronautics and Space Administration

**Stephen Cheston**, Georgetown University

**Stephen Cleary**, Mfederal College of Virginia

**P. Czernski**, National Research Institute of Mother and Child, Poland

**Steven Doyle**, Office of Technology Assessment

**Lewis Duncan**, Los Alamos Scientific Laboratory

**William Erickson**, University of Mary/and

**Harold A. Feiveson**, Woodrow Wilson School, Princeton University

**Zorach Glaser**, Bureau of Radiological Health

**Anita Harlan**, L-5 Society

**John Hooper**, Sierra Club

**Wayne Jones**, Lockheed Corp.

**Don Justesen**, Veterans Administration

**Fred Koomanoff**, U.S. Department of Energy

**John Logsdon**, George Washington University

**Simon V. Manson**, National Aeronautics and Space Administration

**Richard Marsten**, Office of Technology Assessment

**Ernest L. Morrison**, National Telecommunications and Information Administration

**Fred Osborne**, Sunsat Energy Council

**Steven Plotkin**, Office of Technology Assessment

**John Richardson**, National Academy of Sciences

**Michael Riches**, U.S. Department of Energy

**Donald Rote**, Argonne National Laboratory

**Charles Rush**, National Telecommunications and Information Administration

**Richard Santopietro**, U.S. Department of Energy

**Carl Schwenk**, National Aeronautics and Space Administration

**Richard Setlow**, Brookhaven National Laboratory

**Charlotte Silverman**, U.S. Public Health Service

**David Sliney**, U.S. Army Environment/ Hygiene Agency

Marcia Smith, Congressional/ Research Service

**Gerald Stokes**, Pacific Northwest Laboratory

**A.R. Thompson**, National Radio Astronomy Observatory

**Kosta Tsipas**, Massachusetts Institute' of Technology

Paul Tyler, Armed Forces Radiological Research Institute

**A.R. Valentine**, Argonne National Laboratory

**Peter Vajk**, Science Applications, Inc.

Margaret White, Lawrence Berkeley Laboratory

**John Zinn**, Los Alamos Scientific Laboratory