National Regulatory
Research Institute

Smart Grid: How Can State Commission Orders Produce the Necessary Utility Performance?

Scott Hempling, Esq., Executive Director
Tom Stanton, Principal for Electricity

National Regulatory Research Institute
8730 Georgia Ave. #201
Silver Spring MD 20910
301-588-5385
www.nrri.org

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I. *Missions:* What are the Possible Missions for Smart Grid?

A. Increase efficiency in utility operations (including asset utilization and O&M in generation, transmission, distribution, and customer service)
B. Increase system security and reliability, including reduced numbers and duration of outages, and improved power quality (suitable for modern electronic equipment)
C. Reduce fossil fuel use and emissions
D. Enhance customer choices, including rate offerings to shape customer behavior and load
E. Modify customer usage patterns to reduce peak loads
F. Improve utility planning quality and accuracy
G. Develop the economy and grow jobs

II. *Components:* To Achieve Smart Grid's Missions, What are the Major Hardware and Software Components?

A. Advanced Meter Infrastructure (AMI)
B. Customer-side systems (e.g., customer web portals, in-premise energy use displays, smart thermostats, energy management systems)
C. Customer education (both about what changes are taking place and why, and about how customers can best utilize smart grid capabilities to reduce their utility costs)
D. Meaningful demand response capabilities
E. Advanced capabilities for integrating distributed resources

F. Distribution automation and distribution management systems
G. Transmission enhancements
H. System-wide communications and information integration
I. Utility personnel education and training (about the purposes for changes and how best to manage smart grid capabilities to maximize cost savings and consumer benefits)

To explore how the different components can serve the various missions, see Table 1 on page 4.

III. Accountability: For Smart Grid Design and Operations, Who is Accountable for What Results?

A. Who are the major actors and what are their (a) comparative advantages and (b) motivations?

1. Commission
2. Utility
3. Consumers and consumer advocates
   (a) Residential
   (b) Commercial and industrial
   (c) Low-income
4. Smart grid hardware and software vendors
5. Energy service providers[1]
6. Distributed generators

B. For each major design and deployment decision, which entities (among the commission, utility, consumers, and third parties) should have the power and discretion to decide what? (See Table 2 on page 5.)

IV. *Deployment sequence:* What are the Possible Sequences for Smart Grid Design and Deployment?

The main steps include:

A. Establish mission.

B. Learn from pilot programs investigating load management via time of use (TOU), variable peak pricing (VPP), critical peak pricing (CPP), with or without: (i) automated metering infrastructure; and (ii) customer premises hardware and

[1] Depending on the industry structure in each state, such parties can include competitive electric service providers and aggregators, non-utility energy efficiency program service providers, and energy service companies (ESCOs).

software for pricing information presentation.

C. Complete additional pilot programs, if necessary, for smart meter and advanced metering infrastructure (AMI): (i) for a relatively small geographic area or group of customers, or (ii) for broader groups of customers.

D. Complete additional pilot programs, if necessary, investigating any combinations of: (i) enabling distributed resources; (ii) distribution automation; (iii) improved utility asset utilization; and (iv) system-wide communications and information integration.

E. Install smart meters system wide.

F. Install AMI system wide.

G. Install AMI system wide and provide rates to facilitate customer load management.

H. Integrate smart grid system wide: (i) enabling distributed resources; (ii) distribution automation; (iii) improved utility asset utilization; and (iv) system-wide communications and information integration.

Table 1: How Smart-Grid Missions Are Achieved by Major Smart-Grid Components

Missions→ ↓Components↓	**Increase efficiency in utility operations**	**Increase system security, reliability, and power quality**	**Reduce fossil fuel use and emissions**	**Enhance customer choices, including rate offerings**	**Modify customer usage patterns to reduce peak loads**	**Improve utility planning quality and accuracy**	**Develop the economy and grow jobs**
AMI	Enable operational efficiencies; efficient outage management	Detect and diagnose problems early Respond quickly to outages	Minimize vehicle miles driven for meter reading and customer service	Enable variable rates that better reflect market prices	Make possible the use of in-premise displays and smart thermostats	Provide detailed knowledge of service territory loads and growth	Reduce theft and fraud Improve cash flow
Customer-Side Systems	Foster "set it and forget it" convenience	Support preventive maintenance	Advance efficient energy use and conservation	Make possible new products and services	Improve HVAC and appliance management	Present detailed data on usage patterns	Put downward pressure on prices and bills
Demand Response	Enable efficient EV charging	Shift loads and reduce peaks	Improve environmental dispatch	Shift loads and reduce peaks to decrease bills	Foster "set it and forget it" convenience	Supply detailed data on demand response	Put downward pressure on supply costs
Distributed Resources	Integrate variable output generation; storage	Enable smart microgrid operations	Integrate variable output generation; storage	Enable more green power choices	Optimize use of wind and solar	Improve short term forecasting and scheduling	Diversify supply
Distribution Automation	Reduce system losses Improve asset utilization	Enable dynamic optimizing	Improve asset use efficiency		Facilitate smart charging of electric vehicles	Produce disaggregated data for improved asset utilization	Reduce system losses Improve asset use efficiency
Transmission Enhancement	Decrease congestion and line losses	Reduce forced outages Prevent cascading outages	Facilitate integrating wind and solar	Minimize bottlenecks to improve market efficiency	Match loads with output of non-dispatchable generation	Allow better matching of supply and demand	Expand green power portfolio & supply diversity
Information & Communications Integration	Improve forecasting	Manage assets to avoid reliability problems	Integrate weather & air quality data	Broadcast real time prices to induce demand response	Utilize web portals and in-premise displays to communicate with customers	Get the right data to the right people in time to be helpful	Provide accurate price signals Support timely bill settlement
Education and Training for Utility Personnel	Improve employee productivity	Detect problems early to avoid emergencies		Promote new rate offerings to help customers achieve cost savings	Teach customers about load management and demand response	Make sure utility workers are ready to use the best available data	

Sources: Table adapted from *Understanding the Benefits of the Smart Grid*, June 2010, National Energy Technology Laboratory, DOE/NETL-2010/1413, www.netl.doe.gov/smartgrid/, incorporating additional information from Brown, Ashley and Roya Salter, September 2010, *Smart Grid Issues in State Law and Regulation*, Galvin Electricity Initiative, www.galvinpower.org.

Table 2: Who Should Have the Power and Discretion to Make Smart Grid Design and Deployment Decisions? Tentative Answers to Stimulate Dialogue

Major Actors→ ↓Decisions↓	**Commission**	**Utility**	**Residential Consumers**	**C&I Consumers**	**Low-income Consumers**	**Consumer Advocates**	**Smart Grid Vendors**	**Energy service providers**[1]	**Distributed Generators**
Establish the mission(s)	decide	advise	consult	consult	consult	advise	Inform	inform	consult
Need for and design of pilot project(s)	decide	advise	confer	confer	confer	consult	consult	advise	confer
Deployment sequence	decide	propose	confer	confer	confer	consult	consult	advise	advise
Rate offerings	approve	propose	consult	consult	consult	advise		decide	consult
Rate selections		advise	decide	decide	decide	advise		advise	decide
Cost recovery method	direct and approve	propose				advise			
Access to customer data	decide	accept	permit	permit	permit			accept	permit
Monitoring and evaluation plan	approve	advise				advise			
Performance metrics	decide	affirm				advise		advise	
Customer education goals	approve	propose	consult	consult	consult	advise	consult	consult	consult
Proposal scope in terms of service territory or customer base	approve	propose	consult	consult	consult	advise	consult	advise or propose	advise or propose
Proposal scope in terms of smart grid components	approve	propose	consult	consult	consult	advise	advise	advise	advise

[1] The appropriate participatory role for energy service providers can differ, depending on the industry structure in each state. Such parties can include competitive electric service providers and aggregators, non-utility energy efficiency program service providers, and energy service companies (ESCOs).

V. *Public Interest Prerequisites:* What Public Interest Prerequisites Should any Smart Grid Proposal Contain?

A. Intended cost savings: In each major area of smart grid improvements, what tangible benefits will the proposed project produce? How definite and assured are those benefits?

1. Efficiency in distribution utility operations
2. System reliability, including reduced numbers and duration of outages
3. Reductions in fossil fuel use and emissions
4. Enhanced customer choices, including rate offerings to shape customer behavior and load
5. Changes in customer consumption patterns
6. Data collection and information provision to support utility planning
7. Economic development and jobs creation

B. Project Costs: What are the expected costs for each major area of smart grid improvements? How certain are the expectations? Who bears the risks and benefits of cost overruns or savings?

C. Symmetry of burden and benefit, risk and reward: Does the proposal properly allocate costs, risks and benefits among customers, the utility, and third party service providers?

D. Cost recovery: Who gets paid, when, how much and through what mechanisms?

1. What is the plan for utility performance measurement?
2. How is cost recovery associated with utility performance?
3. What are the mechanisms for cost recovery?
4. Cost recovery timing: Is cost recovery timed to align customer bills with customer benefits?

E. Performance metrics: Are there clear performance metrics, with cost recovery connected appropriately to them?

F. Customer education: Does the proposal define customer education goals appropriately, while assigning sufficient resources, talent and accountability necessary to make sure the benefits occur?

G. Customer data: How does the proposal address the tradeoffs between accessing data and protecting privacy?[2]

H. Security: How does the proposal address the tradeoffs between accessibility and security?[3]

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[2] See NRRI Research Paper, *When My Toaster Learns to Talk – Balancing Consumer Privacy with Smart Grid Data Requirements*, in press.

[3] See National Institute of Standards and Technology (NIST), September 2010,

I. Open infrastructure: Does the proposal promote a flexible, nonproprietary, open infrastructure? (NARUC Resolution on Smart Grid, July 2010).

J. Third-party access: Will the systems be open to customer-authorized 3rd parties to provide energy management services? (NARUC Resolution on SG, July 2010).

K. Monitoring and evaluation: Does the proposal provide for rigorous, independent monitoring and evaluation?

VI. *Commission Procedures:* What are the Options for the Scope, Sequencing, and Pacing of Commission Decisionmaking?

A. To what extent should commissions establish principles and expectations in advance, as distinct from reacting to utility proposals?

B. Is an experimental or pilot project needed to determine feasibility or to check whether the smart grid plan is adequate and complete and demonstrate that broader scale implementation will be cost effective?

C. What is the appropriate scope for each project or proposal?

1. Should approvals be sought and received for smaller or larger portions of a utility service territory or customer base?

2. Should approvals be sought and received for smaller or larger groups of smart grid components?

Guidelines for Smart Grid Cyber Security, http://www.nist.gov/smartgrid/.

Baltimore Gas & Electric Company,
Case No. 9208, Order No. 83410 and 83531

- **Company Profile:** Combined gas & electric utility company (T&D-only subsidiary of Constellation Energy), with 1.2 million electric customers, $2.68 billion electric revenues.
- **Preamble: What came before this proposal?** Two summers of pilot programs – testing meters, meter data relay, customer responses to different rate structures and three types of demand-response enabling technology.
- **Scope of proposed project:** Universal smart meter deployment over 3 to 5 years, for both electric and gas customers, and a utility-to-meter-to-premises 2-way communications network. (Order, p. 2).
  - Customer-side systems:
    - $66 million is budgeted for communications and consumer education over a 14-year program life. Approximately $31 million is budgeted during initial deployment.
    - Consumer education is proposed, along with web portal deployment and notifications of Peak Time Rebate opportunities.
    - The Company proposed mandatory TOU rates in its initial application, and then modified its application, following the Commission's June 21, 2010 Order, to offer customers opt-in TOU rates.
- **Intended cost savings:** According to the Company, the cost savings associated with its Smart Grid proposal are "conservatively estimated by BGE to be in excess of $2.6 billion over the life of the project, along with considerable additional benefits to reliability, service quality, and environmental objectives." (July 13, 2009 *Application*, Case No. 9208, pp. 1-2). Some of those additional benefits are said to include: load-shifting due to TOU rates; avoided meter reading costs; improved customer response; enhanced customer service; remote outage detection & faster outage restoration. (June 21, 2010 Order, pp. 22-23).
- **Project cost estimate:** $835 million ($136 million, ~1/6 of project total cost, from DOE ARRA funds).
  - 5-year deployment of full AMI infrastructure: $434 million capital costs, approximately $48 million O&M.
  - Other costs (for communications, information technology, smart energy pricing): $207 million capital, $146 million O&M.
- **Proposed cost recovery mechanism:** Original proposal: By volumetric surcharge,[4] using a prospective tracking mechanism with annual true-ups (Application, pp. 7, 14-16). Modified proposal: 25% through surcharge, pending outcome of a rate case following full AMI deployment. Tracker to collect ~$160 million, net of meter reading cost savings, to cover all program costs except for Peak Time Rebates. After rate case, BGE would recover remaining initial deployment costs and post-deployment costs in base rates.
- **Docket duration: 13 months.** 7/13/09 application. 6/21/10 Order denying application. 7/12/10 application for rehearing. 8/13/10 Order approving modified application.
- **Commission Conclusion:** Modified application approved, "as conditioned by" the Commission Order. (August 13, 2010 Order, pp. 50-51). The conditions include: (1) cost recovery via a regulatory asset account and not a surcharge or tracking mechanism; (2) submission of a comprehensive customer education plan along with "a comprehensive set of metrics by which the Commission may measure the effectiveness of the customer education plan;" and (3) "[BGE] and the other parties shall work together to develop, and submit for the Commission's approval, a comprehensive set of installation, performance, benefits and budgetary metrics that will allow the Commission to assess the progress and performance of the Initiative… ."

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[4] The Company's initial proposal was for a volumetric surcharge for electric customers and a flat surcharge for gas customers. In its modified application, the Company "agreed to recover its tracker on a volumetric basis rather than a flat customer charge." (August 13, 2010 Order, p. 8).

Hawaii Electric Companies,
Docket No. 2008-0303

- **Company Profile:** Three companies, each serving one island: Hawaiian Electric Co. (HECO, on Oahu), Maui Electric Co. (MECO, on Maui); Hawaii Electric Light Co. (HELCO, on the big island); 1,140,000 customers; 9,690 million kWh sales; ~2,500 MW capacity; $2.035 billion revenues.
- **Preamble: What came before this proposal?** 3 AMI pilot projects over 4 years involving close to 4,000 meters and including tests of cellular, WIFI, and BPL meter data collection and communications systems.
  - The Company reports it is presently conducting pilot evaluations of two leading meter data management system (MDMS) software products and is working with multiple suppliers to develop and test such devices as in-premise displays and smart thermostats.
- **Scope of proposed project:** 6-year AMI deployment; 451,000 meters (293,000 in Oahu, 66,000 in Maui, 92,000 in Hawaii).
  - The Companies propose $1.726 million for "Extended Pilot Testing 'to provide a comprehensive test and evaluation process, where applicable performance criteria will be addressed.'" (Order, p. 6).
  - Customer-side systems:
    - The Companies report plans to develop a web portal that will provide customers with "time differentiated electricity consumption" information (Application, p. 25, Exhibits 4, 12, 13).
    - For customers without Internet access, HECO says it is investigating the use of in-premise displays that can communicate directly with the AMI Network or through a Home Area Network (HAN).
- **Intended cost savings:** Direct operational benefits of $25,514,000 for 2010–2015, from: (a) reduction in manual meter reading expense; (b) reduction in field services expenses related to remote disconnect/ reconnect and remote read capabilities; (c) reduced electricity theft; and (d) meter accuracy gains.
  - The Companies identify other benefits, as yet unquantified, including customer and system benefits derived from programs that the AMI system will support or provide a platform for developing (e.g., customer service, demand response, distribution asset utilization and outage management).
- **Project cost:** Total AMI project cost for all 3 companies estimated at $110,364,000 ($97,938,000 implementation costs, $12,426,000 operating costs).
- **Proposed cost recovery mechanism:** Requested preapproval of capital expenditures, deferred cost accounting including AFUDC, 12-year amortization of MDMS costs, cost recovery for remaining book value of existing meters, and for other incremental AMI costs through the Company's existing Renewable Energy Infrastructure Program (REIP) surcharge, or through an AMI surcharge mechanism. (HECO Application, pp. 1-3).
- **Docket duration: 19 months.** Application 12/01/08. Order closing docket 7/26/10.
- **Commission Conclusion: Application denied.** The Commission concludes:

  > [T]he HECO Companies have stated that they are working on Smart Grid Roadmaps. In the commission's view, any new AMI or preferably AMI/smart grid application should include or be preceded by an overall smart grid plan or proposal filed with the commission. (Order, p. 8).

Oklahoma Gas & Electric Company,
Cause No. PUD 201000029, Order No. 576595

- **Company Profile:** 765,000 electric company retail customers in OK and AR; 26.9 million MWh sales; 6,800 MW capacity; $1.75 billion electric revenues.
- **Preamble: What came before this proposal?** *Positive Energy*® Smart Grid pilot program. 6,600 meters. Twenty-five residential customers with "touch-screen information panels and communicating programmable thermostats… ." Also, *Smart Study TOGETHER*™ rates for variable peak pricing (VPP, with customers receiving day-ahead price notices) or time of use (TOU, with customers receiving weekly price notices). Customers can opt to receive their price notices via email, text message, phone message, or all 3 options.
  - Pilot testing continues, with "3,000 Norman [Oklahoma] customers… [in] summer of 2010 and 2011 using in-home devices and/or Internet portals… to get electricity pricing and usage information." (www.oge.com/residential-customers/products-and-services/positive-energy-smart-grid/).
- **Scope of proposed project:** System wide AMI & distribution automation by the end of 2012, including development of a private wide-area network (WAN) using microwave and wireless.
  - Provisions for possible cost sharing with Arkansas. (Order, p. 18).
  - Customer-side systems will include:
    - A web portal available to customers by January 2011.
    - Minimum expenditures of $2.3 million, by Stipulation, on a customer education program about "the best use of the information available on the portal." (Order, p. 14).
    - Monthly home energy reports available for a small fee, but free to low-income heating energy assistance program (LIHEAP) clients and seniors.
    - Residential and commercial June through September variable peak pricing and TOU options.
- **Intended cost savings:** The Company guarantees that its customers will benefit over the next 4 years, through 2013, from a total of approximately $22 million in fixed reductions in its annual revenue requirements. The guaranteed savings include both O&M costs and a reduction of losses due to fraud and theft in the amount of $4 million. (Order, pp. 7-8, 21; Stipulation, Exhibit 1, p. 1**).**
  - The Company estimates ~9% demand-response reductions, from all programs combined, by 2018. (OG&E *2010 Sustainability Report*, p. 9).
- **Project cost:** $366.4 million, capped by Stipulation,[5] over a 3-year deployment period ($127 million, ~35% of project total cost, from DOE ARRA funds).
  - The levelized cost for the average OG&E residential customer is estimated to be $1.94 per month, over the 42-month duration of the Smart Grid Recovery Rider (SGR). (Order, p. 8).
- **Proposed cost recovery mechanism:** Through "SGR" Smart Grid Recovery Rider (until the completion of the Company's 2013 rate case).
  - The Company will establish 3 regulatory assets, for: (1) O&M; (2) stranded meters; and (3) web portal.
- **Docket duration: 3½ months.** 3/15/10 application, 5/27/10 filing of stipulated settlement, 7/1/10 order.

[5] If there are costs in excess of the cap, the Company may seek cost recovery in its 2013 rate case. (Order, p. 17).

- **Commission Conclusion: Approved Joint Stipulation and Settlement Agreement.** The Commission found:

  [T]he Smart Grid Deployment, as described in the Joint Stipulation, is fair, just and reasonable and represents a prudent investment by OG&E and, when constructed and placed in service, will be used and useful to OG&E's customers. (Order, p. 17).

  - Commissioner Dana L. Murphy issued a dissenting opinion. (Order, pp. 20-21). Commissioner Murphy explains, in part:

    In my view, there is simply not enough data and evidence to support **pre-approving** cost recovery of the entire proposal today. As it stands, the request is for the Commission to **pre-approve** more than $220 million of ratepayers' dollars for a project that is, at present, largely unproven. Further, to get the full benefits from *that* investment, it is unknown at this time what significant **additional** expenditures may be needed in the future.

    I believe a more measured approach would be appropriate whereby any pre-approval of costs would be considered on a **limited** basis, in incremental **stages, *after*** OG&E has provided hard data substantiating that the technology works properly, that privacy and security are not compromised, and that the purported savings and benefits are real . While it is true approximately $22 million in savings has been guaranteed by OG&E, no concrete data or guarantees were presented to prove any additional actual savings or benefits will result. Estimates and assertions of benefits and savings associated with the proposed deployment were made, but I believe OG&E should be willing and required to prove by stages that these assertions are reliable and supported by actual, verified, relevant data before OG&E receives ratepayer dollars. (Order, p. 21). [Emphasis in original.]

Table 3: How Well Do Three Recent Smart Grid Proposals Achieve Public Interest Prerequisites?

Company→ ↓Public Interest Prerequisites↓	Baltimore Gas & Electric Co.	Hawaii Electric Companies	Oklahoma Gas & Electric Co.
Intended cost savings	• "[C]onservatively estimated… in excess of $2.6 billion over the life of the project, along with considerable additional benefits to reliability, service quality, and environmental objectives." (7/13/09 Application, pp. 1-2) • Additional unquantified benefits from: load-shifting due to TOU rates; avoided meter reading costs; improved customer response; enhanced customer service; remote outage detection & faster outage restoration. (6/21/10 Order, pp. 22-23)	• $25.5 million over ~6 years, in meter reading, field services, theft recovery, and meter accuracy. (Application, pp. 60-61) • Other "potential to produce significant cost savings in the future, but will also require additional costs and investment to implement." (Application, p. 45)	• The Company "guarantees" to customers approximately $22 million in fixed reductions in its annual revenue requirements, including O&M savings and $4 million in reduced losses due to fraud and theft. (Order, pp. 7-8, 21; Stipulation, Exhibit 1, p. 1) • The Company estimates ~9% demand-response reductions, from all programs combined, by 2018. (OG&E 2010 Sustainability Report, p. 9).
Project costs	• $835 million ($136 million, ~1/6 of project total cost, from ARRA funds).	• Estimated at ~$110 million.	• $366.4 million ($127 million, ~35% of project total cost, from ARRA funds).
Symmetry of burden and benefit, risk and reward	• Like OG&E, BGE will commit to a cap on implementation costs, with the burden to show prudence for any expenditures in excess of the cap. BGE will "guarantee a minimum level of operational savings… $90 million over the 14-year life of the project. (8/13/10 Order, pp. 29-30) • The Commission "expect[s] that BGE will deliver a cost-effective AMI system before cost recovery will be incorporated into rates, and the Company's customers should not be required to pay in full, with a return, if the system does not meet that essential standard." (8/13/10 Order, p. 37)	• Cost recovery approval requested before pilot project completion. (Order, p. 7)	• "[N]o concrete data or guarantees were presented to prove any additional actual savings or benefits will result." (*Separate Opinion of Commissioner Dana L . Murphy*, Order, p. 21)
Cost recovery	• The Commission finds "that a regulatory asset, recovered through base rate cases, provides the Company with an opportunity for recovery of prudently incurred costs, while synchronizing the cost to customers most closely with the onset of benefits." (8/13/10 Order, p. 35)	• Requested preapproval of capital expenditures, deferred cost accounting including AFUDC for MDMS costs, cost recovery for remaining book value of existing meters, and for other incremental AMI costs via surcharge mechanism. (Application, pp. 1-3)	• Through "SGR" Smart Grid Recovery Rider (until the completion of the Company's 2013 rate case), with 3 regulatory assets, for: (1) O&M; (2) stranded meters; and (3) web portal. (Order, p. 17)

Table 3: How Well Do Three Recent Smart Grid Proposals Achieve Public Interest Prerequisites? (continued)

Company→ ↓Public Interest Prerequisites↓	Baltimore Gas & Electric Co.	Hawaii Electric Companies	Oklahoma Gas & Electric Co.
Performance metrics	• To be developed by "the parties… designed to measure the progress of the project and the benefits to ratepayers." (8/13/10 Order, p. 32)	• None clearly identified.	• A Smart Grid web portal shall be available by 1/1/11 to all customers having a smart meter. (Order, p. 17)
Customer education	• BGE will engage a serious customer education effort, subject to a "need [for] further vetting, input and modification." (8/13/10 Order, p. 43) • "BGE's performance… should be measured against specific… metrics." The parties are directed to "develop a comprehensive set of metrics and submit them for [Commission] approval before implementing any consumer education and communications plans. (8/13/10 Order, p. 44)	• Not directly mentioned, other than "…time-of-use rates and customer electricity pricing information that facilitate substantive customer understanding and energy use management." (Application, p. 9) • Assumes AMI "empowers… and enables customers to make smart energy choices… ." (Application, p. 46).	• No less than $2.3 million shall be spend on customer education, "regarding the best use of the information available on the web portal. (Order, p. 17) • In addition, all customers without internet access shall be given the opportunity to receive a monthly Home Energy Report. This report shall be made available, free of charge, to customers eligible for the Company's LIHEAP and/or Senior Citizen program who are without internet service. (Order, p. 17)
Customer data access and privacy	• No explicit plans provided.	• No explicit plans provided.	• No explicit plans provided.
Security	• Privacy and cyber-security are recognized by the Commission as critical issues remaining to be addressed "and… [the Commission] and the parties will need to work through them together carefully." (8/13/10 Order, p. 32) • BGE "shares the industry-wide concern" and plans that all contracts will "include language… to ensure product compliance with security standards and/or best practices, as appropriate." (Butts Testimony, 7/13/09, p. 30)	• No details, but EISA 2007 recognized throughout Application. • "Cyber-security concerns" to be identified and addressed during "extended pilot testing." (Order, p. 6)	• Not discussed. • *Separate Opinion of Commissioner Dana L . Murphy* recommends pre-approval for costs only "***after*** OG&E has provided hard data substantiating… that privacy and security are not compromised… ." (Order, p. 21). [Emphasis in original.]

Table 3: How Well Do Three Recent Smart Grid Proposals Achieve Public Interest Prerequisites? (continued)

Company→ ↓Public Interest Prerequisites↓	Baltimore Gas & Electric Co.	Hawaii Electric Companies	Oklahoma Gas & Electric Co.
Open infrastructure	• Testimony cites the February 21, 2007 NARUC resolution which "supports movement toward an appropriate level of open architecture and interoperability of AMI to enable cost-effective investments, avoid obsolescence, and increase innovations in technology products." (Butts Testimony, 7/13/09, p. 13; Exhibit MDC-1, p. 2) • BGE will "carefully consider" interoperability standards in its vendor selection process. (Butts Testimony, 7/13/09, pp. 30, 33)	• Planned "open architecture" capability for MDMS. (Exhibit 8) • No near-term plans for third-party access. (Exhibit 9)	• Not discussed.
Third party access	• Third party suppliers are mentioned once, for their ability "…to leverage this new [Smart Grid] infra-structure to offer differentiated pricing arrangements." (7/13/09 Application, p. 11) • "Eventually, appliances… may be connected to the Smart Grid using the ZigBee communication chip and may be able to directly respond to high energy prices." (7/13/09 Application, p. 11)	• ZigBee devices contemplated. (Exhibit 13)	• Not discussed.
Monitoring and evaluation	• "[BGE] and the other parties shall work together to develop, and submit for the Commission's approval, a comprehensive set of installation, performance, benefits and budgetary metrics that will allow the Commission to assess the progress and performance of the Initiative… ." (8/13/10 Order, p. 51) • The Commission "direct[s] BGE and the parties to develop, and submit for our approval, a comprehensive set of installation, performance, benefits and budgetary metrics that will allow us and the public to gain a full understanding of whether, and to what extent, this Initiative is being deployed and is working as planned." (8/13/10 Order, p. 48)	• Evaluation by HECO reported as a function of pilot projects. (Application, pp. 18-19) • Evaluation of TOU rates to be completed 1 year after full AMI deployment. (Application, p. 9) • "[T]he utility will submit an annual report to the Commission on the number of customers currently served, number who opted out, customer load response, impact of time-of-use rates on customer's monthly bills and feedback received from customers. (Application, p. 9)	• "OG&E agreed to provide the [Commission] with periodic reports concerning Smart Grid complaints and customer input received." (Order, pp. 8, 15) • "OG&E indicated a willingness to provide the Commission information OG&E provides to the federal government [for the ARRA grant], including the project plan and metrics and benefits reporting plan." (Order, p. 19)