

Report on the Smart Grid Collaborative U-15278

Prepared by Staff of the Michigan Public Service Commission

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Overview

On April 24, 2007, the Michigan Public Service Commission (MPSC) issued an order in Case No. U-15278 directing the MPSC staff to convene a statewide collaborative on smart grid infrastructure with the intent to improve the state's electric grid. The collaborative's primary focus is on national smart power-grid infrastructure development and when options reviewed appear cost-effective and practical to implement, the Staff was required to establish criteria and standards, triggering pilot programs or broader deployment in Michigan. Further, the collaborative was directed to "emphasize reviewing and adopting technologies that make the grid flexible and efficient, enable distributed technologies, and preserve reliability."

The collaborative has participation from over 60 industry stakeholders representing utilities, cooperatives, power providers, vendors, and research institutions. Two meetings of the collaborative have been held to date. The first, on August 14, 2007, was an introductory meeting and included two speakers from Electric Power Research Institute who provided an overview of smart grids, how to implement them and what Michigan opportunities were available for smart-grid enabled demand response and energy efficiency applications. The second meeting, held on March 13, 2008 had speakers who focused on summarizing the national legislation for smart grid, discussing the merging of the transportation and electricity infrastructures, describing Detroit Edison's smart grid projects and updating the status of utility advanced metering infrastructure (AMI) pilot proposals.

Recent National Legislation on Smart Grid

The Federal Energy Independence and Security Act of 2007¹ was signed into law on December 19, 2007, and contains a Title devoted entirely to Smart Grid. The smart grid provisions give the Department of Energy (DOE) the lead on all but two issues (Interoperability and State Consideration), but DOE must coordinate with the Federal Energy Regulatory Commission (FERC), NIST, the Department of Homeland Security, other federal agencies and the States.

The smart grid title begins with Section 1301, which contains the statement of policy on the modernization of the electricity grid and describes the components of 10 achievement goals "which together characterize a Smart Grid":

- (1) Increased use of digital information and controls technology to improve reliability, security, and efficiency of the electric grid.**
- (2) Dynamic optimization of grid operations and resources, with full cyber-security.**
- (3) Deployment and integration of distributed resources and generation, including renewable resources.**
- (4) Development and incorporation of demand response, demand-side resources, and energy-efficiency resources.**
- (5) Deployment of `smart' technologies (real-time, automated, interactive technologies that optimize the physical operation of appliances and consumer**

¹ Link to the Federal Energy Independence and Security Act of 2007 at <http://thomas.loc.gov/cgi-bin/query/z?c110:h.r.6.enr:>>

- devices) for metering, communications concerning grid operations and status, and distribution automation.**
- (6) Integration of `smart' appliances and consumer devices.**
 - (7) Deployment and integration of advanced electricity storage and peak-shaving technologies, including plug-in electric and hybrid electric vehicles, and thermal-storage air conditioning.**
 - (8) Provision to consumers of timely information and control options.**
 - (9) Development of standards for communication and interoperability of appliances and equipment connected to the electric grid, including the infrastructure serving the grid.**
 - (10) Identification and lowering of unreasonable or unnecessary barriers to adoption of smart grid technologies, practices, and services.**

Other sections in the title describe a reporting process, demonstration projects, matching grants, information mandates, implications of private wires laws and Smart Grid security. Of particular interest is Section 1305 which discusses Smart Grid Interoperability Framework and Sec 1307 discussing State consideration of Smart Grid.

Section 1305 authorizes NIST as the lead agency assigned to develop a framework for protocols and standards “to achieve interoperability of smart grid devices and systems” specifically to enable “all electric resources, including demand-side resources, to contribute to an efficient, reliable electricity network.” The project will have broad stakeholder input from relevant Federal, State agencies and private entities. The scope of the framework shall “...be flexible, uniform and technology neutral” including “...technologies for managing smart grid information, and designed to accommodate traditional, centralized generation and transmission resources and consumer distributed resources, including distributed generation, renewable generation, energy storage, energy efficiency, and demand response and enabling devices and systems.” The goal is to accommodate regional and organizational differences and technological innovations. An initial report on the recommended standards is due by the end of 2008.

Section 1307 amends the Public Utility Regulatory Policies Act (PURPA) of 1978 to direct the States to consider requiring that electric utilities, before investing in “non-advanced grid technologies”, consider investments in a “qualified smart grid system.” The term “qualified smart grid system” will have to be based upon such factors as total costs; cost-effectiveness; improved reliability; security; system performance; and societal benefits but will ultimately be defined by DOE. States are also directed to consider smart grid investments as recoverable from ratepayers, including costs associated with obsolete equipment. Further, electricity purchasers are to be provided time-based prices that are accessible via Internet or other means. Consideration by each State regulatory authority with respect to each electric utility for which it has ratemaking authority and each non-regulated electric utility must start within 1 year of enactment (or a hearing date must be set by then and the consideration must be completed within 2 years of enactment).

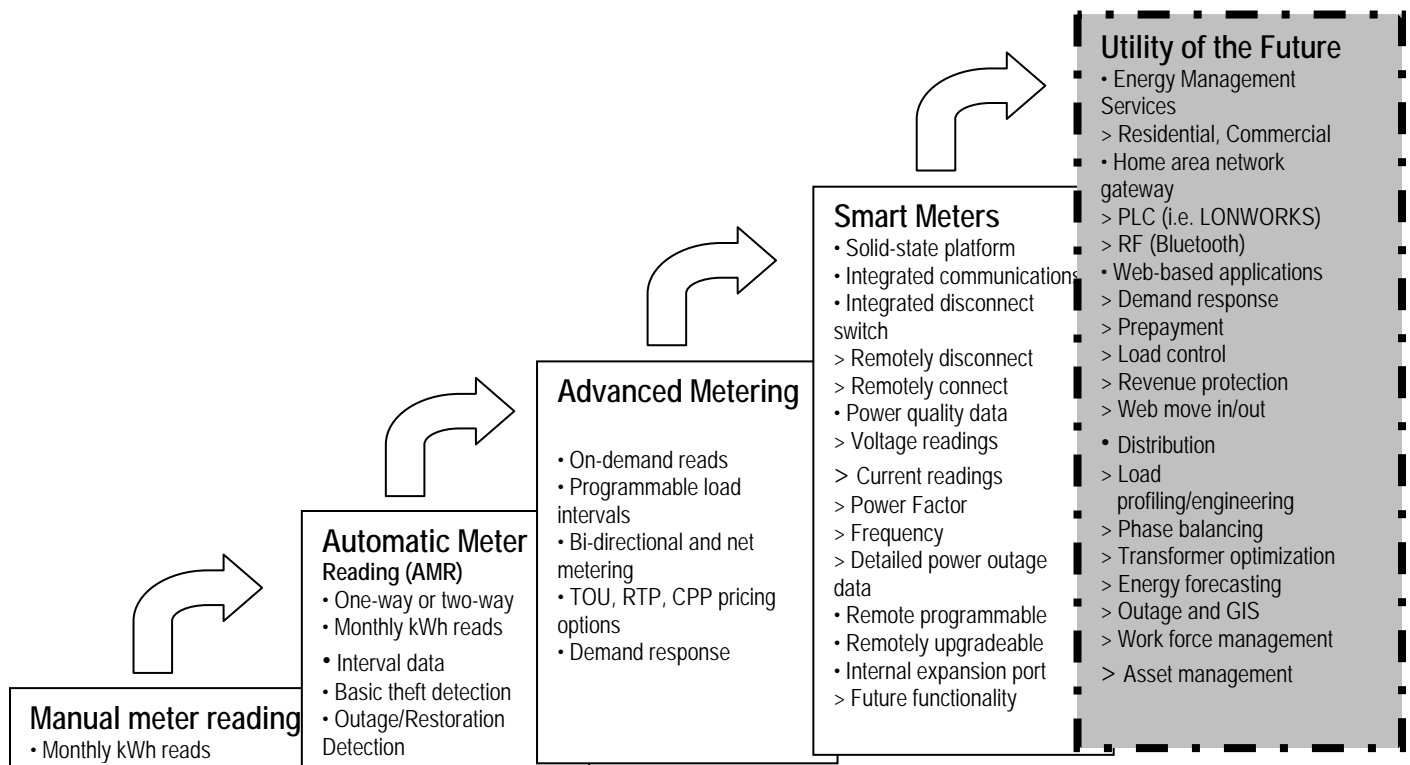
State Efforts on Smart Grid

A recently released FERC state summary report on Demand Response and Smart Metering² illustrates that the MPSC is not alone in their interest in seeing the development of a smart grid infrastructure. The report states "... a number of state legislatures and state public utility commissions have issued new rulemakings, orders, and /or initiatives in support of AMI investments (and time-based rates). These new announced deployments and state activity are important because they will create the necessary infrastructure and capability to support demand response."

Smart power grid infrastructure development and investment is critical to enable enhanced demand response program deployment but just as importantly, to prepare for future technology developments and customer requirements. Infrastructure development in Michigan is in preliminary stages, as utilities and cooperatives across the state are actively investigating upgrading to smart meter³ installations. The figure below, describes the evolution of the smart grid/AMI concept from automatic meter reading as its most rudimentary functionality, to enhanced systems that not only optimize utility operations with self-healing grid capability, but also provide the customer with the broadest in-home applications that optimize energy efficiency, demand response and smart appliance integration.

Evolution of the Smart Grid/Advanced Metering Infrastructure

Graphic source: Duke Energy



² 2007 FERC Assessment of Demand Response and Smart Metering 2007, p.23 at <<http://www.ferc.gov/legal/staff-reports/09-07-demand-response.pdf>>

³ Meters are considered 'smart' or advanced, by virtue of their underlying technologies which replace outdated electromechanical meters with digital meters that enable advanced communications and data relays. The three functions that make a meter smart are: the ability to take interval measurements, measuring both what was consumed and when; automatic transmission of the resulting data, eliminating the need for manual reading; and two-way communications: the ability to both "listen" and "talk."

The Commission has recently received rate case proposals submitted by Consumers Energy (U-15245) and Detroit Edison (U-15244) that seek rate recovery of AMI deployments. The advanced meter deployments will be used in demand response pilot programs. A comparison of the demand response pilot proposals between the two utilities, finds a variance in methodology, scope and AMI technology. Staff needs to provide guidance on the functional requirements of AMI systems that are necessary for rate recovery.

Investigation into the development of guidelines for AMI minimum functionality standards and criteria for rate recovery.

Advanced metering technology is viewed as the foundation to promote the legislatively enacted policy of the United States that all electric customers have time-based rates available, such as critical-peak pricing or real-time pricing, and that demand response resources are fully realized through AMI technology. The Federal Energy Independence and Security Act of 2007 provides general direction but utilities will need more detailed direction from state commissions, especially regarding minimum functionality requirements, that will impact the specific options they will bid for AMI technology projects. Without specific direction on minimum functionality, utilities may take on unnecessary risk, since demand response features that are not opted for during the initial deployment, but are later deemed essential by the Commission, could substantially increase costs and stranded investment if those features are added later

Currently, a window of opportunity is open for the Commission to address minimum functionality standards. During the time in which interoperability standards are being developed at the Federal level, Michigan can and should establish minimum functionality standard for rate recovery of AMI.

An example of why Michigan should develop minimum functionality standards was highlighted in Detroit Edison's current rate case (U-15244) in V. G. Dow's pre-filed testimony. In response to the question, "How mature is the commercially available AMI technology solutions offering customer load management and demand response?" Dow answered, "Commercially available products to cover these features are very limited and involve some degree of risk due to advanced communications with limited interoperability." Detroit Edison wisely did not include the estimated cost of customer load management and demand response features for recovery in its filing, since it did not know what options would be required by the Commission and because interoperability standards are not in place.

An important consideration when establishing these functional requirements is the recognition that infrastructure developed today will be a foundation for the continually evolving technology of tomorrow. Flexibility is critical to allowing efficient smart grid infrastructure development. Several states have already investigated developing functionality standards for AMI smart metering and staff hopes to benefit from the learning experiences of these earlier efforts. First attempts at developing standards were too prescriptive and in some cases, have resulted in deployment of technology that was already outdated.⁴

⁴ PG&E in California, per Scott DeBroff November 7, 2007 presentation to staff.

Staff recommends the Commission investigate developing minimum functionality standards and criteria for rate recovery of AMI infrastructure and enabling technologies for load management, demand response, energy efficiency, and prepayment services. Staff proposes to follow a process similar to Texas Public Utility Commission and open a docket and take comments on the following questions related to developing AMI functionality standards for rate recovery in Michigan. Responses to these questions will provide staff with a framework for creating a staff strawman proposal.

1. In assessing possible deployment approaches and advanced-metering technologies and functions, how should the costs and benefits to utilities and customers be considered? Should the Commission prescribe functionality standards and criteria on deployment approaches, technologies, and functions, or should it leave broad latitude to utilities to make these decisions to choose on behalf of customers?
2. To what extent should advanced-metering technologies and functions be standardized and to what extent should utilities be able to select functions on behalf of customers? To what extent can standard protocols for the information produced by advanced meters output be prescribed?
3. Should the Commission prescribe cost-recovery guidelines for the costs of advanced meters? What should these guidelines say?
4. Should the Commission prescribe open-architecture guidelines for advanced meters? Has open architecture been successfully implemented elsewhere? If the Commission prescribes guidelines, what should these guidelines say?
5. Should the Commission prescribe guidelines to deal with information transmission and storage issues? Should it require a pilot project or gradual deployment of advanced meters, in recognition of the volume of information that the market participants will have available from advanced meters?
6. Are there other issues the Commission should address in this proceeding?

Recommendation

Until the Commission can identify minimum functionality standards for utility rate recovery of AMI investments, Michigan utilities will prudently limit their AMI deployment to a phased technology pilot approach, so as to perform extensive testing, and limit financial risk associated with this major capital expenditure. During this transition period, Staff recommends that the Commission complete a public input process to develop minimum AMI functionality guidelines and criteria for rate recovery by regulated electric utilities.