



Efficiency & Sustainability

PROCEEDINGS

2 Residential Buildings: Program Design, Implementation, and Evaluation

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American Council for an Energy-Efficient Economy

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Foreword

Responding to the theme of this Millennium Summer Study—“Efficiency and Sustainability”—professionals from around the world discussed the technological basis for and practical methods of implementing efficient and (hopefully) sustainable energy use in buildings. Issues, trends, challenges, and accomplishments were discussed. Each volume in this proceedings focuses on specific issues that encompass global visions for the future and discussion of future trends.

The 2000 Summer Study continued to emphasize new trends in buildings, equipment, markets, and social issues. Topics ranged broadly from the ENERGY STAR® program for new construction to building envelope and system engineering issues. The papers presented reviewed the latest information on utility restructuring and impacts on utility-sponsored programs, as well as global market issues, information technologies, and non-energy benefits. Sustainable development strategies; community-scale initiatives; factors influencing energy consumption and purchase of energy-efficient technologies; and how to design, implement, and evaluate energy programs were just a few of the cutting edge discussions that warm the mind and stir our quest for enlightenment.

The subjects of the ten volumes in this proceedings are:

1. Residential Buildings: Technologies, Design, and Performance Analysis
2. Residential Buildings: Program Design, Implementation, and Evaluation
3. Commercial Buildings: Technologies, Design, and Performance Analysis
4. Commercial Buildings: Program Design, Implementation, and Evaluation
5. Deregulation of the Utility Industry and Role of Energy Service Companies (ESCOs)
6. Market Transformation
7. Information and Electronic Technologies
8. Consumer Behavior and Non-Energy Effects
9. Energy and Environmental Policy
10. Building Industry Trends

We, the co-chairs, would like to thank the 23 panel leaders who sorted more than 658 abstracts, selecting and nurturing 309 papers through the rigid review and publishing process, and selecting more than 60 talks for the poster sessions. We would also like to thank the many peer reviewers who worked with the panel leaders. Finally, a well-deserved thank you to the staff of ACEEE, in particular Glee Murray and Rebecca Lunetta (who received key assistance from Renee Nida and Julia Harvell) for their support and guidance throughout this process and for making the week a very successful “energy camp.”

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PANEL 2: INTRODUCTION

Residential Buildings: Program Design, Implementation, and Evaluation

Background

The residential sector is in a period of rapid growth in both remodeling and new building starts, which has had a profound effect on energy efficiency potential and opportunities. The pace of building construction has increased, making it even more important that the energy impacts of alternative construction decisions are made clear to builders and homeowners.

Residential programs (operated by utilities, weatherization organizations, government agencies, and energy efficiency product and service companies) have had significant successes in a number of areas:

- ENERGY STAR® labels have stimulated the production of over 14,000 new energy-efficient homes over the last four years.
- Customer interest in duct sealing and cleaning services is increasing as concern about pollen levels and home comfort levels have increased.
- ENERGY STAR-labeled home appliances and windows are beginning to achieve significant market shares.
- In the weatherization community, advanced audit tools and retrofit techniques continue to improve the cost-effectiveness of the federal Weatherization Assistance Program (WAP).
- Energy efficiency programs and buildings and appliance standards have stimulated the market penetration of technologies and practices only recently emerged from the research and design phase. Examples include low-emissivity windows, condensing gas furnaces, and high-efficiency halogen and compact fluorescent lamp (CFL) fixtures.

Utility programs have been a major source of funding for residential energy efficiency programs, but overall funding levels have declined by roughly 50 percent over the last four years due to utility restructuring. Sustaining the gains of the last twenty years in energy efficiency will be a difficult challenge, and will be further complicated by the desires of some regulators to stimulate sustainable changes in markets through market transformation programs.

Restructuring has left residential customers in a kind of limbo in some states. Some customers are scheduled to receive real rate reductions as utilities pay off their stranded investments while others are faced with the possibility of rising prices and declines in the reliability of residential

service in the post-restructuring generation market. Few energy service companies have decided to actively market their services to residential customers due to the perception of thin profit margins with these customers. Thus while larger customers will enjoy absolute decreases in prices in the near term, the outlook for falling prices or bills for residential customers is much less certain.

On the other hand, rising peak demands have not been matched by growth in generation capacity in some sectors of the country. The possibility of requiring customers to pay for rising electricity costs on a time-of-use basis is being actively discussed in California and the Midwest and many states predict rising average prices for residential customers in a completely restructured market. So the benefits of utility restructuring to residential customers are still unclear.

Federal expenditures have not yet made up for the loss of utility funding. The only direct residential energy efficiency financing program (WAP) has suffered appropriations declines in recent years as Congressional budget-balancing efforts have cut discretionary spending. While support for pollution-prevention efforts such as the ENERGY STAR programs has grown during the 1990s, their funding has come under increasing Congressional fire as the focus has been on the need to cut, not increase, overall government spending.

Low-income customers are perhaps most vulnerable in this new world. With federal funding in decline for weatherization as well as other social safety net programs, the ability of some households to afford energy bills along with other expenses is increasingly questionable. The future of utility low-income energy efficiency programs is in a period of redesign.

Panel Overview

This panel offers a number of insights into the issues raised by the larger trends described above. The sessions address a full spectrum of the residential market, from new construction to retrofit, and from lighting to heating, ventilation, and air conditioning (HVAC). Some promising new directions for the future of residential energy efficiency are outlined.

Labels vs. Location:

Can ENERGY STAR Labels Make a Difference in New Home Choices?

This session presents different perspectives and approaches for using the ENERGY STAR label to influence new home owners to purchase more energy-efficient and comfortable homes: one paper discusses how to bundle HERS rating services and ENERGY STAR labels as part of a more comprehensive package of services to home builders; another discusses using ENERGY STAR labels as a tool to ensure that new homes are more comfortable, safe, and durable (and then indirectly more energy efficient); and the final paper discusses the lessons learned in the first generation of ENERGY STAR homes and outlines future challenges related to building customer demand, recognizing successful builders and verifying that homes “comply” with the label.

Market Transformation in New Construction

This session examines new home construction markets from mobile homes in the Northwest to urban redevelopment in the Midwest. In addition to characterizing industry building practices and organizational issues, it offers lessons that could be the keys to success in these market segments.

Used Buildings to New Buildings: We're from the Government and We're Here to Help You

The federal government plays a critical role in promoting energy efficiency through the design of new, more efficient products and innovative implementation programs fostered through partnerships among manufacturers, builders, buyers, consumers, and others. The papers in the session provide results of two very successful U.S. Department of Energy programs that are focused on implementation and partnerships with key stakeholder groups. The Building America program, which focuses on new construction, is reviewed in terms of the program's goals, expectations, and actual outcomes to date. The second paper reviews the Rebuild America program which relies on community partnerships and offers a variety of types of technical assistance and materials to a variety of market sectors.

New Ways to Deliver Home Comfort and Save Energy: New Hardware, Duct Services, and Targeted Training for HVAC Contractors

This session presents case studies of two programs that have successfully introduced new HVAC technologies and practices in new and retrofit applications and the results of a market assessment of the general contracting market and specialized trades in California. The first paper describes a program that is sponsoring the introduction of home performance franchises in central California using a new duct sealing technology, and the second paper presents a market characterization of the existing residential contracting market with an eye towards developing new types of programs that can capitalize on the fragmented nature of this market, while the final paper presents the results of a demonstration program to install advanced evaporative cooling technologies in small commercial applications.

Pushing the Envelope with Windows Market Transformation

Energy-efficient windows have become one of the hottest new focus areas for residential market transformation. This session includes a national overview of windows market transformation efforts as well as detailed discussions of windows programs in Wisconsin and southern California.

More Light, Less Heat: CFLs Circle the Globe

Sub-CFL market transformation programs have become quite popular in the international arena over the last few years. One paper assesses the impact of a residential CFL retrofit program on the total system load of Ghana. Another paper provides field study results from a South African efficient lighting initiative. The results will be used to effectively design a full-scale efficient lighting initiative that is to be commenced later in 2000. The third paper provides a comprehensive review of residential CFL programs undertaken in several Latin American countries over the last few years.

Are You Being Served? Innovation in Low-Income Programs

Responding to the challenges of serving low-income customers in deregulated markets, this session describes innovative approaches ranging from aggregation efforts in New York to refrigerator replacements in multifamily homes, to a comprehensive retrofit program in Vermont.

Market Transformation: Are We Transformed Yet?

It has become very evident with the plethora of market transformation studies that there is no one way to design and implement them. What is critical is for them to demonstrate and report on results that can be assessed so future programs can learn from their experiences. The findings from the market transformation programs reported in this session are all unique and present some excellent insights into overcoming obstacles and innovative approaches both in the design and assessment of market transformation programs. One paper targets the private multifamily owners/operators segment through local/regional apartment associations. Another paper reviews a successful effort in Poland to remove the barriers to widespread consumer adoption of CFLs, without much involvement from the Polish utilities. The third paper uses a unique approach to examine the near-term impacts of market transformation programs on the sales personnel in retail stores and consumers of lighting products or appliances.

Show Me the Money:

How to Use Other People's Money to Finance Energy Efficiency Improvements

The papers in this session describe three different approaches to securing financing for additional energy efficiency measures in residential structures: an innovative approach used in Vermont to bundle rating and mortgage services into a convenient one-stop product that meets the market need for timely and certain closings; an innovative approach that focuses on bringing “knowledgeable” third-party investors in as equity partners with homeowners to help reduce the risk of signing up for energy-efficient mortgage products; and finally an evaluation of a program that focuses on providing training for existing lenders and real estate agents to stimulate the sale of energy-efficient mortgages.

The Truth About Home Energy Use from Canada to Japan: An International Tour

This session presents snapshots of residential energy use in three different settings using three different approaches: the energy use and housing characteristics and energy savings potential for homes in Wisconsin are described using on-site and mail surveys supplemented with billing analysis, the energy savings potential for Canadian homes is described using the results of over 13,000 home energy guide ratings, and finally the energy use and savings potential for homes in Japan is analyzed using the results of an intensive home energy use monitoring project at the end-use level for a small community in Japan.

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