Panel 9 Introduction

Demonstrations and Retrofits

Papers in this panel focus on demonstrations and retrofits. The panel covers building retrofits and demonstrations, education and outreach efforts, and demonstrations in utility, state, and federal programs.

Thinking in terms of the "big picture," we assume that the objective of all demonstration programs is to help our nation move toward a more sustainable energy future. Each of the papers presented in this panel provides information or data that enhances our overall knowledge. Throughout the panel sessions and in the interactive session, we'll be discussing lessons learned from each of the demonstration programs and how these lessons contribute to our collective knowledge for making the "next" retrofit or demonstration program as valuable as possible.

The panel is divided into nine sessions, and descriptions of the sessions and the papers follow.

Spotlight Papers

The first spotlight paper selected for this panel covers the broad issues addressed in a current status report and describes methods for successful implementation of energy-efficiency demonstrations and retrofits in the future. Pirkey, Rivera, and Ormsby present an excerpt from a report prepared for the U.S. DOE called "Strategies for Improving the Market for Energy-Efficient Technologies." The paper provides a review of methods used by utilities and their manufacturing partners to increase sales within specific utility service territories. Further, the authors set out three criteria for success in establishing demand-side management (DSM) programs that include emerging technologies.

The other spotlight paper, "Friendly Fusion: Integrating Energy Efficiency with Renewable Technology" by Carlisle and Nakarado, discusses the feasibility of moving the United States and the world toward a sustainable future by using renewable resources in combination with energy efficiency. It outlines several existing programs and their political and societal effects.

Getting the Word Out-Education and Outreach Programs

Papers in this session document successful educational programs. The paper by Heschong and Mahone describes two different approaches for providing technical information and professional training. One approach involves training that supports changes in the California Energy Standards; the other involves educating the public in new, efficient lighting technologies. The paper by Aldridge and Elliot presents results of a survey of approximately 30 organizations involved in energy-related education, research, or demonstration. The paper presents a series of critical questions that organizations interested in establishing an energy technology center should address. The final paper in the session by McKane describes New York State's Appliance Directories Project, a public/private cooperative venture. The project used market compression analysis-a statistical technique—to identify appropriate levels of equipment energy efficiency within an existing market for applications such as regulations, financial incentives, purchasing standards, and increased public access to information about energy-efficient appliances and equipment.

Experience Gained in Insuring Healthy Indoor Environments

Papers in this session address the topic of indoor air quality. Hadlich, Grimsrud, and Krafthefer report on a study that addresses radon concentrations and dynamics in large institutional and commercial buildings. The study included radon concentration screening measurements in a sample of buildings at the University of Minnesota and a comparison of radon dynamics in underground, mechanically ventilated, and naturally ventilated buildings. Custer and Stiles present results of a study on the feasibility of sealing a crawl space from outside air entry to save energy without increasing the moisture

content of the wood members in the crawl space. Ander, Lau, and Offerman describe the detailed results of a building bake-out procedure. The results indicated that the procedure caused only a modest and temporary reduction in the net emission rates of formaldehyde and volatile organic compounds.

A Holistic Viewpoint-Approaches to Reduce Energy in New and Existing Buildings

The papers in this session offer a holistic perspective on reducing energy use in housing. Litt and Meier discuss definitions for low-energy housing and make the case that the definition for low-energy housing needs to be considered in the context of total household energy, not merely energy used for space heating. A paper by Borsch-Laaks and Pohlmann provides a comprehensive look at the parameters for environmentally concerned home building. They discuss what they consider to be the essential features of a German low-energy house that uses only 40 percent of the space heating of a typical German house. The house design addresses ecologic and economic considerations as well. The final paper by Hamilton, Tohinaka, and Neme describes a series of "smart protocols." These are procedures developed for use in the field delivery of both gas and electric utility residential DSM programs that can be used to determine how best to maximize the cost effectiveness of retrofit opportunities and avoid lost opportunities. They add little to the cost of retrofit delivery and can help identify site-specific opportunities that yield the greatest net benefits.

Industrial and Commercial Programs – The Big Ticket Energy Savings

Reducing energy use in commercial and industrial applications is featured in this panel. The paper by Wolpert et al. describes a strategy to achieve electric energy savings in commercial buildings cooled with centrifugal chillers when such chillers are converted to use non-CFC refrigerants. Carroll, McKellar, and Wroblewski discuss how trade allies and utilities can work together to promote energy efficiency. Their paper describes the Wisconsin Performance Optimization Service (POS), a unique approach to achieving greater industrial electric demand-side savings by initially leveraging and enhancing the skills of industrial fan, pump, and blower trade allies. Delaney brings a utility perspective in "Evaluating Benefits For An Industrial DSM Program." This paper summarizes the results of a study of 40 industrial customers and looks at source fuel efficiency, environmental impacts, and cost effectiveness of the implemented process changes.

Natural Gas-The Bridge Fuel

Residential and commercial applications using natural gas equipment are featured in this panel. Papers describe one residential utility DSM program and two reports of programs in the U.S. DOE New Technology Demonstration Program (NTDP). Cawley, Hamilton, and Bongiovanni investigate fuel switching from electricity to natural gas in their paper "Beyond the Tank Wrap." They describe program design innovations in a residential retrofit DSM program leading to a 60 percent participation rate and a 42 percent average reduction in annual electrical use. Fuel switching is the primary measure accounting for the end-use reductions. Miller presents results of a project to develop performance maps of a furnace and air conditioner developed from field data. These maps could be used for evaluating future field records from a residential gas-driven heat pump. Gas cooling equipment performance is measured by Armstrong, Katipamula, and Conover in "New Technology Field Evaluation of Gas-Engine Driver Air-Conditioning Equipment." Their paper reports that energy cost reductions of more than 80 percent were achieved in two engine-driven rooftop units of 15 tons cooling capacity.

Equipment

This panel reports on three different types of equipment: residential HVAC equipment, office computers, and indirect/direct evaporative coolers. In "Energy Impacts of Attic Duct Retrofits in Sacramento Houses," Jump and Modera present the results of a field study that separately measured the impacts of combined duct leak sealing and insulation retrofits. Lapujade and Parker study the energy-efficiency savings of an Energy-Star computer system and compare its performance to a conventional computer with identical characteristics. Hoeschele presents results of a monitoring study of indirect/direct evaporative coolers (IDEC) in six residential sites in Sacramento. Typical cooling energy savings of 60 percent are projected based on the monitored performance of the IDEC units and the expected performance of a 10 SEER air conditioner.

Energy-Efficient Design Approaches

An important lesson learned about successful energy-efficient commercial building design first documented in the early 1980s is the need to view energy-efficient building design as a problem-solving exercise that integrates energy efficiency with user needs, owner needs, and other requirements. The papers in this session adhere to this general philosophy. The paper by Romm and Browning provides case studies and data to make the linkage that energy-efficient design can result in improved worker productivity. An increase in productivity as small as one percent can provide dollar savings to a company that could exceed the entire energy bill. The paper by Houghton presents projected, measured, and simulated data from an actual retrofit of a small commercial building in Boulder, Colorado, that uses many energy conserving and renewable features including daylighting, high-performance glazing, indirect lighting with simple occupancy controls, compressorless evaporative cooling, low-flow water fixtures, tankless water heating, and efficient office equipment and appliances.

Federal Energy Management - Uncle Sam Saves, Too

The United States government is by far the largest consumer of energy in this county. This panel features three reports on energy-efficiency demonstrations and retrofits in federal facilities. In "Greening the White House," Barnett et al. present a report on this retrofit project. Interactive design and implementation by a team that included architects, lighting designers, mechanical engineers, utilities, interior designers, water efficiency experts, and others was an important feature of this retrofit project. Energy savings are estimated at 50 percent or more. Greenberg et al. present a report of the U.S. DOE in-House Energy Management Program. The little-known program is currently funded at \$30 million and is expected to grow considerably in coming years. This paper presents results from efforts to date, discusses institutional and financing issues, and discusses future directions. Harris and Ginsberg report on the BEST program at FEMP. The BEST program is a comprehensive service for federal energy managers that offers easy access to all FEMP programs. This is an important tool in reaching the federal government's target reductions in the recent Executive Order.

Interactive Session – What Type of Retrofit and Demonstration Programs Will Have the Biggest Impact in the 1990s?

Given our collective knowledge of successes and failures from demonstration and retrofit programs, what's the next step? Panelists in this session were chosen for their past experience in operating or analyzing retrofit and demonstration programs. Papers in the interactive sessions include the following:

The paper by Piette et al. provides multiyear performance data for 28 new commercial buildings. The paper by Bretz and Akbari describes the albedo durability of solar-reflective roof coatings for cooling-energy savings, Sterling presents a description of the program requirements for design, construction, and commissioning of an energy-efficient livable office building. Conover and Hunt explain the processes by which a new technology demonstration project is identified, supported, and implemented at a federal site and the results communicated in the federal sector. It also provides a synopsis of current and future projects under the U.S. Department of Energy New Technology Demonstration Program. Baxter et al. present the results of a direct measurement of load availability and load control switch performance in a residential AC cycling pilot program.

Display papers include a poster by Balon that presents a series of examples on the cost trade-offs that permit efficiency to be built into a building without raising the total cost. Shankle et al. present a poster that describes the U.S. DOE Building Technology Transfer Meetings and how they help transfer building energy research results to potential users of the technology. Mayo et al. present a poster on the SAVEnergy Action Plan initiated by U.S. DOE. Their paper describes this program's new approach to energy and water conservation audits that will become available to all federal agencies.

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