Panel 2 Introduction

Demand and Load Shapes

This panel deals with a wide array of issues that are related to demand impact load shapes, load shape impacts and related issues. It is a new and timely panel for the Summer Study. This is one of the more interdisciplinary of the panels and includes topics that should be of interest to many. The focus of the panel is issues that primarily relate to reducing or shifting demand and thus lowering the average cost of energy supplied to buildings. Ways to reduce demand illustrated in this panel include load management programs, innovative pricing, using DSM to defer T&D and special case studies such as photovoltaics. This panel extends work in areas that have been addressed frequently in previous Summer Studies, as well as focusing on emerging issues. Several sessions are related to load shape estimation and the roles of different monitoring tools. Load-shape estimation methods provide basic information for planning, as well as being applied to program evaluation and to technology assessment.

This panel has two special spotlight papers that deal with special issues selected by the panel leaders. The spotlight paper prepared by Bowman and Goldberg on trends in metering for load studies addresses the relationship among research objectives, analytic methods, and monitoring capabilities. The second spotlight paper prepared by Chamberlain, on innovative pricing, highlights a major emerging theme addressed by this panel. Two related sessions describe some applications and evaluations of alternate pricing strategies. The session on transmission and distribution impacts of DSM programs addresses another emerging area of interest that can utilize pricing, monitoring, estimation, and evaluation strategies.

Session 1. Load Shapes: Estimation Methods— In a set of case studies, Alereza and Faramari compare load shape estimates with different levels of data availability, for six buildings. Their work indicates the adequacy of different data detail, depending on the estimation objectives. Akbari et al. provide a method for integrated estimation of load shapes and energy end-use intensities at the service-area level, using hourly load data and survey data. Hepting et al. focus on estimating cross-effects among end-uses at the hourly level, for DSM implementation.

Session 2. Leveraging End-Use Metering Samples— Chilcott and Gillman describe methods and limitations of transferring end-use load shapes from other areas. Margossian uses end-use metered data to validate a method of disaggregating whole-premise load data. Both of these papers utilize existing end-use metered data to establish load-shape estimation methods that will not require end-use data. Highlighting the difficulties of collecting such data, Hennessy et al. describe a project for collecting end-use data on natural gas.

Session 3. Case Studies in Load Shape Estimation—The development of load profiles and/or load shape and energy savings from specific installations are discussed in this panel via a case study approach. The Englander and Remley paper presents detailed monitoring information on variable drives on injection molding machines (used predominately in the plastics industry). The Goldner and Price paper deals with the sizing and selection of hot water systems in multifamily buildings and the Halverson et al. paper is a good example of detailed monitoring of lighting in the DOE Headquarters building.

Session 4. Monitoring Tools— The development of estimation methods and monitoring methods go hand in hand. Lebot et al. describe a device for interval monitoring of end-use energy and demand, collected over phone lines; and the application of this device in a study of French households. Sharp presents current developments in Non-Intrusive Load Monitoring Systems (NILMS) and considerations for use of these systems. Kinney and Stiles' poster describes equipment for in-field monitoring of refrigerator performance using interval data. Dutt et al. present results of an extensive study comparing in-field refrigerator loads with those measured in laboratory conditions.

Session 5. *Evaluation of Load Management Programs Using Hourly Load Data*—Traditionally, load-shape estimation has been of interest for planning and forecasting at the sector level. As programs and rates are designed to control demand, load-shape estimation becomes an increasingly important component of evaluation. Papers in this session all use interval

load data for ex-post evaluation of load management programs. Jacobs and Zebedee use a temperature-driven hourly load model in evaluating an air conditioner duct repair program in the southern United States. Baladi et al. use hourly load data to explore load shifting behavior in a residential time-of-use rate experiment in the Midwest. Wilcox examines load effects for a rebate program.

Session 6. Evaluation Methods— This session provides examples of evaluation methods used to develop estimates of peak and energy impacts of utility DSM and pricing programs. The Harrison et al. paper presents an evaluation of a ceiling insulation program using the California protocols. The Hamzawi and Messenger piece describes the development of both energy and peak impacts also using the California protocols for DSM technologies from the technical and regulatory perspectives. The Cruz, Keane, and Sullivan paper examines whether a dispatchable pricing program can indeed delay distribution investment.

Section 7. Technology Assessment—This session contains three papers that assess the performance of technologies ranging from motors to photovoltaics to computer workstations. The Gordon et al. paper presents an analysis of performance factors on savings for a motor replacement program. The paper by Byrne et al. presents performance data from photovoltaic installations under creative alternative financing mechanisms. Lastly the Szydlowski and Chvála paper presents energy consumption data of PC workstations.

Session 8. *T&D Impacts from DSM—* In the last few years there has been a lot of focus on valuing the T&D impacts from utility DSM programs. This is especially true in areas where there is surplus capacity. The three papers in this session present examples of using DSM or distributed generation to defer T&D expenditures. The Weijo and Ecker paper presents a utility case study from the Pacific Northwest. The Sparks et al. paper is a detailed evaluation of the T&D impacts of an agricultural DSM program. The Pratt et al. paper presents distributed generation as another way to defer T&D investment.

Session 9. Interactive Session: Evaluation of Innovative Pricing Methods— Along with the increasing interest in load management rate structures comes a need for methods of evaluating the load impacts of these rates. King and Shatraw presents a peek at what might happen with retail access with an evaluation of a real-time-pricing program in England. Goldberg describes the evaluation of a commercial-industrial controllable rates program. Hackner et al. describes the evaluation of a residential direct load control program in Wisconsin.

As mentioned previously, this is a new session at the summer study. We hope that all participants will enjoy its interdisciplinary scope.

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