IPU BIBLIOGRAPHY

MICHIGAN STATE UNIVERSITY ■ **INSTITUTE OF PUBLIC UTILITIES** Regulatory Research and Education

SMART GRID EVALUATION

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EnerNex Smart Grid Evaluation Checklist. *EnerNex*. Accessed on 08/23/11 [link].

An itemized checklist of questions to ask and perspectives to consider when evaluating a smart grid project.

Gellings, C. et al. (2011) Estimating the Costs and Benefits of the Smart Grid. *Electric Power Research Institute* (EPRI). Accessed on 08/23/11 [link].

"The primary goal of this report, which is a partial update to an earlier report (EPRI 1011001), is to initiate a stakeholder discussion regarding the investment needed to create a viable Smart Grid. To meet this goal, the report documents the methodology, key assumptions, and results of a preliminary quantitative estimate of the required investment. At first glance, it may appear the most obvious change from the 2004 report is the significant increase in projected costs associated with building the smart grid. In actuality, the increased costs are a reflection of a newer, more advanced vision for the smart grid. The concept of the base requirements for the smart grid is significantly more expansive today than it was seven years ago, and those changes are reflected in this report."

Herter, K., et al. (2011) Evaluation Framework for Smart Grid Deployment Plans*. Herter Energy Research Solutions, Inc., and Environmental Defense Fund.* Accessed on 08/23/11 [link].

"The purpose of this document is to provide a template by which the California Smart Grid Deployment Plans can be evaluated by external parties (e.g. the CPUC and the public). The focus of this evaluation is the comprehensiveness of each utility plan for pursuing the promised benefits to electric utility customers and reducing the environmental impact of the electric grid as a whole. Although this template was created to evaluate smart grid plans rather than actual deployments, it will be crucial to develop additional tools to assess those deployments and their progress toward meeting California's goals and regulatory mandates. Those future assessments could be designed around a similar framework."

Hoch, L., and James, S. (2010) Benefits and Costs of the Victorian AMI Program. *Oakley Greenwood.* Accessed on 08/23/11 [link].

"The AMI Program is cost-effective no matter which mix of costs and benefits is used. In the extreme, if the low case benefits and highest costs are used, for either the AMI Rollout or AMI Program, a clear net benefit results. Under the low case benefits and expected costs case the net benefits of the AMI Rollout and AMI Program are $253 million and $764 million respectively. The respective ratios 21 of the benefits to costs are 1.16 to 1.00 and 1.42 to 1.00. In addition, the benefits that can be expected to flow as a result of the basic operations of the AMI technology that is to be installed under the AMI Program total $2.036 billion, which exceeds the $1.813 billion estimated cost of the AMI Program. These basic operations include but are not limited to the automation of manual processes in meter reading, and disconnection and re-connection of electricity supply. These benefits do not

require any changes to legislation, regulations or market rules; new pricing approaches on the part of electricity retailers; or behavioral changes on the part of customers. They are readily available through the technology as long as appropriate processes and procedures are adopted by the distribution companies."

- Hoch, L., et al. (2010) Review of AMI Benefits. *Oakley Greenwood*. Accessed on 08/23/11 [link].

  "This report provides a review of material that has been produced for the Victorian Government concerning the benefits of its Advanced Metering Infrastructure (AMI) Program. That program includes but is more comprehensive than the AMI Rollout that commenced in 2009. The information provided in this report will serve as an input to an assessment of the costs and benefits of both the AMI Rollout and AMI Program, and a public consultation process that the Department will run over the course of the coming months."

- Houseman, D. (2008) Who Benefits from AMI? *Metering International.* Accessed 08/26/11 [link].

  "As the utility value chain continues to be pulled apart into pieces around the world, the answer to the "who" will pay gets more complex. In the traditional ownership model, all the utility functions had a single owner and so benefits that crossed multiple business segments (e.g. distribution, transmission, generation for electricity) could be paid for by the single owner of the utility. Today with the European Union unbundling their utilities and other utilities splitting into separate companies, as well as new companies building facilities that are not owned by the traditional utility, the question has a much more complex answer."

- Jackson, J. (2009) Are Smart Grids a Smart Investment? *Jackson Associates.* Accessed on 08/23/11 [link].

  "Instead of applying the elasticity/aggregate load approach of previous approaches, this study applies load control and pricing program impacts directly to individual customer end-use loads such as air conditioning, water heating and so on to determine utility-level impacts. The utility customer hourly load data applied in this study consists of more than 800,000 residential and commercial utility customers records for the 200 utilities. The commercial sector is defined to include commercial, institutional and government utility customers. These utility customer records were drawn from MAISY Utility Customer Hourly Loads Databases."

- Jackson, J. (2011) Evaluating Smart Grid Investments at Cooperative and Municipal Utilities in US. *The Smart Grid Research Consortium.* Accessed on 08/23/11 [link].

  "This article presents the results of the Smart Grid Research Consortium's nationwide survey of utility smart grid activity, describes smart grid investment modeling issues and modeling objectives pursued in the project, and presents several observations based on Consortium smart grid investment evaluations."

- Mansoor, A. (2008) Framework for the Evaluation of State Smart Grid Pilot Projects. *Electric Power Research Institute (EPRI)*. Accessed on 08/23/11 [link].

  "When evaluating smart grid pilot projects, it is important to understand the technologies being used and the type of project being implemented. Create a framework for planning and performance assessment, as well as a clearinghouse of smart grid information to document the history of the implementation."

- Peffer, T. (2010) UC Berkeley's Cory Hall: Evaluation of Challenges and Potential Applications of Building-to-Grid Implementation. *California Institute for Energy and Environment (CIEE).* Accessed on 08/23/11 [link].

  "From September 2009 through June 2010, a team of researchers developed, installed, and tested instrumentation on the energy flows in Cory Hall on the UC Berkeley campus to create a Building-to-Grid testbed. The installation of a Building-to-Grid testbed at Cory Hall provided a framework for understanding the barriers and opportunities in developing Building-to-Grid systems. Cory Hall is not the typical B2G installation since it is a campus building in a campus master-metered scenario, as well as an extensively instrumented academic research testbed. However, the process for design and development of the system illuminated some challenges and applications general to all buildings, especially older larger buildings that are quite prevalent in the U.S."

- Sergici, S., and Faruqui, A. (2011). Evaluation of Baltimore Gas and Electric Company's Smart Energy Pricing Program. *The Brattle Group.* Accessed on 08/23/11 [link].

  IPU Note: The evaluators pooled SEP 2008 and 2009 pilot datasets to investigate the persistence of customer price responsiveness. They found that BGE SEP customers were persistent in their price responsiveness in the 2nd year of the program despite milder summer conditions. In fact, SEP customers increased their elasticities, suggesting that learning and adaptation were taking place.

- Sergici, Sanem and Faruqui, Ahmad. (2008) Experimental Design Considerations in Evaluating the Smart Grid. *The Brattle Group*. Accessed on 08/23/11 [link].

  IPU Note: This study shows that the magnitude of price response demands on a number of factors, including the magnitude of the price increase and the presence of central air conditioning. The report also includes common problems in pilot design, tips about borrowing from other pilot programs and validity issues.