“Duke Energy’s Utility of The Future: Developing A Smart Grid Regulatory Strategy Across Multi-State Jurisdictions”

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Keywords: Duke Energy, Utility of the Future

Abstract

An overview of the regulatory challenges faced by Duke Energy as it pursues its Utility of the Future project.

Duke Energy (NYSE: DUK) is one of North America's largest electric power companies. Headquartered in Charlotte, NC, it has nearly 37,000 MW of generating capacity (plus 4,000 MW more in Latin America) and serves nearly 4M customers.

Duke Energy’s long term vision is to transform the operation of its electric power grid by creating a reliable and scalable networked infrastructure capable of delivering and receiving information from intelligent devices distributed across its power systems, automating components of the distribution systems and leveraging the linked networks for improved operational efficiencies and customer satisfaction. Duke Energy refers to this new networked infrastructure as its Utility of the Future (UoF) project.

KEMA, Inc. has been onsite with Duke since the inception of the UoF project, and continues to serve as Duke’s external counsel regarding project implementation.

Article

Duke Energy's initial Smart Grid pilots are already underway as it seeks to fine-tune its network configuration for various topographies (urban, suburban, rural). Two examples include:

1. **Piloting advanced metering and distribution automation** in Charlotte to test potential communications systems, distribution sensors, meters and in-home applications

2. **Integrating non-BPL communications and multiple meter types** in Bloomington, IN to create a Smart Grid "testbed" and to serve a varied customer base that includes industrial, commercial, urban, rural and large campuses

Duke Energy's full-scale Smart Grid rollout will begin in the second half of 2008 and continue for several years.

At present, Duke is preparing to execute a number of development initiatives across its jurisdictions. Phase I deployments of the UoF project will include the installation of hardware and software necessary to create a communications network infrastructure. The infrastructure will enable a subset of the future business opportunities described within the project description statement to support specific customer locations as follows:

- Charlotte, NC
- Greenville, SC
- Cincinnati, OH

1. DUKE ENERGY'S UTILITY OF THE FUTURE PROJECT

1.1. Overview

Duke Energy's long term vision is to transform the operation of our electric power grid by creating a reliable and scalable networked infrastructure capable of delivering and receiving information from intelligent devices distributed across our power systems, automating components of the distribution systems and leveraging the linked networks for improved operational efficiencies and customer satisfaction. This new networked infrastructure will provide the future platform for changing the customer experience and their use of energy in support of Duke's Energy Efficiency program.

1.1. Detailed Description of the Project

The primary focus of this project is to analyze, design and deploy a portfolio new communication networks to service specific customer areas within the Carolinas and the Midwest. This network will use our electric distribution power lines/grid to link intelligent devices such as meters, data aggregators, transformers, and substation devices in a networked fashion. Via the network, these devices will send and receive data to various utility systems for the purpose of improving operational efficiencies and customer satisfaction.

The communications network foundation to be implemented under the Utility of the Future initiative will begin to provide technical capabilities required to support Duke's Energy Efficiency Save – A – Watt approach as a Fifth Fuel. Future data received from intelligent devices across our distribution system will be available for enabling the Energy Efficiency Program and other enterprise software applications which will measure, protect and automate Duke's electric grid creating future opportunities and benefits for Duke Energy and its customers in the following areas:

Opportunity	Benefit
Advanced Metering	AMI, more efficient move in/out processes, remote connect/disconnect of service, billing exceptions, reduction in billing cycle, improved meter accuracy, revenue protection, load research
Energy Efficiency	Demand Side Management (DSM) program proliferation, operational efficiencies, value of load to operations, value of energy in the market
Distribution Automation	Volt / VAR control & management, asset management, power quality driven O&M
Outage Management	Detection and verification, revenue impacts
Call Center	Reduction in overall call volume related to meters, trouble calls, change in service and billing
Substation Automation	Asset management
Environmental	Reduction in CO_2 from reduced truck rolls

Societal	Customer opportunity cost due to outages

In addition, the project will identify and resolve any operational, technical, regulatory, or vendor issues pertaining to network infrastructure deployments. Additional deployment costs or benefits not already identified in the business case will be identified and assessed from actual performance within service areas where new network assets are deployed. Information gathered from deploying these new assets will provide verification of business case assumptions, and will be used as input to future deployment initiatives beyond this project.

Duke Energy's plan begins with the installation of smart meters and communications. Advanced metering will be an initial application, which can also include utility benefits such as improved outage detection and response. From there, Duke Energy expects to add system optimization correlating data to allow us to fine-tune voltages and reactive power and optimize on a feeder-by-feeder basis, so we don't overbuild. Eventually, Duke will begin to experiment with microgrids.

Before deploying new network infrastructure assets within a service area, system testing will be conducted. Metrics from system testing will be collected and analyzed to confirm that network infrastructure, new system functionality and system data integrity are implemented and working per requirements. System testing will determine the relative efficiency and reliability of different configurations of networked devices deployed across our various topographies, system configurations and technical/regulatory operating requirements.

2. Regulatory Cost Recovery

2.1 General Observations on AMI / Smart Grid Cost Recovery

For any utility pursuing an AMI project, cost recovery is a major concern. Utilities may face a number of regulatory challenges in their efforts to secure cost recovery for AMI / Smart Grid projects, including demonstration of positive net benefits of the project; cost allocation issues; underappreciated existing meter costs; and negative or non-supportive commission views on smart grid technology.

Based on findings from a study that KEMA conducted earlier this year, the average cost for an AMI / Smart Grid utility project is approximately $775 million. While the costs of the project may be easy to quantify on the front end, the long-term benefits of technology improvements may not be as clear to regulators, particularly since the benefits may be spread over multiple customer classes and may not be fully realized for years. The unfortunate result is that state regulators may be reticent to approve cost recovery or even the implementation of AMI / Smart Grid technologies without specific guarantees that benefits of the technologies will exceed the costs in the long-term. It is a challenge for all utilities that are including technology upgrades in their future business plans.

The way regulators add up the costs and provide rate recovery for AMI / Smart Grid investments will largely determine how utilities and their shareholders perceive AMI investments. A public utility commission might easily justify rate-basing capital costs for new metering hardware, but less certain is how a utility should bear the costs of retooling its internal processes to pursue the Smart Grid vision, as well as marketing the new program and educating customers to ensure maximum benefits continue flowing.

In data gathered on AMI / Smart Grid cost recovery means, some common trends among the approaches that utilities and public utility commissions are taking began to emerge. In fact, cost recovery strategy appears to fall into one of the following categories, regardless of the state jurisdiction:

- Trackers: A mechanism that follows or "tracks" unpredictable costs that the utility incurs. Typically, trackers are determined at the end of the year and then recovered over a 12-month period. Trackers can be both targeted to a specific project, or have a broader distribution (i.e., address aging infrastructure too).
- Balancing Accounts / Rate Base: A balancing account is an accounting procedure developed by the governing utility commission to track and recover reasonable and prudent costs unrecovered through retail bills due to the application of applicable rate freezes or ceilings. The rate base of a utility is established by governing utility commission. It determines the value of the physical assets of the utility which are used to provide services and can be recovered from customers in rate structures.
- Customer Surcharge: A mechanism that has no standard statutory definition, but typically is a charge defined by the governing utility commission and imposed on customers to recover utility expenses.

- State Funding: It varies state-by-state, but this approach includes funding for projects provided from existing or newly created state accounts.
- None; Instances in which no cost recovery plan has yet been developed for an AMI / Smart Grid project.

In the United States, the regulatory landscape is Landscape is generally positive for AMI / Smart Grid cost recovery. No state has denied outright cost recovery of an AMI project, although applications are pending in several states. The most common recovery methods are trackers and building recovery into rate base.

Of these options, trackers appear to represent the most common trend, as they offer a good manner for focused cost recovery, in absence of going through the full rate case process. They also appear to be attractive given the uncertainty surrounding estimates of total project costs. Trackers presumably save time and limit the risk exposure for the utility.

The second most common approach is to approach cost recovery through surcharges. Most utilities appear to be taking a marginal-costs approach when proposing either a surcharge or rate base recovery option. In other words, most utilities appear to be arguing that the determination of a class' customer-related distribution cost responsibility based on estimates of marginal customers costs (costs to serve that class) multiplied by the number of customers the class.

Other options used for AMI / Smart Grid cost recovery, although not as common as the ones listed above, include the following:

- DSM Tracker
- Earnings sharing mechanism
- Participant fees
- Deferred accounting
- Formula rates
- Combinations of some of the above

2.2. Unique Regulatory Challenges Faced By Duke Energy

As mentioned above Duke Energy has utility operations in five states and is presently planning initial deployment of its Utility of the Future project in three deployment locations. None of the three states in which Duke Energy is planning these initial deployments (North Carolina, South Carolina, and Ohio) has formalized any cost recovery policy for AMI / Smart Grid cost recovery.

Ohio is making the most traction toward developing a cost recovery policy. The Public Utilities Commission of Ohio (PUCO) is holding a series of workshops related to AMI / Smart Grids (Case No. 07-646-EL-UNC). Along with two broad policy presentations related to the benefits of AMI, the workshops will also address cost recovery via discussions of the financial model to used for regulatory filings in the state. The workshops intended to provide stakeholder feedback to inform PUCO Staff recommendations to the PUCO for a decision. Timing of the proceeding beyond the workshops is not scoped.

What appears likely is that the PUCO staff will default to use of the McKinsey Model, but is open to conducting off-line discussions on alternatives. All electric distribution companies and PUCO Staff must be in agreement if a model other than McKinsey is utilized.

Duke Energy--Ohio (DEO) is planning to file an application with the PUCO seeking an increase of $34 million, or 5.8 percent overall, in natural gas rates. The increase would be effective in the early- to mid-2008. In this filing, DEO will seek approval to make annual rate updates to recover the cost of the new equipment. This filing, part of Duke's general rate case in Ohio, is separate from what will be likely be separate regulatory filings focused exclusively on the Utility of the Future project (not just in Ohio, but in all of Duke's five states of operation).

Duke Energy's overall regulatory strategy for its Utility of the Future projects includes the following prioritized objectives:

- Prioritize States based on the following criteria:
    - Regulatory receptivity to smart grid technology
    - Regulatory receptivity to timely cost recovery
    - Existing unrecovered / underappreciated sunk meter costs
    - Consider expanding U of F to encompass aging distribution infrastructure improvements
- Communicate vision, costs and benefits to regulators
    - Develop compelling "road show" for regulators to educate them on the Utility of the Future objectives.

  - Meet with key stakeholders
  - Create and implement demonstration labs
- Implement initial deployments
- Develop strategy to transition to installation of new technology meters.

Before proceeding with the deployment in any state, Duke Energy has established a methodical approach to enable favorable regulatory strategy in that particular jurisdiction. Before proceeding in any state: First, the company plans to educate regulators and other stakeholders about its vision and the benefits and costs of implementing Utility of the Future. Toward that objective, Duke intends to create a compelling "road show" that gets people excited about the possibilities and eager for initial deployments. Duke also intends to complete a Demonstration Lab that will simulate various processes supported by the project and plans to coordinate strategic fieldtrips with key stakeholders. The second step Duke intends to take in each state is to develop regulatory proposals that are most appropriate for each jurisdiction. Third, Duke will develop detailed cost/benefit analyses of U of F / aging infrastructure proposals. And fourth, Duke Energy will continue with proof of the U of F concept through initial deployments.

Duke Energy also has developed specific regulatory strategies for the three states in which it is pursuing initial deployment of its Utility of the Future project. The state-specific regulatory strategy has been outlined as follows:

North and South Carolina:

- Explore broader Utility of the Future concept, encompassing aging distribution infrastructure improvements
- Consider Utility of the Future stand-alone tracker filing, or rate case/tracker filing, in 2009
- Bottom line: pursue Utility of the Future regulatory filing in 200

Ohio:

- Participate in PUCO's smart metering workshop (now through Dec. 07).
- Continue to push for implementation of U of F tracker in current gas rate case.
- Depending on outcome of PUCO smart metering workshops, propose stand-alone U of F tracker for electric (alternatively, could propose U of F tracker in electric rate case planned for Ohio in 2009).
- Utility of the Future rate case filing (electric) in 2008 or 2009.

At this time (October 2007) does not have exact cost figures for the various pilot projects, but as decisions are made it will seek regulatory recovery of the costs. By the end of the first quarter 2008, the initial deployments should be under way.

Biographies

Charlotte, NC-based Duke Energy serves approximately 3.9 million customers in five states: North Carolina, South Carolina, Ohio, Indiana, and Kentucky. Established in 1927, KEMA Inc. is an international, expertise-based energy solutions firm providing technical and management consulting, systems integration and training services to more than 500 electric industry clients in 70 countries. There are a number of regulatory challenges that Duke Energy presently faces related to its Utility of the Future project, not the least of which is the fact that it must eventually submit regulatory filings for the project to five different public utility commissions.

KEMA has been serving the complete spectrum of participants in the energy marketplace for over 30 years and offers a full complement of services supporting generation through the customer meter.

Mr. Will McNamara, Principal Consultant at KEMA, is a regulatory and legislative affairs expert with 15 years of energy industry policy-making, rate design, expert testimony, and lobbying experience. Mr. McNamara has unique expertise in developing AMI policy and managing business plans and regulatory filings within the areas of energy efficiency, demand response, and smart grids. He presently serves as project manager providing support to Duke Energy's Utility of the Future Project, in which the utility is preparing to execute a full-scale AMI deployment across its multi-state service territory. In this role, Mr. McNamara has overseen the creation of Duke's use cases and functional requirements for its planned AMI system, technology vendor selection, and development of its regulatory business case and cost-recovery proceedings. Prior to joining KEMA, Mr. McNamara managed legislative and regulatory policy for Sempra Energy, during which time he was helped develop the company's AMI business strategy and approved all of the California regulatory filings of San Diego Gas & Electric's AMI business plan and cost recovery strategy. He has appeared as an expert witness and provided testimony in numerous hearings before the California Public Utilities Commission; the California Energy Commission; the California Senate and Assembly; and the Federal Energy Regulatory Commission. In his work as an energy consultant he has also managed regulatory filings on behalf of utility clients in the states of Arizona, New Mexico, and Colorado. Mr. McNamara holds an MBA, M.A. in Mass Communications and a B.A. in political science / journalism.

Mr. Matt Smith is Director of Technology Development and the Utility of the Future project for Duke Energy. He was named to his current position in October 2006.

Most recently, Mr. Smith worked in strategic planning for Duke Energy. Prior to the merger between Duke Energy and Cinergy, he worked in mergers and acquisitions and strategy for Cinergy. While at Cinergy, he also worked in Cinergy Solutions and in Cinergy's merchant business unit in a policy role.

Mr. Smith earned a bachelor of arts degree in business administration from Weber State University in Ogden, Utah. He earned a JD/MBA from the University of Kentucky College of Law and Gatton College of Business in Lexington, Kentucky.