

Table of Contents

Preface	v
Introduction	vii
I. Overview	
<i>The UAH Solar and Wind Energy Program</i> (David L. Christensen)	3
<i>Status of Marshall Space Flight Center Solar House</i> (William R. Humphries)	15
<i>Activities in Space-Based Solar Power Development</i> (Walter E. Whitacre)	31
<i>Summary of NASA-Lewis Research Center Solar Heating and Cooling and Wind Energy Programs</i> (Richard W. Vernon)	43
<i>Government: Expeditor of Energy Conservation and Solar Energy</i> (Thomas L. Ainscough)	67
II. Architectural and Institutional Considerations (Environmental – Economic)	
<i>Solar Energy Recorder</i> (Robert B. Lollar and Richard R. Mandt)	77
<i>Architectural Constraints on Solar Applications to Housing</i> (Donald Watson)	89
<i>Economic Aspects of Solar Energy in the Southeast</i> (M. C. Ziemke and C. A. Ponder)	103
<i>Environmental Exposure Considerations in Solar Heating and Cooling Systems</i> (Howard H. Yen and David R. Reese)	113
<i>Outdoor Performance Testing of Flat-Plate Solar Collectors</i> (G. A. Zerlaut and W. T. Dokos)	121

III. Components and Subsystems (Collectors and Concentrators)

<i>Design and Characterization of Solar Concentrators</i> (D. E. Anderson, D. A. Thayer, and H. B. Sahl)	143
<i>Predicted Performance of Transparent Plastic Honeycomb Solar Collectors</i> (R. K. Wedel and K. N. Marshall)	157
<i>Design of an Enhanced Flat-Plate Solar Collector</i> (L. S. Fletcher and S. Ahiskali)	171
<i>A Parabolic Collector Using Composite Construction</i> (Peter Rojeski, Jr. and Gary W. Sams)	179
<i>Thin-Film-Coated Cover Plates for Solar Collectors</i> (R. P. Taylor and R. Viskanta)	189
<i>Development of a Prototype Faceted Fixed-Mirror Solar Concentrator</i> (J. Richard Williams)	209
<i>Solar Collector Testing by Calorimetry</i> (W. David Lee)	229
<i>A Simulation Study of a Solar Flat-Plate Collector</i> (W. B. Reuland, W. E. Russell, and J. B. Scott)	235
<i>Application of Thermic Diode Solar Panels</i> (Shawn Buckley)	249

IV. System Design, Analysis, and Test

<i>Design Guidelines for Solar Heating Systems</i> (T. E. Shoup and L. S. Fletcher)	269
<i>Principles of Solar Concentrator Design</i> (Donald G. Burkhard)	283
<i>Solar Space Heating with Aquifer Heat Storage: A Design Study</i> (Robert C. Brothers and C. Paul Wilhite)	293
<i>Comparative Evaluation of Solar Cooling Concepts</i> (H. M. Curran and T. Alereza)	305

Performance Simulation for the Design of Solar Heating and Cooling Systems
(Paul O. McCormick) 327

Experimental Evaluation of a Solar Concentrator
(Leon J. Hastings) 333

Solar Energy/Heat Pump Alternatives for Energy Conservation in Residential Applications
(Floyd O. Calvert and Darrel G. Harden) 359

Liquid Subsystems for Collection, Storage, and Distribution of Solar Heat
(C. C. Smith, G. O. G. Lof, and D. S. Ward) 373

Low-Temperature Rankine Air Conditioning
(J. A. Bond and C. S. Robertson, Jr.) 389

An Analysis for Designing Solar Concentrator-Collector Configurations
(J. H. McDermit) 405

V. Applications – Residential and Commercial

Hot-Water Usage in a Typical Single-Family Residence
(Ralph J. Johnson and Hugh D. Angleton) 433

Solar Heating and Cooling of Mobile Homes
(S. L. Macklis) 437

Design, Performance, and Architectural Integration on Solar Heating System Using Reflective Pyramid Optical Condenser
(Eric M. Wormser) 451

Solar Heating a Boston School
(J. E. Notestein) 461

Performance Analysis of Solar Service Hot Water Systems in the Northwestern United States
(C. Byron Winn, Peet M. Soot, and William R. Szmyd) 485

Comparative Performance Analyses of Three Solar Heated and Cooled Buildings
(C. Byron Winn and Gearold R. Johnson) 499

Solar Heating of a Commercial Office Building
(Stanley F. Gilman) 511

<i>Design of the Solar Heating System for Grassy Brook Village Condominium</i> (David L. Hartman)	517
<i>Integrated Home Energy System</i> (C. Hardy Long)	521
<i>Use of Solar Energy in a Soybean Processing Operation</i> (Al Reisz)	539

VI. Applications – Power

<i>A Simulation Model for Solar Thermal Electric Power Systems</i> (Gearold R. Johnson and Nabil El Gabalawi)	553
<i>Solar Insolation Transients— Their Impact on the Design and Testing of Solar Thermal Power Plants</i> (Charles A. Lindley)	573
<i>Minimum-Cost Solar Collector Fields</i> (William S. Duff)	591
<i>Solar Thermal Electric Power Systems</i> (William S. Duff and S. Karaki)	605
<i>Air Force Sponsored Photovoltaic Research</i> (John M. Green)	615
<i>Hydrogen as an Energy Vector</i> (William D. Powers)	627

