

*Application of Solar Technology to Today's  
Energy Needs—Vol. I*

June 1978

NTIS order #PB-283770

Volume I

Application of  
**Solar Technology**  
to Today's Energy Needs

**Library of Congress Catalog Card Number 78-600060**

For sale by the Superintendent of Documents, U.S. Government Printing Office  
Washington, D.C. 20402, Stock No. 052-003-00539-5

# FOREWORD

This report reviews a range of solar energy systems designed to produce thermal and electrical energy directly from sunlight with units small enough to be located on or near the buildings they are designed to serve. It examines the state-of-the-art of the technology, identifies the circumstances under which such systems could be economically attractive, and discusses the problems encountered in integrating these devices into existing energy generation and delivery systems. The study also assesses the impact that widespread use of decentralized solar energy equipment could have on the United States — its energy supplies, its ability to achieve foreign policy objectives, its physical environment, its levels and patterns of employment, and the functioning of society as a whole. It is apparent from the study that development of a large market for such equipment would have a profound impact on the way an industrial society evolves.

The analysis conducted for this report found that with aggressive Federal support, there are realistic circumstances in which small-scale energy systems could compete favorably with conventional energy sources in many residential, commercial, and industrial applications by the end of the next decade. Given the limited number of choices available for meeting our future energy needs, the options made available by this technology deserve serious consideration



**RUSSELL W. PETERSON**

*Director*

**Office of Technology Assessment**

# OTA Solar Advisory Panel

**Jerry Grey, Chairman**  
Private Consultant

**William W. Caudill**  
Caudill, Rowlett & Scott

**John J. Gunther**  
United Conference of Mayors

**Klaus P. Heiss**  
ECON, Inc.

**Morton Hoppenfeld**  
University of New Mexico

**Charles Luttmann**  
The Ralph M. Parsons Company

**James MacKenzie**  
Massachusetts Audubon Society

**Paul Maycock**  
Texas Instruments'

**Marjorie Meinei**  
University of Arizona

**Larry T. Papay**  
Southern California Edison Co.

**Paul Rappaport**  
RCA-David Sarnoff Research Center\*\*

**Floyd E. Smith**  
International Association of  
Machinists

**Ephraim M. Sparrow**  
University of Minnesota

# OTA Energy Advisory Committee

**Milton Katz, *Chairman***  
Director, International Legal Studies, Harvard Law School

**Thomas C. Ayers**  
President and Chairman of the Board  
Commonwealth Edison Company

**Kenneth E. Boulding**  
Professor of Economics  
Institute of Behavioral Science  
University of Colorado

**Eugene G. Fubini**  
Fubini Consultants, Ltd.

**Levi (J.M.) Leathers**  
Executive Vice President  
Dow Chemical USA

**Wassily Leontief**  
Department of Economics  
New York University

**George E. Mueller**  
President and Chairman of the Board  
System Development Corporation

**Gerard Piel**  
Publisher, Scientific American

**John F. Redmond, Retired**  
Shell Oil Company

**John C. Sawhill**  
President  
New York University

**Chauncey Starr**  
Electric Power Research  
Institute

---

\*Resigned after accepting position with U S Department of Energy.

\*\* Resigned after accepting position as Director of the Solar Energy Research Institute

# OTA Solar Energy Project Staff

**Lionel S. Johns, Energy Program Manager**

**Henry Kelly, Project Leader**

**David Claridge**

**John Furber**

**John Bell**

## *OTA Energy Staff*

**Richard Rowberg**

**Lynda Brothers**

**Marvin Ott**

**Dorothy Richroath**

**Linda Parker**

**Lisa Jacobson**

**Joanne Seder**

**Radmilia L. Bartok**

**Rosaleen Sutton**

## *Technical Assistance*

**Oak Ridge National Laboratories**

**Sandia Laboratories**

**Lawrence Livermore Laboratory**

**Department of Energy**

**Division of Solar Energy**

## *Consultants*

**Timothy Adams**

**Linda Ashworth**

**Richard Bourbon**

**Allen Brailey**

**Jack Burby**

**Peter Ceperley**

**Thomas Erwin**

**Crayson Heffner**

**Sam iker**

**Ann Cline Kelly**

**Renal Larson**

**Robert Morse**

**Corbyn Rooks**

**Edward Sproles**

**Donald Veraska**

**Don Watt**

**Mary Zalar**

## Contractors

**American Institute of Architects**

**Research Corporation**

**Environmental Law Institute**

**Thermo Electron Corporation**

**Cotton & Wareham**

**Jet Propulsion Laboratory**

**University of Oklahoma, Science&**

**Public Policy Program**

## OTA Publications Staff

**John C. Holmes, Publishing Officer**

**Kathie S. Boss**

**Joanne Heming**

# Acknowledgment

**This report would not be possible in its present form without the careful review and information supplied by hundreds of individuals and companies in the many fields and specialties covered by this report.**