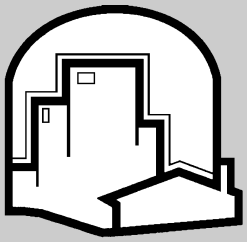

2002 ACEEE Summer Study on Energy Efficiency in Buildings

Teaming for Efficiency
PROCEEDINGS

9

Energy and Environmental Policy

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Foreword

The 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.

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Acknowledgments

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Energy and Environmental Policy

Power interruptions, brownouts, and requests for voluntary curtailments of electricity use are becoming commonplace in many states, elevating concerns regarding electricity system reliability and power quality. Since a large majority of the energy used to heat, cool, and light buildings comes from the electric grid, these concerns are particularly relevant to the buildings sector. While gains have been made to reduce peak electricity loads, the potential for further cost-effective reductions remains large, as is the reservoir of untapped energy efficiency improvements. Part of the problem is that grid reliability is rarely a consideration in developing policies and programs for the buildings sector. Incorporating public health and environmental concerns into energy planning is also in its infancy.

Responsive demand, energy efficiency, clean and renewable energy resources, and distributed generation are all solutions for addressing the reliability, public health, and environmental concerns associated with the consumption of electricity. However, policy innovations and government initiatives are required to break through the numerous obstacles that impede their widespread implementation.

The papers in the Energy and Environmental Policy Panel survey the status of policy and programmatic efforts in various communities, states, and countries. Authors highlight numerous successful partnerships and programs, discuss lessons learned, and propose policies that promote sustainable energy technologies as a route to a cleaner, more secure energy future.

Estimating Program Benefits

Three papers in this panel highlight the progress made to date in the field of program evaluation, while also identifying promising directions for the future. Kinzey et al. summarize the National Research Council's 2001 evaluation of the U.S. Department of Energy's support of energy efficiency research, development, and deployment (RD&D) for residential and commercial buildings. In addition to describing the novel framework developed to conduct the evaluation, the authors address one of the key challenges facing program evaluators—quantifying the impact due to specific program interventions. Laitner et al. discuss the key role played by energy-economic models in assisting policy makers in the framing of appropriate policy directions. They contend that to date these models have served to constrain the development of innovative policies. In the context of the California Climate Action Registry,

Price et al. underscore the limitation of using a statewide average electricity emissions factor; instead, the authors develop and evaluate three methods for estimating electricity emissions factors for calculating the combined net carbon dioxide emissions from all generating facilities that provide electricity to Californians.

Air Quality and Energy Efficiency

The potential to link environmental benefits to energy efficiency efforts exists but is often untapped. Three papers identify and discuss opportunities to address both of these concerns. Sumi et al. present preliminary results on the environmental benefits, particularly air pollutant reductions, of Wisconsin's Focus on Energy Program. Hall et al. summarize a Southern Appalachian Mountain Initiative (SAMI) study that assesses the potential role of incentives to reduce energy use and SO_x, NO_x, and CO_2 emissions from the buildings sectors of the eight-state SAMI region. Garcia et al. review recent demand response programs in the northeastern states and California and propose a new approach, or demand response model, through a state pilot project that includes public health and environmental concerns.

Impacts of Appliance Labeling and Standards

International examples demonstrate how remarkable achievements can be attributed to appliance labeling and standard programs. Harrington and Holt show how Australia has successfully matched the world's best regulated efficiency standards with refrigerators and freezers, and how the new practice of adopting the world's best practice offers a fast and effective mechanism of delivering real energy savings. Lin et al. discuss opportunities to impact energy consumption in China by influencing the appliance market, particularly through the evolution of its standards and labeling programs, and the agencies that implement them. Dale et al. analyze retail price data of major appliances in the U.S. to determine that historic increases in efficiency over time (due to a standard or other reasons) incur smaller price increases than would be expected, indicating that the real prices of major appliances have decreased.

Tax Incentive Debate

A bewildering array of state and federal tax incentives exist to promote clean energy technologies, and over the past year numerous new incentives have been proposed. Three papers help policy analysts sort through this confusing policy landscape. Prindle and Nadel review previous experience with tax credits for energy efficiency measures and outline principles to follow when designing new tax credits. The authors provide comments on various tax proposals and estimate their potential energy, economic, and environmental consequences. Brown et al. comprehensively review state-based tax incentives ranging from residential efficient appliance incentives to large-scale commercial "green" building incentives. The paper also evaluates the ability of these credits to encourage the adoption of energy-efficient technologies by providing incentives, and by raising the visibility and credibility of targeted technologies. In Oregon, a State Business Income Tax Credit exists for efficient equipment that can be passed from one business to another in exchange for its present value. The paper by Gordon et al. summarizes a market study that suggests the potential for expanding such programs.

Advances in Heat Island Mitigation Policies

Progress in heat island mitigation technologies, mainly cool roofs, has turned more attention to this issue. While gains have been made in the research arena, major advancements in heat island mitigation policies have yet to be realized. This "Round Table" presentation provides an update on heat island mitigation research and activities and proposes national, state, and local actions that can be taken to cool urban and suburban areas. Akbari and Pomerantz survey the latest advancements in cool roofing, cool paving, and urban vegetation and recommend areas for further research and local heat island reduction actions. Diestch et al. estimate co-benefits such as increased energy savings, improved public health, and reduced stormwater runoff, as a result of U.S. local government activities to reduce urban heat islands. Wong and Mercado describe how the U.S. Environmental Protection Agency (USEPA) can help overcome barriers to further heat island mitigation policies by integrating heat island reduction with community development, health policy, and air quality planning. Lisa Gartland contributes technical and practical experience to the discussion, as a heat island researcher and former director of a local cool community program. Sarkovich describes the Sacramento Municipal Utility District's experience with the first utility-funded cool roof rebate program in the nation and recommends ways to overcome perceived market barriers to participation.

International Exchange of Policy Experience

A great deal can be learned from examining the policy experiences of different countries. Nilsson and Wene survey programs, which develop markets for sustainable technologies, in order to identify factors associated with the success of those programs. They conclude that successful programs combine several policy issues, use feedback mechanisms, and are demand-driven. The paper by Van Wie McGrory et al. summarizes work-in-progress in order to inventory current programs and policies for government sector energy efficiency in developing countries, with specific coverage of successful case studies in Mexico. Kool et al. describe the making of a "strategic framework on the market implementation of energy efficiency within the Dutch-built environment," including building regulations, local planning, tax changes, and national covenants with major players.

Successes in Community Action

The variation between communities regarding their actions and approaches towards energy efficiency and air quality improvements is evident in this set of papers. Nilsson and Mårtensson survey and discuss differences between 12 municipal energy plans in Sweden, focusing on their contribution or control of the development of local energy systems. Hill et al. describe a local climate initiative underway in Burlington, Vermont as the departure point for a more general discussion on the relationships, similarities, and distinguishing features of monitoring and reporting activities undertaken to support entity-based reporting of greenhouse gas emissions reductions and registries. Heinemeier et al. describe a unique multi-stakeholder partnership that was recently formed in the metropolitan San Antonio area to focus on energy efficiency and environmental issues. This partnership assists local jurisdictions in complying with recent Texas legislation requiring all governmental entities within targeted urban counties to achieve five percent electrical energy savings each year for five years.

Efficient Buildings Through Linkages of Voluntary, Public Purpose, and Regulatory Mechanisms

Making buildings, especially new ones, energy efficient is an extremely complicated policy challenge. The buildings sector is complex, multi-faceted, highly regulated, and very slow to change. Three papers discuss long-term, high-payoff strategies that combine the tactics of voluntary programs with codes and standards. Eilert et al. begin with a broad, theory-based overview of a strategy that is evolving in California, which includes the efforts of utilities, public purpose programs, and building code developers. Pope et al. describe how California is updating appliance standards that build on the experience and market-building activities of utility programs. Stone et al. present data to quantify the long-term energy savings achieved in California's latest energy code upgrade cycle. A panel of code and policy experts round out this "Round Table" presentation with a discussion and additional insights on how to apply the California experience in other places.

State Energy Efficiency Initiatives

Many opportunities for transforming markets, passing legislation, and quantifying energy savings and emissions reductions are most appropriately addressed at the state level. Bryk et al. evaluate the New Jersey Utility Administration of System Benefit Charge-Funded Energy Efficiency Programs providing specific advantages and disadvantages of utility administration with respect to program design, implementation, and evaluation. There is a particular focus on market transformation objectives through policy initiatives such as codes and standards, and through coordination with regional and national initiatives. Hadley uses the National Energy Modeling System to determine the market potential for energy savings in the residential and commercial sectors of Iowa. Culp et al. emphasize the importance of buildings in their paper, which outlines recently passed legislation, responsibilities of different government entities, and procedures being developed to encourage energy conservation in residential construction in Texas to comply with Senate Bill 5, which requires additional reductions in ozone levels.

Benchmarking and Labeling Buildings

Benchmarking and labeling the energy performance of buildings is a potentially powerful policy instrument, but it is fraught with technical challenges. The paper by Eijadi et al. draw from the authors' LEED™ (Leadership in Energy and Environmental Design) Green Building Rating System project experience to characterize how LEED is currently used. They also suggest ways that the rating system can be enhanced, for example, by reformulating prescriptive requirements into performance-based requirements wherever possible, and by customizing LEED guidelines by region. The paper by Hinge et al. describes the USEPA ENERGY STAR® benchmarking system for school building managers and administrators, which characterizes how schools perform relative to one another and tracks building performance over time. The paper by Huibers et al. describes a Dutch home energy rating system that was introduced in the early nineties, and its successor, the Energy Performance on Locations, which is a rating system for new housing sites.

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