Panel 7 Introduction

Resource Planning Methodologies

In recent years, the attention of much of the energy resource planning community has focused on the unique complexities of utility demand-side management programs. DSM program features such as uncertainty and interactive effects presents challenges. The application of analytical techniques (e.g., conditional demand) provides unique lessons for resource planners. New issues in evaluation and financial/cost analysis are also dealt with in two of the sessions. Papers on case studies in resource planning methodologies and actual forecasted results are presented in other sessions.

The evaluation of planned and completed DSM programs is revisited from a "lessons-learned" perspective in the three papers in the discussion session. Narum and Pigg discuss bias in evaluations and present an approach for dealing with it. Fulmer and Biewald discuss, draw conclusions about, and make recommendations with regard to cost-effectiveness tests. Baxter and Schultz review the California experience with DSM and discuss the long-run implications for resource planning.

It has long been argued that flexibility represents a strategic advantage of demand-side management (DSM) programs as it can be ramped up or throttled back as needed. That flexibility, however, may make DSM results and costs more uncertain than their supply-side alternatives. As well, there may be limits to the amount of flexibility that the DSM marketplace can accept so that a stable DSM investment path may be required. Session 1 addresses the issues related to DSM flexibility and how uncertainty can be incorporated into a planning framework. Nichols reviews current planning methods to value flexibility of generation resources. Hildebrandt and Wirtshafter presents a case study of DSM flexibility in Integrated Resource Planning. Stem shows the importance of the key inputs in the estimation of confidence intervals on DSM savings.

Conditional Demand (CD) techniques in the energy field have traditionally been used to assess building energy usage as it relates to general explanatory variables. Session 2 focuses both on validation efforts for specific examples of CD and some new and unique approaches to their use. Battles attempts to specify model improvements based on validation efforts. Blaney et al. use an innovative Bayesian approach to estimate hourly load shapes in the residential sector. Parti et al. present a new "type-casting" methodology for measuring residential new construction DSM savings.

The development and application of advanced analytical methodologies have increased as a result of utility demand-side programs and is the topic of Session 3. Schiffman compares Identification Based Modeling to Conditional Demand Analysis in DSM measurement in the first paper in Session 3. In Atherton et al. a model of customer appliance efficiency choice is described which uses both stated preference and actual behavior. Train et al. describe a nested logit choice model that was developed and used to calculate net savings for rebate programs.

Since demand-side programs are usually not implemented in isolation, their interactive effects need to be understood. Session 4 includes three papers that examine systems effects and ways of characterizing them. Theory in the valuation of financial options is drawn on to quantify the impact of uncertainty in utility resource planning in Lowell's paper. Walrod uses investment theories of portfolio planning to incorporate the characterization of risk into resource planning. McNally et al. describe the development of an algorithm to evaluate interactive effects of DSM measures and determine rank ordering.

Session 5 presents the results of forecasting studies in four areas: residential, commercial, industrial, and overall DSM. Belzer et al. focus on the historical period 1972-1991 as the basis for estimates of building energy consumption estimates in the commercial sector. Brown estimates achievable electricity efficiency improvements in the residential sector and compares the results to the technical potential. Mowris et al. model the industrial DSM potential in the Southern California Gas territory using the Long-term Industrial Energy Forecasting (LIEF) model.

Session 6 focuses on methodologies and results related to the projection of DSM effects. Rohmund et al. provide an assessment of the relative importance of utility DSM and other forces for efficiency gains. Shipley et al. present a new method

for estimating technical potential for energy and demand savings through DSM. Koomey et al. breakdown residential water usage into its various components and attempt to quantify the remaining savings potential.

Three diverse Case Studies are presented in Session 7. Treidler and Modera use electrical end-use metering data and computer simulations in the design of DSM initiatives aimed at reducing peak demand from residential air conditioning. Nore and Roberts attempt to explain regional differences in the growth of miscellaneous electrical end uses in the residential sector. Redlinger and Van Horssen highlight the methodology and results of an integrated water, waste water, and energy conservation study performed through a multi-agency alliance.

Session 8 deals with capital investments in energy efficiency resources by utilities and industry. These are examined from the shareholders' perspective and from the perspective of capital requirements. Hadley and Hirst present details of how shareholders are affected by investments in IRP. MacDonald discusses a capital-requirements approach that can be used to corroborate national energy savings estimates and projections.

In the Spotlight session, the question of how big an impact DSM will have is the focus of the first paper. Faruqui et al. forecast the impact of DSM programs on the demand for electricity in the U.S. out to the year 2010. The key issue that resource planners must deal with in assessing the value of DSM resources in an increasingly competitive market is uncertainty and flexibility. Michaels discusses the flexibility of DSM resources and their limits in the final Spotlight paper.

Jim Fay *Mike Singleton*