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# Passive Solar Design

*An Extensive Bibliography*

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# PREFACE

Passive solar energy has the potential to reduce significantly the energy requirements for buildings in virtually every part of the United States over the next 2-5 years. To realize this potential the U.S. Department of Energy (DOE) has initiated a Passive Solar Program. Its objective is to significantly reduce the nation's use of nonrenewable energy sources through the application of passive solar energy. This will be accomplished by accellerating the development and utilization of passive solar heating, cooling, and process systems. The Passive Solar Program consists of two major areas: Technology Development and Technology Utilization. Technology Development incorporates physical studies and materials development, product development, and systems development. Technology Utilization includes commercialization readiness assessments, technology transfer, stimulation of technology delivery capability, amd stimulation of market demand.

Recent studies regarding an assessment of the readiness of passive technology for commercialization have indicated the following principle conclusions:

- Technical readiness for passive solar heating has been demonstrated for a variety of designs, climates, and building types. Low maintenance and high reliability are key characteristics.
- Economic readiness for passive solar heating has been demonstrated in residential and commercial building applications. Already in 1978, passive solar heating compares favorably on a life-cycle basis with electric space heating in nearly all parts of the United States, with oil in most places, and with (regulated) gas in some places. Passive solar heating is generally predicted to be more economical on a life-cycle basis than active solar heating for the same delivered BTU (at low solar fractions).
- Although development of some specialized products would be helpful, most materials, manufactured products, and construction methods needed for commercialization are now commonly employed in building construction without serious environmental, net energy, or institutional drawbacks to be anticipated from their expanded use.
- The major barriers to commercialization are surmountable through an effective passive solar commercialization program.

While there is much activity underway throughout the United States in passive solar heating and cooling, these techniques are still not generally incorporated into most new and existing buildings. This lack of passive buildings may be generally traced to:

- The building industry's lack of awareness and understanding of present and possible passive solar applications.
- A lack of quantitative basis for evaluating design decisions such as estimating costs and performance.

- Presently higher first costs than conventional building design and construction.
- Artificially low fuel prices.

A key element in the commercialization of passive solar is the ability of the building community to effectively integrate passive solar approaches into the normal design process. The lack of marketable passive solar building designs and design tools was identified as an important obstacle to commercialization. The goals of commercialization will be met when passive solar design is accepted as 'standard practice' by both professionals and building trades. In other words, when common materials and passive solar products are combined in such a way as to maximize the benefits of environmental resources (e.g. sun, wind, earth, etc.) in the design of the building. Consequently, a key strategy is to develop various design tools which lead to development of designs and construction of buildings using passive techniques.

Built upon a foundation of research and development, the main structure of the commercialization effort is education and information dissemination. Education of the consumer will stimulate demand for passive solar systems. Education of the key participants in the building industry (designers, builders, developers, lenders, etc.) and expansion of existing professional design and trade organizations' education and information programs will greatly stimulate near-term use.

Part of this program involves the production of documents on passive solar concepts to increase the availability of information to designers and others in order to increase the professional capability to design passive buildings. Aside from the present one these documents include:

- Passive Solar Design: A Short Bibliography for Practitioners

  Produced by the AIA Research Corporation for DOE; available from U.S. Government Printing Office.

- Survey of Monitored Passive Solar Buildings

  Produced by AIA Research Corporation for DOE; available from U.S. Government Printing Office.

- Passive Design Handbooks

  Under production for DOE; availability not yet known.

- Survey of Passive Solar Buildings

  Produced by the AIA Research Corporation for the U.S. Department of Housing & Urban Development; available from AIA Publications Fulfillment, 1735 New York Avenue N.W., Washington, DC 20006.

- Regional Guidelines for Building Passive Energy Conserving Homes

  Produced by the AIA Research Corporation for the U.S. Department of Housing & Urban Development; available from the National Solar Heating & Cooling Information Center, PO Box 1607, Rockville, MD 20850.

- Passive Solar Heating and Cooling Conference and Workshop, Albuquerque, NM, May 18-19, 1976. Proceedings. Available from National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22161. 355 p. $10.50 (paper).

- 2nd National Passive Solar Conference, University of Pennsylvania, Philadelphia, March 16-18, 1978. Passive Solar: State of the Art. 3 vols. Available from Mid-Atlantic Solar Energy Association, 2233 Gray's Ferry Avenue, Philadelphia, PA 19146. $20.00 (paper).

- 3rd National Passive Solar Conference, San Jose, CA, January 9-14, 1979. Proceedings; availability not yet known.

# INTRODUCTION

The purpose of this bibliography is to provide all those interested in passive solar design with the sources of information as available at the time of publication.

It is intended to give the researchers and practitioners access to the bulk of materials on topics relating to the use of passive heating and cooling techniques and an attempt has been made to be as comprehensive as possible.

"A Short Bibliography for Practioners" containing basic easily accessible materials has already been published. New publications on the subject are appearing all the time. However, the present document will serve as a baseline for literature searches on this new material.

The bibliography is organized into two parts: by subject and by author. Part A is divided into twenty-one subject matter categories each with entries listed alphabetically according to the title. As with any cataloguing system, the categories are somewhat arbitrary and the assignment of particular entries to specific subject matter categories is similarly somewhat arbitrary. Therefore, if the first category consulted does not yield a reference on the desired subject, two or three related categories should be consulted. The books and articles listed will, of course, readily lead to additional sources.

Part B is alphabetically listed according to author, The information given about each entry is not as complete as in many bibliographies, but is sufficient for most practitioners or researchers to locate the documents desired. In the interest of space, many referenceshave been abbreviated and listed before part one. In this way it should be possible with a minimum of persistance to locate the item desired and obtain a copy.

The Bibliography includes materials included in major computerized data banks as of January 1978. In the interest of completness, the proceedings of the Second National Passive Conference have also been included. Later materials should be separately researched.

List of Abbreviations

AAMA - Architectural Aluminum Manufacturers Association
35 East Wacker Dr., Chicago, IL 60601

ACI - American Concrete Institute
P.O. Box 19150, Redford Sta., Detroit, MI 48219

Agri Eng - Agricultural Engineering
American Society of Agricultural Engineers
Box 410, St. Joseph, MI 49085
(Masoneilan Intl. Inc., Norwood, MA)

AIA - American Institute of Architects
1735 New York Ave., NW, Washington, D.C. 20006

AIA/RC - AIA Research Corporation
1735 New York Ave., NW, WAshington, D.C. 20006

AICHE - American Institute of Chemical Engineers
345 East 47th St., New York, NY 10017

AIP American Institute of Planners
1776 Massachusetts Ave., NW, Washington, D.C. 20036

AIRAH - Australian Institute of Refrigeration, Air Conditioning and Heating
Brisbane Queensland, Australia
Institution of Engineers Australia
11, National Circuit, Barton, A.C.T.

ALT SE - Alternative Sources of Energy
Route 2, Box 90A, Milaca, MN 56353

Appl Solar Energy - Applied Solar Energy (English Translation of Geoliotekhnika, sometines Heliotechnology)
Allerton Press, Inc.
150 Fifth Ave., New York, NY 10011

Archit Des - Architectural Design
Standard Catalogue Co., Ltd.
26 Bloomsbury Way, London WC1A 2SS, England

Archit Rec - Architectural Record
McGraw Hill, Inc.
1220 Ave. of the Americas, New York, NY 10020

ASAE - American Society of Agricultural Engineers, or, American Society of Automotive Engineers
2950 Niles Road, P.O. Box 410, St. Joseph, MI 49085

ASC - Association of Student Chapters (of AIA)
1735 New York Ave., NW, Washington D.C. 20006

ASHRAE - American Society of Heating, Refrigeration and Air Conditioning Engineers (formerly: ASHVE - American Society of Heating & Ventilating Engineers)
345 East 47th St., New York, NY 10017

ASISES - American Section - International Solar Energy Society
State Road 401, Cape Canaveral, FL 32920

ASME - American Society of Mechanical Engineers, Inc.
345 East 47th St., New York, NY 10017

ASUSI - Arizona State University Solar Energy Index
Arizona State University, Tempe, AZ 85281

BIA - Brick Institute of America
1750 Old Meadow Rd., McLean, VA 22101

BNWL - Batelle Pacific Northwest Laboratory
Batelle Memorial Institute, Batelle Blvd., Richmond, VA 99352

Building Res Pract - Building Research and Practice, ALSO, Batiment International
Centre Scientifique et Technique du Batiment,
4 Ave du Recteur Poincare, F-75782, Paris 16 France

Build Int. - Build International
Applied Science Publishers Ltd.
Ripple Road, Barknig, Essex, England

Chem Eng Prog - Chemical Engineering Progress
American Institute of Chemical Engineers
345 East 47th St., New York, NY 10017

CIE - Commission International de l'Eclairage
Central Bureau
4, Ave de Recteur Poincare, F-75782, Paris 16 France

CNRS - Center National de la Recherche Scientifique
15 Quai Anatole-France, 75700 Paris, France

Consulting Engr - Consulting Engineer
Northwood Publications Ltd.
Elm House, Elm St., London WC1OBP, England

CRREL - Cold Regions Research and Engineering Laboratory (U.S. Army)
Hanover, NH

CSI - Construction Specification Institute
1150 17th St., NW, Washington, D.C. 20036

CSIR - Council for Scientific and Industrial Research, South Africa
Scientia, P.O. Box 395, Pretoria 0001, South Africa

CSIRO - Commonwealth Scientific and Industrial Research Organization, Australia
314 Albert St., E. Melbourne 3002, Victoria, Australia

DOE - Department of Energy
20, Massachusetts Ave., NW, Washington, D.C. 20545

EDB - Energy Data Bank (The following number indicates the year of data entry into the Bank)
62
Technical Information Center, Oakridge, TN 37830

Energy Convers - Energy Conversion (formerly: Advanced Energy Conversion)
Pergamon Press, Inc.
Maxwell House, Fairview Park, Elmsford, NY 10523

Eng News Record - Engineering News Record
McGraw Hill, Inc.
1221 Ave. of the Americas, New York, NY 10020

Environ Conserv - Environmental Conservation
Elsevier Sequoia S.A., Box 851, CH-1001, Lausanne 1, Switzerland

ERDA - Energy Research and Development Administration (now DOE)
20 Massachusetts Ave., NW, Washington, D.C. 20545

GA Inst of Tech - Georgia Institute of Technology
Solar Energy & Materials Technology Division
Atlanta, GA 30332

Geliotekhnika - Russian for Applied Solar Energy
Applied Sciences Publishers Ltd.
Ripple Road, Barknig, Essex, England

Glass Ind - Glass Industry
Magazines for INdustry
777 Third Ave., New York, NY 10017

GPO - (U.S.) Government Printing Office
North Capitol & H Sts., NW, Washington, D.C. 20401
(Superintendent of Documents, Washington, D.C. 20402)

Heat, Piping, Air-Cond - Heating, Piping, Air-Conditioning
Reinhold Publishing Co., Inc.
600 Summer St., Stamford, CT 06904

Heat, Vent - Heating and Ventilating News (formerly: Heating and Ventilating News and Heating and Ventilating Equipment Heating and Ventilating Equipment News)
Maclaren Publishing Ltd., Davis House
69-77 High St., Croydon, Surrey, England

IEEE - Institute of Electrical and Electronics Engineers
345 East 47th St., New York, NY 10017

IMI - International Masonry Institute
823 15th St., NW, Ste. 1001, Washington, DC 20005

ISES - International Solar Energy Society
State Road 401, Cape Canaveral, FL 32920

JA - Article in Journal in ASU Library
Arizona State University, Tempe, AZ 85281

J Air Pollut Cotr Assoc - Air Pollution Control Association Journal
4400 Fifth Ave., Pittsburgh, PA 15213

J Appl Meteor - Journal of Applied Meteorology
American Meterological Society
45 Beacon St., Boston, MA 02108

J Eng Power - Journal of Engineering for Power
(Series A of the Transactions of the ASME) vol. 92.
American Society of Mechanical Engineers
345 East 47th St., New York, NY 10017

J Heat Transfer - Journal of Heat Transfer (vol. 92)
American Society of Mechanical Engineers
345 East 47th St., New York, NY 10017
Also issued as: American Society of Mechanical Engineers
Quarterly Transactions

J Quant Spectrosc & Radiat Transfer - Journal of Quantitative Spectroscopy and Radiation Transfer
Pergamon Press, Inc., Journals Dept.
Maxwell House, Fairview Park, Elmsford, NY 10523
(Also: Headington Hill Hall, Oxford OX3 0BW, England

LASL - Los Alamos Scientific Laboratory
University of California, Los Alamos, NM

LLL - Lawrence Livermore Laboratory
University of California
P O Box 808, Livermore, CA 94550

Mech Eng - Mechanical Engineering
American Society of Mechanical Engineers
345 East 47th St., New York, NY 10017

MIT - Massachusetts Institute of Technology
28, Carleton St., Cambridge, MA 02142

M-ASEA - Mid-Atlantic Solar Energy Association
2233 Grays' Ferry Ave., Philadelphia, PA 19146

MSFC - Marshall Space Flight Center (NASA)
Huntsville, AL 35804

NASA - National Aeronautics & Space Flight Center
400 Maryland Ave., SW, Washington, DC 20546

NATO - North Atlantic Treaty Organization
Brussels, Belgium

NBS - National Bureau of Standards (Gaithersburg, MD)
Route 1 - 70 SE Quince Orehard Rd., Washington, DC 20234

NCMA - National Concrete Masonry Association
6845 Elm St., McLean, VA 22101

NESEA - New England Solar Energy Association
P O Box 121, Townshend, VT 05353

NMSEA - New Mexico Solar Energy Association
P O Box 2004, Santa Fe, NM 87501

NOAA - National Oceanic and Atmospheric Association
6010 Executive Bvd., Rockville, MD 20852

NPSC - National Passive Solar Conference, 2nd
University of Pennsylvania, Philadelphia, March 16-18, 1978

NSF - National Science Foundation
1800 G St., NW, Washington, DC 20550

NTIS - National Technology Information Service
U.S. Dept. of Commerce, Springfield, VA 22161

OARDC - Ohio Agricultural Research and Development Center
Wooster, OH 44691

ORNL - Oak Ridge National Laboratory
Oak Ridge, TN 37830

Penn Univ National Ctr for Energy, Mgmt, & Power - Pennsylvania
University National Center for Energy, Management and Power
Towne Building, Philadelphia, PA 19104

Prog Arch - Progressive Architecture
Reinhold Publishing Co., Inc.
600 Summer St., Stamford, CT 06904

PSHCC - Passive Solar Heating and Cooling Conference and Workshop
Proceedings, 5/18-19/76, Albuquerque, NM
Information available from National Technical Information Service
U.S. Dept of Commerce, Springfield, VA 22161

RAE - Royal Aircraft Establishment
Farnborough, Hauts, England

RANN - Research Applied to National Needs
Document Center
1800 G St., NW, Washington, DC 20550

Rev Alum - Revue de l'Aluminium
Societe d'Edition et de Documentation des Alliages
Legers, 5 Rue Saint-Phillippe-Du Roule, Paris (8e), France

RSI - RSI (Roofing, Siding, Insulation)
Harcourt Brace Jovanovich Inc.
757 Third Ave., New York, NY 10017
Incorporating: Solar Contractor

SAMPE - Society of Aerospace Materials and Process Engineers (formerly: Society for the Advancement of Materials & Process Engineering
P O Box 613, Azusa, CA 91702

SERI - Solar Energy Research Institute
1536 Cole Bvd., Golden, CO 80401

Solar ED - Solar Energy Digest
17776, San Diego, CA 92117

Sol Energy - Solar Energy
(International Solar Energy Society)
Pergamon Press, Inc.
Maxwell House, Fairview Park, Elmsford, NY 10523
Also: Headington Hill Hall, Oxford 0X3 0B, England

Sol Eng - Solar Engineering
Solar Engineering Publishers Inc.
8433 N. Stemmons, Suite 880, Dallas, TX 75247

Sol Tech - Solar Technology (Reports)
P O Box 1648, Madison, WI 53701 $75.00 Per Year

SPIE - Society of Photo-Optical Instrumentation Engineers
(Seminar Proceedings 1963)
P O Box 10, Bellingham, WA 98225

TAC - Technology Application Center
The University of New Mexico, Albuquerque, NM 87131

TEA - Total Environmental Action
Church Hill, Harrisville, NH 03450

TP - Technical Paper (at ASUSI)

Univ Microfim - University Microfilm International
300 N. Zeeb Rd., Ann Arbor, MI 48106

USAF - United States Air Force
Air Science Tactics, Univ of MD, College Park, MD

USDA - United States Department of Agriculture
Washington, DC 20250

WMO - World Meteorological Organization
41 Ave. Giuseppe Motta CH-121, Geneva Zo, Switzerland
Distr. in U.S.: Unipub, Box 433, Murray Hill Station

PART A. LISTING BY SUBJECT
(ALPHABETICAL BY TITLE WITH EACH SUBJECT)

# I. COSTS, ECONOMICS, POLITICS

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CALIFORNIA'S PASSIVE PROGRAM, Hunt, Marshall B., 2nd NPSC, pp. 694.

A COMPUTER SIMULATED PERFORMANCE AND CAPITAL COST COMPARISON OF "ACTIVE VS. PASSIVE" SOLAR HEATING SYSTEMS, Fraker, H; Glennie, W.L.; pp. 254-269; PSHCC, May 18-19, 1976.

DAYLIGHT UTILIZATION IN PASSIVE SOLAR SYSTEMS USING LIFE CYCLE COST-BENEFIT ANALYSIS, Griffith, J.W.; PSHCC.

DESIGN AND COST TRADEOFFS IN HEAVILY INSULATED SOLAR HEATED AND COOLED HOMES, Brazil, J.; Magee, J.; 15pp.; Avail: 18340 Vlack Road, Los Gatos, CA (TAC: ST77 33005).

DESIGN OF A LOW COST SOLAR HABITAT, Nelson, Lynn, 2nd NPSC, pp. 761.

ECONOMIC ANALYSIS OF THERMIC DIODE SOLAR PANELS, Stargardt, W.W., Buckley, B.S.; Masoneilan Int. Inc., Norwood, MA; AM. Soc. Mech. Eng.; Pap.; 76-WA, Sol. -7; Dec. 5, 1976; pp. 1-11.

ECONOMIC FEASIBILITY REACHED IN SOLAR HOME, Sun at Work; First Quarter, 1960; pp. 6-7.

ECONOMICS-ONE VIEW, Saunders, Norman; pp.247; PSHCC.

ECONOMIC RESULTS OF CERTAIN PASSIVE STRUCTURES, Saunders, N.B., paper presented, NESEA Better Thermal Utilization Conference, Hartford, CT, Sept. 8-11, 1977.

THE EDDY ADDITION: A NEW ENGLAND HYBRID, Brownlow, D., Price, T.L., III; 2nd NPSC, pp. 111.

EDUCATION WORKSHOP, Chairman: Cook, Jeffrey; pp. 331; PSHCC.

EDUCATIONAL INCENTIVES FOR PASSIVE SYSTEMS, Kennedy, R.J., 2nd NPSC, pp. 758.

ENERGY ANALYSIS AS A POLICY TOOL, Haggard, K., Knudtson, P., 2nd NPSC, pp. 691.

EVALUATION OF THE COMMERCIAL SOLAR RELIANT GREENHOUSE IN THE ROCKY MOUNTAIN REGION, Elfring, D., Lillywhite, M., Massie, C., 2nd NPSC, pp. 716.

FIRST COST ECONOMIC EVALUATION OF THE ATASCADERO SKYTHERM HOUSE, Haggard, Kenneth; pp. 250; PSHCC.

THE GROWTH OF FOLK SOLAR ARCHITECTURE IN NEW MEXICO, Van Dresser, P., 2nd NPSC, pp. 781.

INTERIM GUIDELINES AND CRITERIA FOR A STATE SOLAR ENERGY TAX CREDIT, State Energy Commission Alternatives Division Solar Office; Sacramento, CA; Jan. 5, 1978.

INTRODUCTION OF SOLAR ENERGY IN ARCHITECTURE AND URBANISM, Michel, Jacques J.P.; 2nd NPSC, pp. 20.

LEGISLATIVE MEASURES IN SUPPORT OF SOLAR ENERGY, Feingold, Adolph; Univ. of Ottawa, pres. at the Solar Energy Update 1977, 3rd Annual Gen. Mtg. and Conf., Solar Energy Society of Canada, Inc.; August 22-24, 1977.

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PASSIVE EDUCATION FOR ACTIVE PROFESSIONALS, Cook J., 2nd NPSC, pp. 716.

PASSIVE SYSTEMS FOR SOLAR HEATING AND COOLING--HISTORICAL PERSPECTIVE, Yellott, John I., 2nd NPSC, pp. 1.

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PRELIMINARY ECONOMIC EVALUATION OF GENERIC PASSIVE SOLAR ENERGY SYSTEM/BUILDING APPLICATIONS, Davidoff, P., Hirshberg, A., Narayanan, P., 2nd NPSC, pp 699.

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THE ROLE OF THE AMERICAN SECTION OF ISES IN PASSIVE DEVELOPMENT, Bennett, Robert, 2nd NPSC, pp 750.

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SOLAR ETHICS-URBAN FORM, Knowles, Ralph, 2nd NPSC, pp 840.

SOLAR HEATING & COOLING TAX CREDIT REQUIREMENTS, State Commission of Public Records and Archives, Santa Fe, NM.

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TECHNOLOGY UTILIZATION: INCENTIVES AND SOLAR ENERGY, Science; Feb. 28, 1975; pp. 707.

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# II. DESIGN CONCEPTS

ACTIVE VERSUS PASSIVE SYSTEMS-A DESIGN RATIONALE FOR THE SELECTION OF PASSIVE SYSTEMS BASED ON A COMPARATIVE STUDY OF EFFICIENCY, CAPACITY, ECONOMICS AND THERMAL NETWORK ANALYSIS, Converse, A.O., Gillett, D., Heldt, R., Taff, D.C., 2nd NPSC, pp 828.

ALTERNATIVE NATURAL ENERGY SOURCES IN BUILDING DESIGN, Davis, A.J., and Schubert, R.P.; Passive Energy Systems, Blacksburg, VA; Van Nostrand Reinhold Co., New York; 1977.

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APPROPRIATE SYSTEMS FOR HEATING BUILDINGS: THE CASE FOR PASSIVE SOLAR WITH MOVABLE INSULATION, Cole, W.J., Kinney, L.F., 2nd NPSC, pp 795.

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ARCHITECTURE OF A PASSIVE SYSTEM OF DIURNAL HEATING AND COOLING, Haggard, K.L.; Calif. Polytechnic State Univ.; ISES, Rockville, MD; International Solar Energy Congress and Exposition; 1975.

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BEYOND PASSIVE DESIGN: TOWARD AN INTEGRATIVE CONSERVATION TECHNOLOGY, Watson, Donald; 2nd NPSC, pp 30.

BIO-SHELTER: ECOLOGICAL DESIGN CRITERIA FOR BUILDINGS, Chahroudi, Day and Wellesley-Miller, Sean; Architecture Plus, Informat Publishing Co., NY; Nov.-Dec., 1974.

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