

**2002  
ACEEE  
Summer  
Study on  
Energy  
Efficiency  
in  
Buildings**

# **Teaming for Efficiency**

## **PROCEEDINGS**

**6**

# **Market Transformation**

*Panel Leaders:*

Marc Ledbetter, Pacific Northwest National  
Laboratory

Marc Hoffman, Consortium for Energy Efficiency




**American Council for an Energy-Efficient Economy**

1001 Connecticut Avenue, N.W. • Suite 801 • Washington, D.C. 20036 • (202) 429-8873  
PUBLICATIONS: (202) 429-0063

Copyright © 2002 All rights reserved.

**American Council for an Energy-Efficient Economy**

No portion of this publication may be reproduced by any process or technique without the express written consent of the publisher.

 Printed on recycled paper.

---

# Foreword

**T**he 2002 Summer Study on Energy Efficiency in Buildings, a biennial conference organized by the American Council for an Energy Efficient-Economy (ACEEE) brings together professionals from around the world to discuss the technological basis for, and practical implementation of, improving energy use in buildings. Participants, including authors of the papers published in these proceedings, represent government agencies, industry, utilities, national laboratories, universities, consultants, public interest groups, and others.

We selected the Summer Study's theme, "Teaming for Efficiency," to highlight the importance of public/private partnerships, regional collaborations, and inter-regional efforts. However, it is clear from the papers presented at this conference and published in these proceedings that the word "team" meant much more to our conference participants than the traditional definition with which we had started—a group of people joining together to bring a specific effort to fruition. The complexity and global nature of today's energy concerns calls for national and international collaborations and the linking together of fields of study and strategies which often evolve separately.

In addition to focusing on teams and partnerships collaborating on specific projects, papers in these proceedings highlight the importance of metaphorical teaming between many individual subjects. Lessons learned from the papers include:

- teaming between individuals involved in field measurements and analytical evaluations is key to developing new efficient products
- the integration of component technologies into building systems results in totals greater than the sums of the individual parts
- research and deployment efforts need to complement each other
- teaming of systems with operators through commissioning, load management, and the use of information technologies is key to realizing expected energy savings and curtailing demand
- teaming is key to getting the tools that support energy-efficient building design and construction into the hands of people who design, build, and operate buildings
- as witnessed in the subject of utility issues, the lack of teamwork and the absence of the ethic of collaboration for the good of society as a whole derailed one of the world's largest energy infrastructures
- the issue of teaming runs through the whole field of market transformation: defining market transformation is, in itself, a team effort, and market transformation programs inherently rely on team efforts to be successful. Advocates of energy efficiency must team with those working to improve the quality of the built environment because energy efficiency is inherently linked with increased comfort and productivity in buildings

- 
- teamwork between program developers and evaluators ensures that we learn from our mistakes and promote our successes
  - cross-cultural efforts lead to more effective programs

Finally, as global events this past year have reminded us, energy efficiency professionals are part of the team working to solve global environmental and security problems.

The subjects of the ten volumes in these proceedings are:

1. Residential Buildings: Technologies, Design, Performance Analysis, and Building Industry Trends
2. Residential Buildings: Program Design and Implementation
3. Commercial Buildings: Technologies, Design, Performance Analysis, and Building Industry Trends
4. Commercial Buildings: Program Design and Implementation
5. Utility Issues
6. Market Transformation
7. Information and Electronic Technologies: Promises and Pitfalls
8. Human and Social Dimensions of Energy Use: Understanding Markets and Demand
9. Energy and Environmental Policy
10. Program Measurement and Evaluation

At this 15th Summer Study, we offered participants a new presentation format—"Round Table" sessions. These sessions involved a full hour and a-half session within the topic area of each panel, and were designed so that industry and non-industry participants could collaborate on topic areas where issues are best addressed by a diverse panel of authors. Within each volume of these proceedings, you may find one or two such "Round Table" papers.

We, the Co-Chairs, would like to thank the 25 Panel Leaders who evaluated more than 600 abstracts, and selected and led 273 papers through a rigorous review process. We would like to thank the many peer reviewers who worked with the Panel Leaders through this process. Most importantly, we would like to thank ACEEE staff, in particular Glee Murray, Rebecca Lunetta, Renee Nida, Deborah Ziff, and Julie Harvell for their tireless efforts to make this an extremely successful conference and to produce these valuable proceedings.

*Dariush Arasteh, Lawrence Berkeley National Laboratory*  
*Linda Sandahl, Pacific Northwest National Laboratory*

---

# Acknowledgments

---

## Organizing Committee

---

<b>Dariusz Arasteh</b> <i>Conference Co-Chair</i> Lawrence Berkeley National Laboratory	<b>Linda Sandahl</b> <i>Conference Co-Chair</i> Pacific Northwest National Laboratory	<b>Rebecca Lunetta, Glee Murray, and Steven Nadel</b> American Council for an Energy- Efficient Economy
--	--	---

---

## Advisory Committee

---

<b>Greg Ander</b> Southern California Edison Company	<b>Kenneth M. Keating</b> Bonneville Power Administration	<b>Garrett Stone</b> representing Anderson Windows and Cardinal Glass
<b>Chris Chouteau</b> Pacific Gas and Electric Company	<b>Merle McBride</b> Owens Corning	<b>Tim Stout</b> National Grid USA
<b>Sue Coakley</b> Northeast Energy Efficiency Partnerships	<b>Pat Meier</b> Wisconsin Division of Energy	<b>Gunnar Walmet</b> New York State Energy Research and Development Authority
<b>Bob Dixon</b> U.S. Department of Energy—Office of Power Technologies	<b>Art Rosenfeld</b> California Energy Commission	<b>Theresa Weston</b> DuPont

**Phil Fairey**  
Florida Solar Energy Center

**Margaret Gardner**  
Northwest Energy  
Efficiency Alliance

**Kathleen Hogan**  
U.S. Environmental  
Protection Agency

**Doug Horstman**  
Maytag

**Richard Karney**  
U.S. Department of  
Energy—Office of Building  
Technology, State and  
Community Programs

---

## Conference and Proceedings Staff

---

Glee Murray, *Director*

Rebecca Lunetta, *Manager*

Renee Nida

Deborah Ziff

Julie Harvell

Chuck Myers — Proceedings Design

Automated Graphics System — Proceedings and  
CD-ROM Production



---

# Contents

<b>PANEL 6: INTRODUCTION</b> .....	6.xi
<b>Education and Training for Market Transformation Programs: Keys to Success</b> .....	6.1
<i>Marge Anderson, Energy Center of Wisconsin</i>	
<b>2001—A CFL Odyssey: What Went Right?</b> .....	6.15
<i>Chris Calwell, Ecos Consulting</i>	
<i>John Zugel, Ecos Consulting</i>	
<i>Peter Banwell, U.S. Environmental Protection Agency</i>	
<i>Wendy Reed, U.S. Environmental Protection Agency</i>	
<b>ENERGY STAR® Specifications: A Decade of Development and a Future of Growth</b> .....	6.29
<i>Robin Clark, ICF Consulting, Inc.</i>	
<i>Andrew Fanara, U.S. Environmental Protection Agency</i>	
<b>The European Design Competition “Lights of the Future” for Energy-Efficient Lamp Dedicated Fixtures: A Successful Example of Market Transformation</b> .....	6.43
<i>Flavio Conti, Flavio Conti Consulting</i>	
<i>Paolo Bertoldi, European Commission DG JRC</i>	
<i>Vincent Berrutto, European Commission DG JRC</i>	
<b>The Northeast States Residential Energy Codes Support Project: A Model for Improved Energy Code Implementation Through Integrated Code and Building Science Training</b> .....	6.55
<i>Michael C. DeWein, Building Codes Assistance Project</i>	
<i>David R. Abrey, Northeast Energy Efficiency Partnerships, Inc.</i>	
<i>Stuart Slote, Optimal Energy, Inc.</i>	
<b>If We Build It, Will They Come? Building Infrastructure and Creating Demand for Energy Efficiency in New York</b> .....	6.67
<i>Mark Eggers, New York State Energy Research and Development Authority</i>	
<i>Andrew J. Fisk, New York State Energy Research and Development Authority</i>	

---

<b>Residential HVAC Quality Installation:</b>	
<b>New Partnership Opportunities and Approaches .....</b>	<b>6.79</b>
<i>Rebecca Foster, Consortium for Energy Efficiency, Inc.</i>	
<i>Mia South, U.S. Environmental Protection Agency</i>	
<i>Chris Neme, Vermont Energy Investment Corporation</i>	
<i>George Edgar, Wisconsin Energy Conservation Corporation</i>	
<i>Patrick Murphy, North American Technician Excellence</i>	
<b>Market Transformation Meets Resource Acquisition:</b>	
<b>The Mid-Market Approach .....</b>	<b>6.91</b>
<i>Margie Gardner, Northwest Energy Efficiency Alliance</i>	
<i>Susan Hermenet, Northwest Energy Efficiency Alliance</i>	
<i>Phil Welker, Portland Energy Conservation, Inc.</i>	
<b>Pickup Trucks and Broken Hearts: Analysis</b>	
<b>of a Texas Upstream A/C Incentive Program .....</b>	<b>6.101</b>
<i>Glenn Garland, ICF Consulting, Inc.</i>	
<i>David Gordon, ICF Consulting, Inc.</i>	
<i>Richard Necaise, ICF Consulting, Inc.</i>	
<i>Bob Drawe, Reliant Energy HL&amp;P</i>	
<b>A Business-Venture Approach to Premium O&amp;M Service</b>	
<b>for Commercial Packaged HVAC Systems .....</b>	<b>6.113</b>
<i>Jeff Harris, Northwest Energy Efficiency Alliance</i>	
<i>Phil Welker, Portland Energy Conservation, Inc.</i>	
<i>Tudi Haasl, Portland Energy Conservation, Inc.</i>	
<i>Dana Banks, Portland Energy Conservation, Inc.</i>	
<b>Seven Years Since SERP: Successes and Setbacks</b>	
<b>in Technology Procurement .....</b>	<b>6.125</b>
<i>Brad Hollomon, Pacific Northwest National Laboratory</i>	
<i>Marc Ledbetter, Pacific Northwest National Laboratory</i>	
<i>Linda Sandahl, Pacific Northwest National Laboratory</i>	
<i>Terry Shoemaker, Pacific Northwest National Laboratory</i>	
<b>Taking National Programs Local: Strategies for Reaching</b>	
<b>Out to Local Government Decision-Makers to Promote</b>	
<b>Energy Efficient Procurement .....</b>	<b>6.139</b>
<i>Katherine Johnson, KJ Consulting</i>	
<i>Carol Sabo, PA Consulting Inc.</i>	
<b>How to Double the Annual Sales of CFLs with Energy Label A .....</b>	<b>6.151</b>
<i>Peter Karbo, Danish Electricity Saving Trust</i>	
<i>Johanne Boelskov, Danish Electricity Saving Trust</i>	
<i>Palle Andersen, Pragmatic Consulting</i>	



---

<b>R&amp;D Programs in Support of Market Transformation:</b>	
<b>An Approach to Evaluation .....</b>	<b>6.163</b>
Helen Kim, <i>New York State Energy Research and Development Authority</i>	
Paul A. DeCotis, <i>New York State Energy Research and Development Authority</i>	
J. David Coup, <i>New York State Energy Research and Development Authority</i>	
Dana L. Levy, <i>New York State Energy Research and Development Authority</i>	
Jennifer Ellefsen, <i>New York State Energy Research and Development Authority</i>	
Mark Coleman, <i>New York State Energy Research and Development Authority</i>	
<b>Taking It EASY in the Netherlands: Refocusing Energy</b>	
<b>Efficiency Policy for Domestic Appliances .....</b>	<b>6.173</b>
Frank Klinckenberg, <i>Klinckenberg Consultants</i>	
Linda Paarlberg, <i>Ministry of Economic Affairs</i>	
Robert Kramps, <i>Ministry of Economic Affairs</i>	
Hans-Paul Siderius, <i>Novem</i>	
<b>Light Commercial Air Conditioning: Moving</b>	
<b>the Market Toward High Efficiency .....</b>	<b>6.185</b>
Mahri Lowinger, <i>Consortium for Energy Efficiency, Inc.</i>	
Denise Rouleau, <i>Consortium for Energy Efficiency, Inc.</i>	
Brad Hollomon, <i>Pacific Northwest National Laboratory</i>	
Jon Linn, <i>Northeast Energy Efficiency Partnerships, Inc.</i>	
Rachael Shwom, <i>Consortium for Energy Efficiency, Inc.</i>	
<b>Function of the ENERGY STAR® Label in Market Transformation Programs .....</b>	<b>6.197</b>
Thomas Mauldin, <i>XENERGY, Inc.</i>	
Mitchell Rosenberg, <i>XENERGY, Inc.</i>	
<b>Non-Energy Benefits As a Market Transformation Driver .....</b>	<b>6.209</b>
Jonathon McHugh, <i>Heschong Mahone Group, Inc.</i>	
Lisa Heschong, <i>Heschong Mahone Group, Inc.</i>	
Nehemiah I. Stone, <i>Heschong Mahone Group, Inc.</i>	
Abby Vogen, <i>Energy Center of Wisconsin</i>	
Daryl Mills, <i>California Energy Commission</i>	
Cosimina Panetti, <i>Building Codes Assistance Project</i>	
<b>The Collaborative for High Performance Schools:</b>	
<b>Building a New Generation of Sustainable Schools .....</b>	<b>6.221</b>
Daryl Mills, <i>California Energy Commission</i>	
Charles Eley, <i>Eley Associates</i>	
Gregg Ander, <i>Southern California Edison Company</i>	
Grant Duhon, <i>Pacific Gas and Electric Company</i>	

---

<b>Screening Market Transformation Opportunities:</b>	
<b>Lessons from Last Decade, Promising Targets for the Next Decade .....</b>	<b>6.231</b>
<i>Steven Nadel, American Council for an Energy-Efficient Economy</i>	
<b>Harnessing New Market Forces to Transform the Commercial Buildings Market .....</b>	<b>6.243</b>
<i>T. Narel, U.S. Environmental Protection Agency</i>	
<i>R. Sauchelli, U.S. Environmental Protection Agency</i>	
<i>D. Gatlin, U.S. Environmental Protection Agency</i>	
<i>A. Cortese, Northwest Energy Efficiency Alliance</i>	
<i>D. Hewitt, Northwest Energy Efficiency Alliance</i>	
<i>D. Anderson, ICF Consulting, Inc.</i>	
<i>K. Blake, ICF Consulting, Inc.</i>	
<b>Engaging Industry: Better their Money than Ours .....</b>	<b>6.255</b>
<i>Glenn Reed, Northeast Energy Efficiency Partnerships, Inc.</i>	
<i>Peter Bardhi, National Grid USA</i>	
<i>Ed Murphy, Western Massachusetts Electric Company</i>	
<i>Jeff Pratt, Pacific Energy Associates, Inc.</i>	
<i>Subid Wagley, Northeast Energy Efficiency Partnerships, Inc.</i>	
<b>Nonresidential Performance Contracting Programs: Assessing the Market Transformation Dimension .....</b>	<b>6.267</b>
<i>Michael W. Rufo, XENERGY, Inc.</i>	
<i>Ralph Prah, Prah and Associates</i>	
<i>David Sumi, PA Consulting Inc.</i>	
<b>Creating a Synergistic Energy Saving Environment Through a Demand Side Management Program .....</b>	<b>6.283</b>
<i>Prasad Vaidya, The Weidt Group</i>	
<i>David Eijadi, The Weidt Group</i>	
<i>Tom McDougall, The Weidt Group</i>	
<i>Jay Johnson, The Weidt Group</i>	
<b>The Impact of the Daylighting Collaborative on Two Firms: Hoffman Corporation and Pella Corporation .....</b>	<b>6.297</b>
<i>Abby Vogen, Energy Center of Wisconsin</i>	
<i>Mark Hanson, Hoffman Corporation</i>	
<i>Tom Cox, Hoffman Corporation</i>	
<i>Dean Stewart, Pella Corporation/Ver Halen Inc.</i>	
<b>Market Transformation and Multiple Equilibria .....</b>	<b>6.311</b>
<i>James Woods</i>	
<i>Adrienne Vayssières Kandel, California Energy Commission</i>	

---

## PANEL 6: INTRODUCTION

# Market Transformation

Since its emergence as an energy efficiency program concept in 1992, market transformation continues to rapidly evolve, correcting for newly found weaknesses and adapting to rapidly changing market and regulatory conditions. Despite a full 10 years of evolution, widespread discussion at conferences, and substantial public funding, the term market transformation continues—perhaps a little surprisingly, and perhaps a little amusingly—to mean different things to different people.

The mile-wide collective definition of market transformation was reflected in the breadth of the more than 100 papers proposed for this panel. Even among the 26 papers that were finally selected for presentation and publication, it is clear the authors interpret market transformation broadly. Nonetheless, at the core of these interpretations are several definitional elements that most practitioners subscribe to. They are:

- a fundamental, self-sustaining change is sought in the market;
- the effort or program is an intervention in the market; an effort to change the way the market is presently functioning;
- the market intervention has a finite life; the intervention can be long-term—even as long as ten years—but the intervention is neither designed nor intended to be ongoing;
- and last, the program should be designed and implemented with full cognizance and careful consideration of how the target market operates.

Beyond these, elements of definitions diverge widely.

Yet, regardless of the broad understanding of what market transformation means, many of the papers written for this panel demonstrate that the strategies necessary for sustainable market changes are fundamentally different from most resource acquisition program approaches of the past. The new crop of market transformation efforts includes comprehensive approaches to tackling New York's new construction markets written up by Eggers and Fisk, education programs in Wisconsin examined by Andersen, a collaborative schools program in California by Mills et al., and a residential HVAC distributor program in Texas by Garland et al. Despite their diverse natures, all of these programs share the goal of changing long-term market participant behaviors. Their tasks are significantly more challenging than most previous resource acquisition programs, as well as potentially more rewarding.

Indicative of this fundamental shift in approach is the number of papers on product labeling for energy efficiency. Cultivating consumer demand for, and manufacturer supply of,

---

higher efficiency products via a brand strategy is examined by Clark and Fanara, Mauldin and Rosenberg, and Klinckenberg et al.

Still other authors examine experience with other market transformation tactics. Holloman et al. survey experiences in technology procurement and Harris et al. posit using a business venture approach to transform the market. DeWein et al. report on building codes training. Rufo et al. look at efforts to help energy service companies deliver efficiency.

The papers written for this panel reflect several important emerging themes in market transformation program development that deserve attention. Among the more important are:

- programs should focus on logical groupings of products and services or whole market sectors, rather than the previously more common practice of targeting single products across many sectors;
- long-term partnering with key market participants is key to achieving sustainable change in the market;
- resource acquisition-style energy efficiency programs (as exemplified by those that were launched in response to the western region electricity market gyrations of 2001) benefit from, and are not inconsistent with, previous or on-going market transformation programs.

The first theme, logical groupings of products or whole market sectors, has emerged out of recognition that it allows for more efficient program implementation, and that it takes better advantage of the way markets work. Working with whole market sectors, such as commercial real estate or grocery stores to speed uptake of a comprehensive product or service grouping is proving to be a smarter, more market-savvy approach than the more narrowly focused predecessors.

The second idea, long-term partnering with key market participants, has come about as a result of acknowledging how difficult and time consuming it is to change some purchasing processes and market biases. For example, the paper by Vogen et al. highlights the slow and complex, yet rewarding progress made by a Wisconsin program intended to increase the use of daylighting in new commercial buildings while not increasing cooling loads. Long-term relationships with key companies have been key to their initial success.

The third theme, compatibility between market transformation and resource acquisition-style programs, pushed onto the scene mostly in reaction to the electric utility market convulsions that rolled through the West in 2001. Severe supply shortages caused many western utilities and states to quickly launch new, large-scale resource acquisition-style programs intended to achieve substantial and quick reductions in energy use and power demand. While some observers worried about the long-term damage some of these new programs might inflict on relationships that were carefully built through market transformation programs, the damage appears to have been minimal. And perhaps, as Calwell et al. argue in their review of recent large-scale compact fluorescent lamp resource acquisition programs, these programs were successful largely as a result of previous market transformation

---

program investments. Conversely, a paper from Vaidya, et al. examines how a comprehensive new construction resource acquisition program in Minnesota is beginning to change market participants.

As of summer 2002, the market transformation concept appears to be alive and well in America and other parts of the world. Public funding is still growing, and new programs are still emerging. Most importantly, however, the extent and depth of cooperation between the organizations that operate market transformation programs, and the private sector companies they attempt to influence, continues to grow robustly.

*Marc Ledbetter, Pacific Northwest National Laboratory*  
*Marc Hoffman, Consortium for Energy Efficiency*

