Foreword

Welcome to the 1998 ACEEE Summer Study on Energy Efficiency in Buildings, the tenth in a series of biennial workshops devoted to technology, policy, and implementation issues related to energy use in buildings. This week-long conference brings together a diverse group of professionals from around the world representing the views and expertise of utilities, industry, national laboratories, government agencies, public interest groups, and universities.

The theme of this Summer Study is ***Energy Efficiency in a Competitive Environment***, reflecting one of the major trends in the field of energy efficiency—the growing need to strategically position energy-efficient and renewable energy technologies in ways that harness market forces. Restructuring of the electric utility industry and increased retail competition in both electric and gas markets has made it imperative to prove to consumers that energy efficiency improvements in buildings can constitute profitable investments. The need to compete in both domestic and international markets is forcing corporations and nations to focus on energy efficiency as a means of improving productivity and reducing costs. Across the globe, efforts to capture the benefits of energy efficiency are increasingly market-driven and market-based.

Other drivers for energy efficiency are also emerging. Of particular note are the environmental benefits of energy efficiency. Numerous studies have documented that energy efficiency is a highly cost-effective and politically palatable near-term solution for addressing global warming. In many countries, including the U.S., buildings are heated, cooled, lit, and powered primarily by fossil-generated electricity, making the buildings sector an important target for reducing greenhouse gas emissions through improved energy efficiency.

But there are also new and continuing challenges. The first decade of the next century promises to extend the current era of low energy prices. At the same time there is no perceived threat of near-term electricity shortages or oil supply disruption. With much of the public still unaware of how energy efficiency contributes to the environment, it is not surprising to find relatively little interest by citizens, corporations, and the government in saving energy for its own sake.

The downward slide of utility demand-side management investments that was so apparent at the 1996 Summer Study is continuing; however, in a few key states such as California and New York the decline is being offset by market transformation programs funded through public benefits charges. In response to such opportunities presented by electric utility industry restructuring, portions of the industry and its efficiency services subsidiaries are staffing up and forming strategic alliances to offer not only performance contracting, but also commodity sales, maintenance, power quality, load profiling, billing, metering, and other services to its customers.

Set against the backdrop of these trends, noteworthy technology developments and implementation progress have been made since the 1996 ACEEE Summer Study. A growing body of research expertise has been translated into innovative and advanced technologies that are now cutting energy costs in both residential and commercial markets. Examples include gas-driven heat pumps, duct diagnostics and sealing, and low-emissivity windows. The past several years have also heralded the rapidly growing use of information technologies in building construction, energy metering, energy management and control systems, and telecommunications. Another technical development is the expanded scope of energy efficiency activities to include building start-up and operations and maintenance, in addition to installing energy conservation measures. The result has been an improved ability to deliver long-term savings.

These market successes reflect the great progress being made in integrating industry and government research agendas, the growing role of energy service companies, the mainstreaming of performance contracting, and the maturation of market transformation efforts. They have also benefited from better alignment between energy efficiency and diverse goals such as indoor air quality and health; occupant comfort, amenities, and productivity; and peak demand reduction. In addition, recent successes

have capitalized on the growing understanding of how individuals and organizations make decisions that affect energy use (such as choice of building and lighting designs and the purchase of heating and cooling equipment) and the expanding field of knowledge of how energy is used in society.

All of these issues, trends, challenges, and accomplishments are discussed in the ten panels that comprise the 1998 Summer Study. Each panel deals with a particular cluster of issues and presents its papers in a separate volume of the proceedings. The ten volumes are as follows:

Volume 1 — Residential Buildings: Technologies, Design, and Performance Analysis

Volume 2 — Residential Buildings: Program Design, Implementation, and Evaluation

Volume 3 — Commercial Buildings: Technologies, Design, and Performance Analysis

Volume 4 — Commercial Buildings: Program Design, Implementation, and Evaluation

Volume 5 — International Collaborations and Global Market Issues

Volume 6 — Deregulation of the Utility Industry and Role of Energy Services Companies (ESCOs)

Volume 7 — Market Transformation

Volume 8 — Information Technologies, Consumer Behavior, and Non-Energy Benefits

Volume 9 — Sustainable Development, Climate Change, Energy Planning, and Policy

Volume 10 — Building Industry Trends

The 1998 Summer Study repeats the panel devoted to building industry trends, which was introduced in 1996. Several new topics have been introduced this year, including sustainable development, information technologies, non-energy benefits, and global market issues.

In closing, we would like to thank the 22 panel leaders who worked their way through more than 600 abstracts, shepherded nearly 300 papers through the peer-review process, and selected 30 displays. The ACEEE staff also deserve special recognition, in particular Glee Murray and Rebecca Lunetta, for their coordination of a complex of logistical details that must come together to make the conference a success.

Enjoy the conference.

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Acknowledgments

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PANEL 9 INTRODUCTION

Sustainable Development, Climate Change, Energy Planning, and Policy

Everything is going global, including energy policy. The last two years have seen more international discussion of energy use trends than any other years, and interest grows steadily. As climate concerns increase, policymakers in all countries want to understand the role of energy in their economies, the effects of reducing energy use, and what kind of programs will lead to a more sustainable future.

The papers reflect this global concern, with several looking at the linkages between energy use and economic activity, the role of energy use in emerging economies of the world, and techniques for comparing the carbon effects of alternative energy designs. Others look at international climate agreements and how they will be enforced, and new and innovative approaches to increasing use of renewable energy sources and reducing energy consumption.

New Energy Efficiency Opportunities. Webber and Brown review the substantial cumulative energy savings and related benefits expected from the suite of ENERGY STAR® labeled products. Kaarsburg et al. quantify the potential energy savings and emissions reductions that might be expected by forceful pursuit of combined heat and power in commercial buildings. Haddad et al. investigate the decision-making process in firms to suggest how economically efficient policies might overcome the barriers that cause companies to forego profitable opportunities to save energy and make money.

International Trends: Energy, Emissions, and Emerging Economies. In the climate change debate, many self-interested claims about the effects of international agreements on economic growth have been made. Schipper et al. discuss the presumed and real links between energy use and economic activity. In addition, while developed countries are concerned about reducing their energy use, the implications of energy use in emerging economies are staggering. Turiel et al. discuss residential energy use in some of these emerging economies and indicate where future energy efficiency needs will be.

Economic Benefits of Energy Efficiency Programs: Can Kyoto Push the Dow Over 10,000? Sometimes energy efficiency programs can be designed with macroeconomic benefits in mind, as Hinge and Bourgeois' and Wiltshire's papers demonstrate. Wade and Leach show how energy efficiency in buildings can be integrated in a country's carbon reduction targets.

Green Power Marketing, or, How the Irish Saved Renewable Energy. Renewables got a jump-start in the mid-1980s when utilities were required to purchase renewable power at avoided cost rates—now they have to compete and convince consumers they should pay for "green power." Davis and Tutt present the latest from California's efforts to label green power so that consumers can compare marketers' claims. Wiser et al. discuss the important role of market rules on the ability of green power marketing to succeed. Finally, Schwartz discusses how public purpose programs in general are fairing in the Pacific Northwest.

Innovations in Power Supply Programs under Restructuring. In this diverse session, Tutt describes the design and preliminary results of the California auction process to distribute $162 million in financial incentives to renewable power plant projects. Plunkett and Sachs describe how a retail buyers cooperative can provide least-cost energy services to small consumers.

Jannuzzi et al. identify what opportunities and programs could assist Brazilian efforts to achieve energy efficiency in their restructured electricity supply system.

Urban Heat Island Mitigation. The strategic combination of reflective roof and pavement surfaces, careful urban forestry, and other measures can reduce urban heat islands and provide communities a full suite of economic and environmental benefits. Gorsevski et al. review a comprehensive approach to reducing urban heat islands with overall resulting air pollution reduction and energy efficiency increase. Schmeltz and Bretz describe the new ENERGY STAR® roofs initiative to promote reflective roofing as part of the comprehensive urban heat island initiative. Pomerantz and Akbari quantify the potential benefits of reflective pavements, particularly asphalt.

Monitoring and Evaluation: How Will International Climate Agreements be Enforced? Signing international agreements make headlines but results depend on countries' enforcement and institutions' compliance. Papers by Vine and Sathaye, and Swisher present two views of how international agreements can be monitored and evaluated. Larsen et al. talk about how agreements with industry have been approached in Denmark.

Effective State and Local Programs. National, state, and local energy offices are often critical catalysts that assure actual effective implementation of measures to improve energy efficiency. As a result, states and communities benefit not only from reduced energy costs but also experience improved economic development, improved air quality, reduced impact on climate change, and other benefits. Smith et al. review the aggregate economic and environmental benefits of selected NYSERDA programs. Hood et al. provide a case study of the benefits of community energy planning in Revelstoke, British Columbia, Canada. Usibelli and Golden discuss the progress the state of Washington has made in implementing energy efficiency programs to promote climate stabilization, economic development, government efficiency, and salmon recovery.

Carbon Accounting: Evaluating Alternative Greenhouse Gas Reduction Measures. As awareness of the climate implications of energy use rise, so will awareness of the greenhouse gas implications of fuel and building material choices. Zoechling et al. raise issues about the fuel choices for space heating in OECD countries. Börjesson and Gustavsson compare greenhouse gas emission from building materials. McLain compares the carbon impacts of alternative strategies of using forest residues.

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