Regulatory Aspects of Smart Metering: US Practice

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Presented by:

Diane Ramthun
Office of General Counsel
Public Service Commission of Wisconsin

The Wisconsin Public Service Commission oversees more than 1,100 Wisconsin public utilities that provide electricity, heat, water and telecommunication services.

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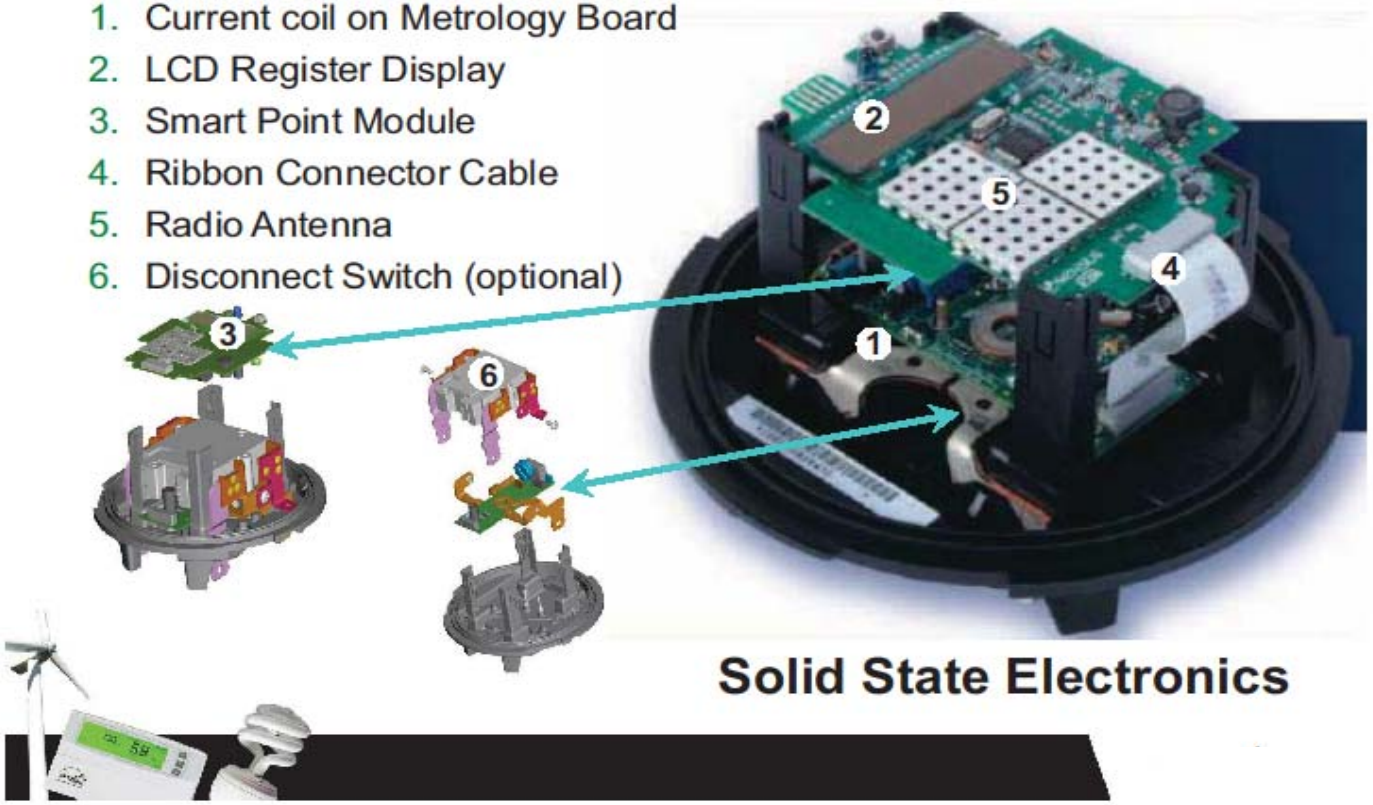
Standard Meters vs. Smart Meters

Electronic Smart Meter

1. Current coil on Metrology Board
2. LCD Register Display
3. Smart Point Module
4. Ribbon Connector Cable
5. Radio Antenna
6. Disconnect Switch (optional)



Solid State Electronics

Smart Meter Functions

Compared to conventional meters, which record total energy consumed over a period of time – smart meters can perform all or most of the following:

- Time-based pricing
- Consumption data for consumer and utility
- Net metering
- Loss of power (and restoration) notification
- Remote turn on and turn off operations
- Load limiting for “bad pay” or demand response purposes
- Energy prepayment
- Power quality monitoring
- Tamper and energy theft detection
- Communications with other intelligent devices in the home

Smart Meters Are Green

A smart meter is a green meter because it enables the demand response that can lead to reductions in carbon and other emissions.

Smart meters also facilitate greater energy efficiency through information feedback to consumers about their energy usage

Advanced Metering Infrastructure (AMI)

Integration of multiple technologies including:

- Smart meters
- Home area networks (HAN)
- Data management and communication systems
- Continuous integration between utility and consumer and the electric load

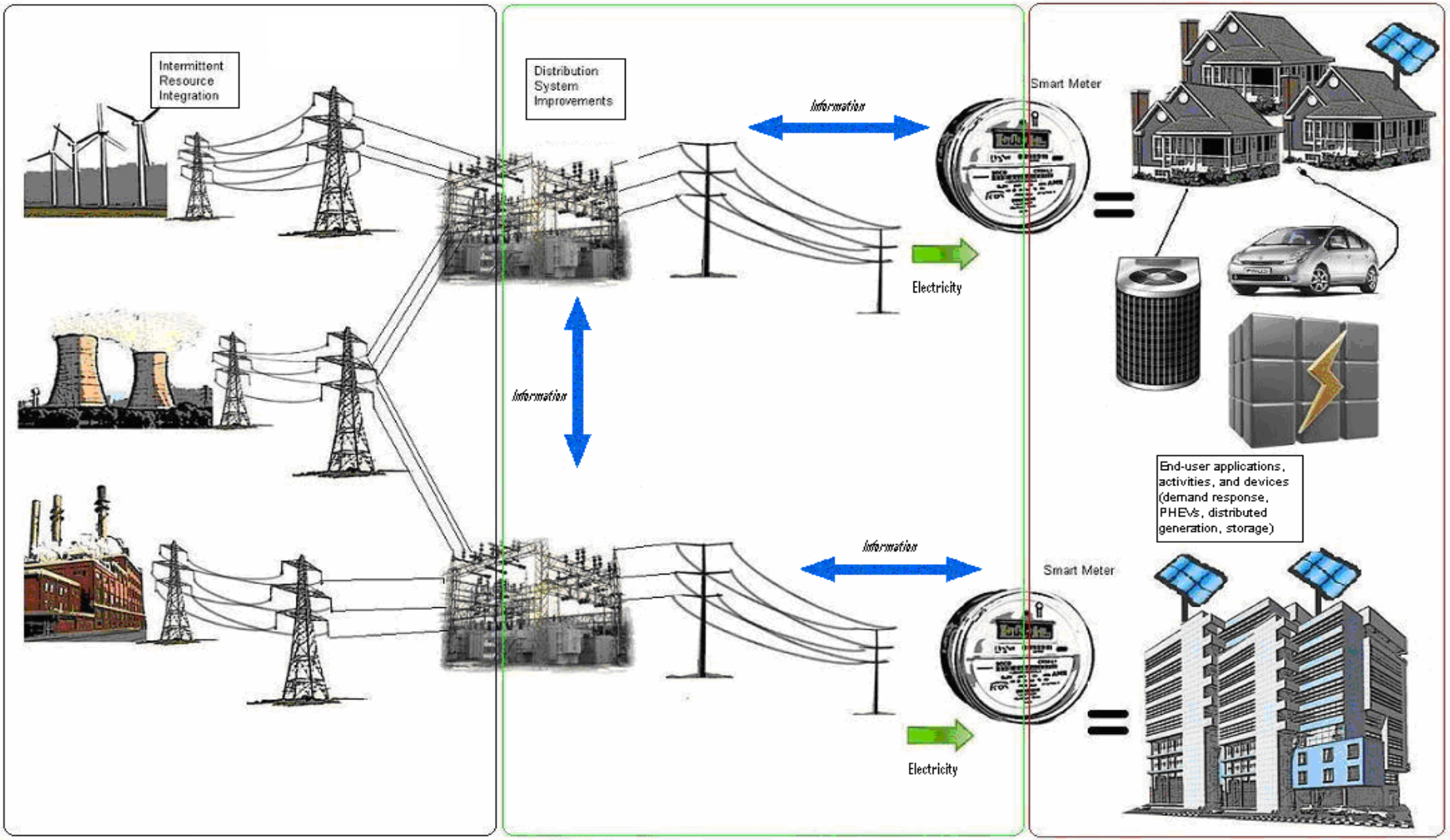
End User Portals

Image from CNET News

Smart Grid

Transformation of existing electric transmission and distribution systems by linkage with communications and information technologies for enhanced grid operations, customer services, and environmental benefits

Components of Smart Grid



Smart house

Features digital meter, smart thermostat and other devices to allow customers to adjust their energy consumption according to preference and rates.

Solar panels: Excess power generated can be sent back to the grid.

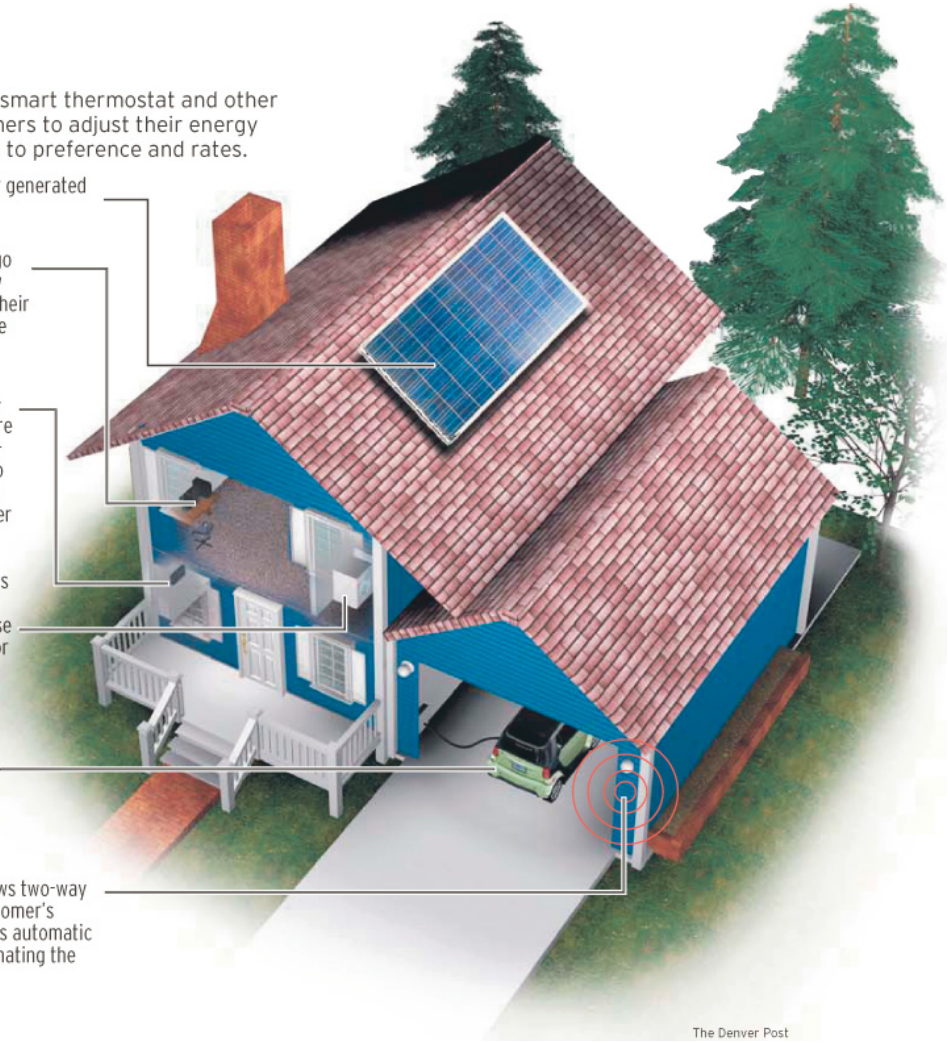
Computer: Customers can go online to a Web portal to view real-time information about their power consumption or change their home energy settings.

Thermostat: Can automatically adjust home temperature setting based on communication with power grid. Can also display how much customers are currently paying for power per kilowatt hour.

Smart appliances: Washers and dryers with on-board computer chips that can sense grid conditions and turn off or on as needed.

Electric plug-in vehicle: Can act as a backup generator for homes and supplement the grid during peak hours, and charge in off-peak hours at lower cost.

Smart digital meter: Allows two-way communication between customer's home and the utility and gives automatic energy usage readings, eliminating the need for meter readers.



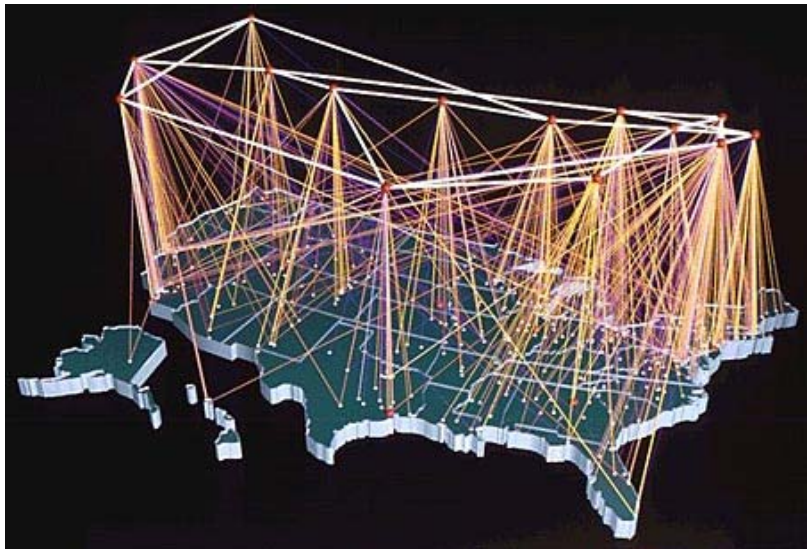
Source: Xcel, Denver Post research

The Denver Post

U.S. Federal Stimulus for Smart Grid Development

Energy Independence Act of 2007 (EISA) set goals on modernizing U.S. electric grid and authorized funding for smart grid development and research projects.

American Recovery and Reinvestment Act of 2009 (ARRA) allocated $4.5 billion to nation-wide effort to modernize electric grid, enhance security of energy infrastructure and ensure reliable electric delivery.



U.S. Deployment of Smart Meters

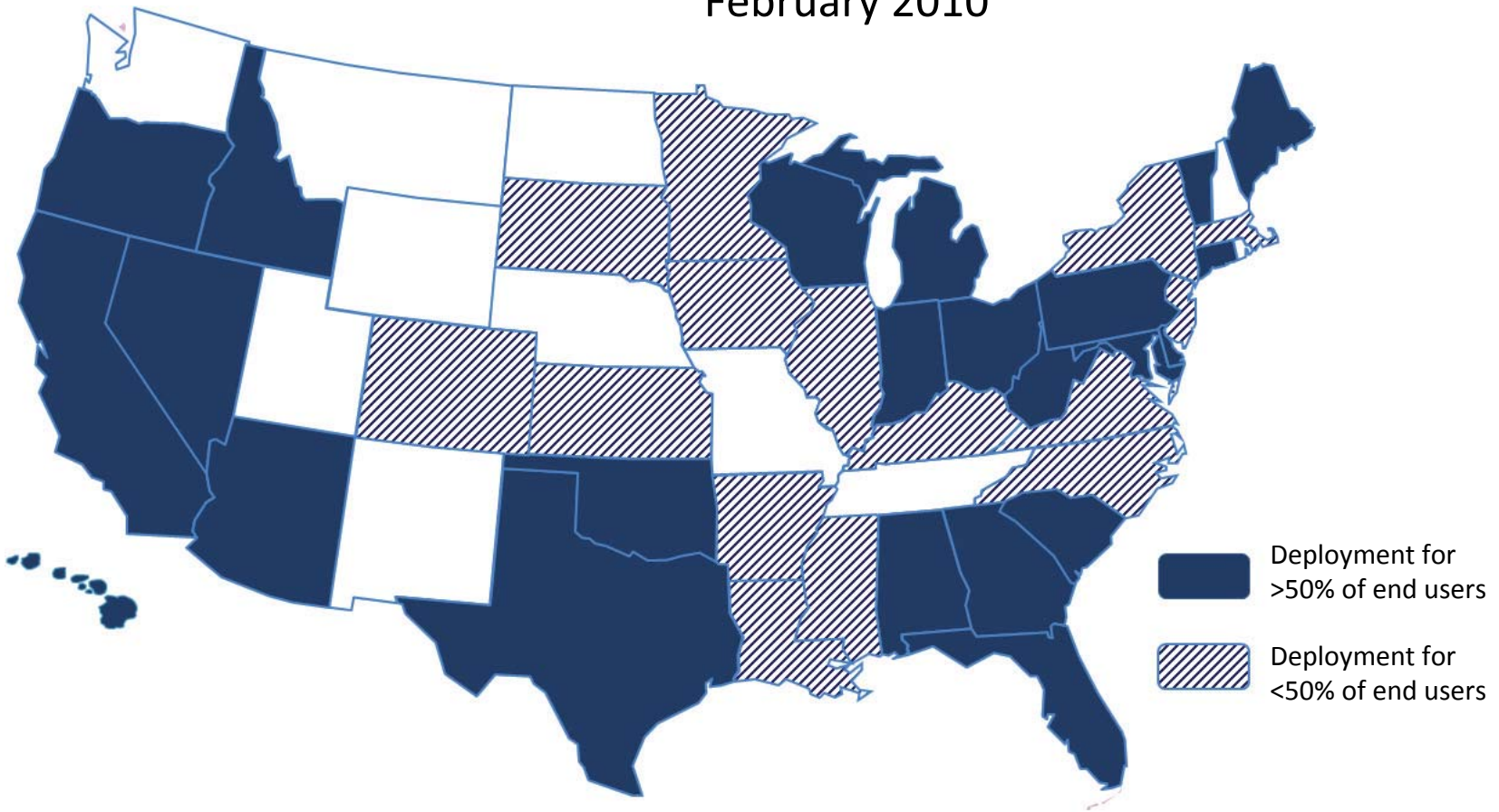
July 2009 – Smart Meters (AMI) comprise about 4.7% of all electric meters in U.S.

52 million smart meters projected to be installed by 2010.

U.S. Department of Energy

Utility-Scale Smart Meter Deployments, Plans & Proposals

February 2010



U.S. Deployment of Smart Meters

- Deployment by utilities within service territories
- State public utility commission approval required for cost recovery and tariff offerings
- Partial reliance on federal funding
- Wide variances in infrastructures proposed, size of projects, cost recovery treatments
- Often pilot programs precede broader deployments

Case Study: Baltimore Gas and Electric Company

In July of 2009, Baltimore Gas and Electric Company (BGE) applied to the Maryland Public Service Commission for authorization to deploy smart meters throughout its service territory.

Features of the Proposed Project:

- Deploy 1.36 million electric smart meters over 3-5 years throughout BGE's service territory
- Installation of utility-meter premises 2-way communications network
- Mandatory time of use rates
- Surcharge to provide advance recovery of cost

Project Cost:

- $835 million inclusive of $136 million of ARRA federal funds

Case Study: Baltimore Gas and Electric Company

Maryland Public Service Commission conducted an administrative proceeding to review BGE's proposed project, including holding a hearing, and rejected the proposal on June 21, 2010, stating:

"The Proposal asks BGE's ratepayers to take significant financial and technological risks and adapt to categorical changes in rate design, all in exchange for savings that are largely indirect, highly contingent and a long way off."

Cost/Benefit Analysis

Maryland PSC: BGE's cost analysis failed to include significant costs resulting from project:

- $100 million for undepreciated value of existing, fully operational meters retired early
- $60 million for new billing system
- $100 million for in-home displays of energy use
- Cost of replacing existing consumer appliances with appliances compatible with smart meters

Cost/Benefit Analysis - Continued

Maryland PSC: benefits of smart meters and AMI are largely contingent on consumer buy-in and changing energy use patterns.

The benefits of the proposal are uncertain because BGE's proposal failed to provide plans for the following:

- Consumer education
- Provision for in-home displays which allow consumer access to real time information on energy pricing

The U.S. Consumer Challenge

Consumers don't like:

- changing behavior
- losing control

Consumers distrust:

- smart meters
- utility motives

Consumers don't understand:

- smart grid
- dynamic pricing
- demand response

Consumers like:

- low cost
- hands-off operation
- control
- choice

"Some shocked by high electric bills blame Oncor's 'smart meters.'

Headline from *The Dallas Morning News*, March 6, 2010

The utilities Oncor Electric Delivery in Texas and Pacific Gas & Electric in California conducted large scale deployments of smart meters in their respective territories.

Consumers perceived the newly installed smart meters to be causing higher electric bills and complained to the pu[illegible]d press in both states.

Need for Consumer Education In Deployment of Smart Meters

To facilitate the use of smart meters, consumers need to be educated on:

- Purpose and use of smart meters
- Available demand response and energy efficiency programs
- Green energy programs
- Dynamic rate offerings

Cyber-security and Inter-operability risks

Maryland PSC: The new smart meter technology in BGE's project is at risk of needing expensive upgrades because cyber-security and inter-operability standards are currently in development.

Each smart meter is a portal to electric grid operations and vulnerable to cyber intrusions:

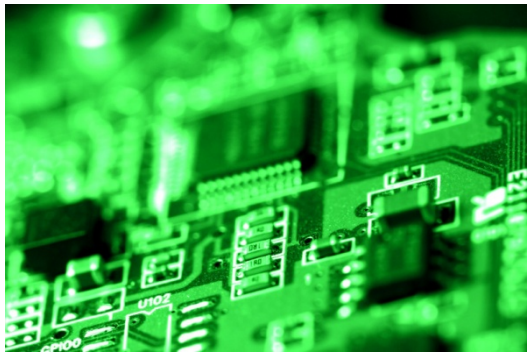
- Physical tampering
- Blocking
- Intercepting of wireless signals

Cyber-security and Inter-Operability Risks - continued

Cyber-security risk: Security of the information passing over the communications of the "smart grid" and security of the controls over system components

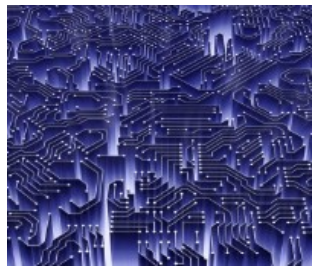
Inter-operability risk: How smart meters and other devices in the smart grid communicate and interoperate with each other

The Department of Energy, National Institute of Standards and Technology (NIST) and North American Electric Reliability Council (NERC) are working to develop industry-wide security standards.



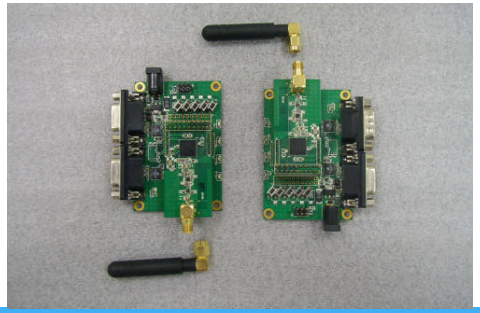
Obsolescence of Smart Meter Technology and Risk of Stranded Investments

Maryland PSC: BGE's proposed smart meters may require expensive upgrades or replacement relatively soon at great cost to ratepayers.



Maryland PSC's particular concern:

- ZigBee chip proposed to be installed in all of BGE's smart meters
- ZigBee chip is currently the dominant chip in U.S. market
- No appliance manufacturer has adopted ZigBee
- Risk that appliance manufacturers adopt alternative technology and make ZigBee obsolete



Cost Recovery

Maryland PSC: BGE's proposed surcharge as cost recovery method is unacceptable because it unfairly imposed entire risk of project on ratepayers.

- BGE project represents large investment in infrastructure which traditionally is recovered in rates
- Surcharge unacceptable because it guarantees dollar to dollar recovery and lessens utility's incentive to control costs

Illinois Statewide Smart Grid Collaborative

Basic Arguments in Favor of Rider Recovery	Basic Arguments in Favor of Rate Case Recovery
1. Smart grid investments may be large and, if so, base rate treatment may strain cash flow and could deny cost recovery due to the operation of regulatory lag. 2. Smart grid investment must compete with other investment priorities when capital is limited. 3. Utilities face more risk if recovery of smart grid investment is not assured, which could raise the cost of capital faced by the utilities and ultimately paid by customers. 4. Some smart grid benefits may flow largely to customers and society, not utilities, so customers should bear some initial costs and risks. 5. Unless a smart grid investment is needed to provide safe, adequate and reliable service, it is discretionary, and absent a rider such investment may occur more slowly, if at all.	1. Base rate recovery, including incentives stemming from regulatory lag, promotes efficiency and cost-minimization and may reduce the likelihood of future stranded costs. 2. Smart grid investments are not easily differentiable; therefore, many routine technology upgrades could be presented as warranting rider treatment. 3. Base rate treatment preserves test year matching of expenses and income, which is needed to prevent excessive rates. 4. A rider allows operational and tax savings stemming from ratepayer-funded investment to be retained by the utility, potentially leading to excessive earnings and rates until the next general rate case. 5. Smart grid investment does not pass the "big, volatile, and beyond utility control" tests historically used to justify riders.

Current Status of BGE's Proposal for Smart Meter Deployment

BGE filed a new application with the Maryland Public Service Commission in August 2010 for authority to construct and deploy its smart meter project.

New proposal

- Time of use rates not mandatory
- Cost recovery not through surcharge but through traditional rate-increase mechanism

The Maryland PSC approved the new proposal on August 13, 2010

High Cost of Smart Meter Deployments: Regulatory Concerns

Hawaii Public Utility Commission recently rejected Hawaii's Electric Co.'s plan to raise rates to recover for smart grid project cost recovery.

Connecticut Light & Power Co. cut back large scale smart meter deployment to pilot project at the request of Connecticut Attorney General because of high costs.

Under pressure from the Michigan Public Utility Commission, Michigan utility Consumers Energy cut $400 million from its $900 million smart grid spending plan.

Smart Meter Deployment: Regulatory Oversight

Regulatory authority over smart meter deployment varies among states.

Wisconsin has not required utilities to seek prior regulatory approval for installation of new electric meters.

Regulatory Considerations

Policy changes that provide incentives and remove disincentives for utilities to deploy smart meters:

- Favorable depreciation rules
- Clear cost recovery policies

Need to ensure consumers' ability to realize benefits of smart meters:

- Consumer education
- Dynamic time-based tariff offerings

Questions?

Diane Ramthun

Office of General Counsel

Public Service Commission of Wisconsin

610 North Whitney Way

Madison, WI 53707

http://psc.wi.gov

Diane.Ramthun@wisconsin.gov